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ASSET OWNERSHIP

AND FEMALE

EMPOWERMENT:

Evidence from a natural experiment in Pakistan

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Abstract

In this study, we exploit a natural experiment to investigate the size and nature of the gender asset gap in Pakistan. In 2010, there was a massive flood, which affected nearly a fifth of the country, and caused a distinct deterioration in socio-economic conditions. Families in floodaffected regions faced a considerable decrease in inheritable property, potentially leading to a scarcity in family assets that could be passed on to the next generation. We use the 2010 floods as a wealth shock to study the impact of decreased household wealth, due to exposure to flooding, on marital asset ownership of women, and subsequently, on female empowerment outcomes. The 2SRI estimation results show that retaining marital assets are associated with a higher status of women in rural Pakistan. Specifically, retaining a higher brideprice leads to an increase in the empowerment of women in the household. We also estimate the association between explicit and implict gender bias. We collect a series of tablet-based Implicit Association Tests (IATs) to show that women with a higher gender bias are also less empowered in household decision-making. The effects of marital assets on implicit gender bias are consistent with those of explicit gender bias. In a country with poor implementation of women's property rights, marital assets are the only property that women possess.

JEL codes: C26; J12; J16; Q54 Keywords: Marital transfers; Brideprice; Decision-making; Domestic violence; Pakistan; Implicit Association Tests; Wealth shock

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I - Introduction

It has been recognised in the literature that women do not share wealth equally as men, even within the same household or family. There exist large inequalities in ownership of land and productive assets between men and women. Not only is there a lower likelihood of women bequeathing land and assets in the first place, it is also often the case that the quality of the assets they possess is lower than those possessed by men (Quisumbing, 2003). If women do own certain assets, they often relinquish the right to exercise the use of the assets (Deere and Doss, 2006; Udry and Haddad, 1995; Udry, 1996).

There is considerable evidence showing the role of gender disparities in wealth being detrimental to women's bargaining power in the household, leading to differential development outcomes (Ambrus et al., 2010a; Breza, 2005; Deere and Doss, 2006; Doss, 2006; Fafchamps, 2002; Quisumbing, 2003). Increased access and ownership of wealth has been shown to improve intergenerational transfers, child development and other indicators of women's autonomy (Behrman, 1988; de Brauw et al., 2014). Moreover, the burden of unequal access to land and resources is not only limited to the household; an estimated 2.5 to 4 percent lower total agricultural output is also attributed to the gender asset gap on the supply side (F.A.O., 2011). The inequalities in land and wealth are constraints that cannot be ignored when aiming at forward-looking and equitable development.

In a patrilineal society such as Pakistan, women are excluded from directly inheriting parental property. In 2011, the Prevention of Anti-Women Practices Act was amended, giving women equal rights in inheriting agricultural land, and making the practice of barring women from inheriting property illegal and punishable with imprisonment. However, data from 2012 shows that over 80 percent women still did not receive their legal share in inheritance (U.N.-Habitat, 2012). Consequently, withholding inheritance on any inheritable land or assets, marital assets are the only "parental inheritance" that a woman will receive in her lifetime, and function as a pre-mortem inheritance (Becker, 1991).

There is extensive literature from Africa and India that has examined the role of asset transfers at the time of marriage on women's empowerment outcomes, but few have studied the relationship in Pakistan's context. This is our first contribution to the existing literature, where our study explores the effects of female marital and parental inheritance on women's empowerment in Pakistan. We exploit a natural experiment, to investigate the size and nature of the gender asset gap in Pakistan.

In 2010, there were massive floods in Pakistan, which affected nearly a fifth of the country, and caused a distinct deterioration in socio-economic conditions for hundreds of thousands of families. The flood claimed the lives of over 1,700 people, and directly affected more than 14 million people, with the destruction of infrastructure and property, such as houses, roads, schools and health facilities estimated to be close to USD 9.7 billion. Since the flooding was much worse in particular regions, this gives heterogeneity in the intensity of physical and financial devastation that was wrought upon our sample households. The damage was most pronounced in the districts of Muzaffargarh and D.G. Khan in Punjab, Nowshera and Charsadda in KPK, and Shikarpur and Sukkar in Sindh, which we the districts where we collected the data in this study (UNOCHA, 2010). Families in flood-effected regions faced a considerable decrease in inheritable property, potentially leading to a scarcity in family assets that could be passed on to the next generation. More importantly, given this paucity, there could be a bias in the transfer of assets against the female members of the family. We exploit the impact of this exogenous decrease in female ownership of assets on spousal and female welfare in general, exploring the channel of reduced female bargaining power particularly. We collect primary data from households that were hit by these floods, and compare their information to those households that are comparable otherwise, but were not impacted (as much) by the floods. The data we collect informs us about the constraints on women's asset ownership, and helps determine the role of female asset ownership and inheritance on women's empowerment and household welfare in Pakistan. Individual level data regarding marital and parental asset transfers, attitudes and practices, along with human capital outcomes, are included in the survey. Further, information on female bargaining proxies, such as mobility, labour force participation, decision making power are also collected. Finally, we also collect data on gender norms using implicit association tests (IATs), a method adopted from the psychology literature. To our knowledge, this is the first study in economics using IAT experiments to measure implicit gender biases in Pakistan. We consider this the second major contribution of our work within the literature of gender norms.

Finally, in an innovative approach to estimate our results, we use the two stage residual inclusion (2SRI) method, from the health literature, to capture the impact of the reduced asset possession on female empowerment. The empowerment itself is captured using a variation of the Women's Empowerment in Agriculture Index (WEAI), proposed by Alkire et al. (2013). The WEAI is specifically designed for capturing the (dis)empowerment of women in rural context, which is the predominant setting for our study.

The results from the 2SRI estimation show that assets received at marriage do improve a woman's household decision-making power. This result is particularly relevant for the marital payment of brideprice It is observed in the data that women's assets are a first resort for consumption-smoothing coping strategies, in order to compensate for losses due to wealth shocks. Moreover, the 2SRI estimation for domestic abuse does not find any protective effects of marital assets. Lastly, individuals that display a higher implicit gender-bias also exhibit a stronger association with explicit measures of gender biases, and do not retain their marital assets.

The remainder of this study is constructed as follows. Section 2 overviews related research and existing evidence. Section 3 describes our unique household survey and the dataset. Section 4 presents the empirical results and section 5 presents the conclusion.

II- Female Asset ownership in Pakistan: Brideprice and Dowry

To highlight the importance of martial asset practices in rural Pakistan, and their effects on empowerment, this section describes the features of the marital practices of brideprice and dowry, as distinguished from those in India, where most of the literature from South Asia is concentrated. The effect of marital transfers on empowerment could be different than that in India due to religious and regional differences.

Haq-e-Mehr, Brideprice, and Dowry

Islamic marriages conducted under Pakistani marital laws generally involve contracts, or *Nikahnamas* which are somewhat similar to pre-nuptial agreements. The marriage is only considered complete with a *Nikahnama* drawn out by a Muslim cleric. Before the marriage is officiated, a formal contract is drawn up, which notes the consent of the couple to marry, and specifies the exact amount of Hag-e-Mahr (dower) to be transferred from the groom to the bride. Both marital parties sign the Nikahnama issued by the union council and each party is supposed to keep a copy. The Nikahnamah requires that the Haq-e-Mahr is mentioned in the contract. Haq-e-Mahr consists of two parts: Moajal (prompt) and Ghair Moajal (deferred). Moajal Haq-e-Mahr is an immediate transfer at the time of marriage from the groom's to the bride's side, while *Ghair Moajal* Haq-e-Mahr is a deferred transfer, promised for payment at the time of divorce or death of the husband. These cannot be renegotiated after the marriage takes place and traditionally would be maintained by the wife. However, under loose property rights, within a patriarchal society, women often lose control over the right of ownership of assets transferred at marriage. Also, the deferred dower payment, for most cases of divorce or death of the husband, is never paid. As reported in the descriptive statistics (Table 2), the total amount of *Haq-e-Mahr* in our sample is very small. Previous studies have also noted this payment is merely a symbolic gesture to fill out a section of the marital contract (Makino, 2019). Besides Haq-e-Mahr, the brides also receive a further transfer from the husband in the form of a customary brideprice (or Bari in traditional terminology). Brideprice typically includes assets and items, such as furniture, jewellery, clothing, and household items, and is a much more significant transfer than the Haq-e-Mahr, which is mostly a smaller monetary transfer (Makino, 2019). Similar to Hag-e-Mahr, the Brideprice is also specified in the Nikahmana before the marriage contract is signed by both parties.

Along with the practice of brideprice, the practice of dowry is also prevalent in Pakistan. In Muslim-majority Pakistan, the word *Jahez* is used to describe dowry, the practice of the transfer of assets from the woman's family to her marital home. In contrast to *Haq-e-Mahr* or *Brideprice*, *Jahez* does not originate from Islamic marital laws and is rather a cultural practice inherited from upper-caste Hindus in India, before the partition of the Indian subcontinent. It is consequently not required to be mentioned in the marriage contract. *Jahez* can be classified into two categories: one comprising household items such as furniture, clothing, electronics, and utensils for the bride to set up a home, and the other comprising items of higher value, for instance jewellery, cash, and, depending on the bride's family financial status, even vehicles and land (Waheed, 2009). As the practice of dowry giving has its origins in predominantly Hindu parts of the Indian sub-continent, this tradition was not strictly observed in predominantly Muslims regions. This is evident from marriage practices of the Khyber Pakhtunkhwa (KP) and Balochistan provinces (predominantly muslim regions pre-partition), where the practice of brideprice is the norm (Makino, 2019). In the remaining two provinces of Punjab and Sindh, the practice of dowry has been observed in rich families as in Indian Punjab, since the late 19th and early 20th centuries (Waheed, 2009).

Brideprice, dowry and household bargaining - Theory and evidence

The practice of brideprice/dowry is criticised in social media and commonly in the social sciences literature, due to the socio-economic costs associated with it, especially those being unequally borne by the women in the relationship. However, within the economics literature that estimates the role of assets in female empowerment, such marital transfers are largely used as a proxy for bargaining power. Especially within the non-cooperative bargaining literature, these are considered as non-labour income sources, which then enters the women's individual utility function and play a role in her empowerment (Ambrus et al., 2010a; Kaye et al., 2005; Mbaye and Wagner, 2017). Other studies show that the practice might not necessarily have an empowering affect, if the marital transfer is not retained by the wife (Chan and Zhang, 1999). Moreover, brideprice also increases the risk of early marriages (Corno et al., 2016; Ashraf et al., 2016). The association between (parental and marital) asset transfers at marriage and female empowerment and wellbeing is still an open question, where the cultural context can alter this association. The existing literature from Pakistan is based on case studies using qualitative data, descriptive studies that use data from the Pakistan Rural Household Survey (PRHS) up to the year 2004, or case studies of Punjab province that only consider dowry (Makino, 2019).

There are two major theories in the literature on the effects of marital transfers on women's empowerment. Gary Becker in "A Treatise on the Family" (1991) proposes two theories for the prevalence of dowry (1) the bequest model and (2) the price model. Becker (1991) proposed that dowry is as a pre-mortem bequest transferred from the bride's parents, which she takes to her marital household, as a compensation for the lack of property rights. Consequently women do not receive an actual inheritance when the parents' assets are being distributed post-mortem. In the Pakistani context, the inheritance laws state that daughters get half of their brother's share of their parents' bequeath. In practice, however, sisters give up their rights to their brothers and do not claim or inherit their family's property despite these legal provisions. Moroever, given the subordinate positioning of women in a patrilineal society, they rarely inherit any lucrative assets from their parents. Also, very few women are inclined to assert their legal right over their parental inheritance. Women's status in their marital homes, especially in the early years, is heavily dependent on social support from male relatives. Women are therefore reluctant to forgo this tremendous social advantage for the sake of any economic gains they may accrue from asserting their claim to the family inheritance (Hussain, 1999). Thus, parents provide their daughters with dowry so that after marriage, they can maintain the same standard of living as in their natal family (Makino, 2019).

The second model is in line with the price model where dowry is the price determined in the marriage market. According to Becker (1991), the person who gains in the marriage, pays the price at the time of marriage. The quality of the bride determines the price (dowry) i.e. a higher quality bride would require a lower dowry, and vice versa. In the case of Pakistan, as per the price model, the higher quality bride would require a higher brideprice from the groom's family. The quality of the bride and the groom is estimated by characteristics considered in the marriage market; socio-economic status, academic achievements, physical attributes, age at marriage, income earning potential (Makino, 2019), and in the Pakistani context, the groom's occupation (men employed in STEM are considered having higher earning prospects) and "prestigious" family name (indicating wealthy feudal background).

Looking at empirical evidence from South Asia, there is a dearth of empirical work on asset transfer at marriage in Pakistan, mostly due to lack of data on intra-household asset allocation. Most of the existing studies in the South Asian context focus on India. Chan (2014) proposes that dowry has a heterogeneous nature and should be decomposed into it two components: A "groomprice", which is not in the wife's control, and a "bequest" dowry, which she is more likely to control. Using data from Karnataka, India, Chan (2014) finds that only a bequest dowry enhances women's status in the marital household. Jejeebhoy and Sathar (2001) find that dowry has empowering effects in only the northern parts of India. Dowry amounts seem to be negatively associated with women's decision-making power in the southern states. Bloch and Rao (2002) and Srinivasan and Bedi (2007) use data from rural India to find a negative association between spousal abuse and dowry. Marital assets also seem to have heterogeneous effects on women's status in other contexts: Zhang and Chan (1999), and Brown (2009) use East Asian datasets and show that dowries have positive effects on several measures of women's welfare, while Suran et al. (2004), using data from rural Bangladesh, find a completely opposite effect. A recent working paper by Anderson et al. (2020) estimates a theoretical model for marital institutions and gender norms in Egypt. Using a household survey, they also find an association between gender norms and dower payments. Overall, there is no general consensus in the empirical literature on the empowering effects of marital assets, as the nature of these assets change depending on the regional and societal context.

The closest research article to our study is the recently published article by Makino (2019) that looks at only Punjab province in Pakistan. The paper addresses endogeneity between dowry to decision making power by adding a rich set of controls (e.g. parents' background) and regional measures (e.g. village-level average of marital payments). This, however, is a method that does not explicitly tackle the endogeneity issue. Therefore, in our study, we not only extend the analysis to other provinces with varying ethnic groups and cultural practices, but also attempt to control for the endogenous relationship between marital assets (both dowry and brideprice) and empowerment by introducing a wealth shock in the form of the 2010 floods. To our knowledge, this is the only study that addresses endogeneity by using a wealth shock in Pakistan. Studies in other regions use famine, war, drought and rainfall data as negative wealth shocks to address endogeneity. Corno and Voena (2016) use rainfall shocks for data on Sub-Saharan Africa, while Chowdhury and Mallick (2015) use the green revolution and the 1971 war to estimate the effect of shocks on dowry in Bangladesh. Others employ changes in marital laws (Ambrus et al., 2010b) and infrastructure improvements (Mobarak et al., 2013) as positive exogenous shocks to marital payments in Bangladesh. Our study contributes to the literature on the effect of shocks on marital payments by adding analysis on Pakistan.

Our main hypothesis is that the flood in 2010 created an exogenous variation in wealthshocks, depleting the family resources at varying levels. Due to the wealth shock, women's assets are expected to be used for consumption-smoothing, especially given how liquid these are in the first place (for e.g. jewellery and cash), compared to other

assets that households can possess (for e.g. land, farming equipment, livestock, etc.). The exogenous loss in marital assets will then negatively impact their empowerment, in the form of lower decision-making power in their marital households. Conversely, women who get to retain their assets, due to lesser damage from the flood, are expected to have better empowerment outcomes in their marital households. In short, we study the impact of an exogenous decrease in household wealth, due to exposure to flooding, on possession of marital assets, and subsequently, on female empowerment outcomes. As this study investigates the channels through which women's inheritance might have an impact on their bargaining power within the household, the data collected focuses on asset ownership and its accessibility to women in the sample. We also estimate the association between explicit and implicit gender biases using a method adopted from psychology. We test the role of implicit gender biases in changing the women's position in the household, leading to, on average, a decreased association with gender-specific roles, namely cooking, cleaning and child care, versus an increased association with roles such as working outside the house, opting for more education or skill formation, and household decision-making. For data on gender norms, we collected responses on a series of Implicit Association Tests (IATs), an experimental method used in the psychology literature. The idea behind the method is that respondents who more easily pair two concepts in a rapid categorisation task associate those concepts more strongly.

III - Data and Empirical strategy

To acquire information on all required variables and outcomes for each household, we surveyed 718 households in three provinces in Pakistan. These households reported their parental inheritances and martial asset ownership, and information for constructing measures of gender norms and roles in the society. Moreover, information on parental background for both the husband and wife, pre-marriage assets, and indicators of women's mobility and decision-making in the household were also collected for the selected households. We also administer a separate questionnaire to measure the impact of the flood and other household shocks, including positive and negative shocks, and coping strategies used to mitigate the effects of each shock.

Recall of assets at the time of marriage can be problematic for the measurement of marital payments received, especially for older women who have been married for many years. However, this is not an issue for our analysis, as larger marital payments are listed within the marriage contracts. Also, marital payments are an important part of the marriage ceremony which are discussed extensively before signing of the contract and have to be agreed on by both parties, as the payments are relatively large. Moreover, larger value brideprice and dowry items such as jewellery have to be worn at the time of the wedding ceremony, and displayed to the wedding guests (Makino, 2019). Consequently, we expect our respondents' data to not suffer from any recall bias related to the important details in their marriage arrangements.

For the selection of our sample areas, we utilise publicly available natural-disasters data at UNOCHA and IFPRI. We used the flood information provided by UNOCHA to select villages that had been worst-hit by flood. We also consulted our survey partners in Pakistan, the National Rural Support Programme (NRSP), on the selection of flooded villages, as they have been previously involved in rehabilitation projects in all provinces. In total, 718 households were interviewed in 60 villages in 6 districts (KP province: Nowshehra and Charsadda districts, Punjab province: Dera Ghazi Khan and Muzaffargarh districts, Sindh province: Shikarpur and Sukkar districts). The survey teams visited ten villages in each district that were affected by floods. Within each village, we selected about 12 households to be interviewed at random. In order to check for migration in or out of the locality, each household was asked about the duration of their residence in the current location. All households have been residing in the same locality before and after the flood. The fieldwork started in January 2019, and was completed in April 2019. The sample from KP province was completed in late January 2019. However, the remaining districts in Punjab and Sindh provinces were completed in April 2019. We experienced a delay of 8 weeks in the data collections due to security issues in Punjab province.¹

Eligible households in our survey are defined as those that were affected by the 2010 flood, have lived in the sample locality before and after the 2010 flood², and have at least one married woman aged 15-65 currently residing in the household.

¹In February 2019, there were border skirmishes between the Indian and Pakistani army, which led to curfews in Punjab province and high security level in rest of the country. Hence, our survey teams had to halt fieldwork until the security situation improved.

²Migration is not a concern in our sample, although some families stayed in IDP camps for a short period. All eventually return to their ancestral homes.

On the basis of the sampling process explained above, we conducted questionnairebased structural interviews using ODK software on Android tablets provided by our survey partners, NRSP. The questionnaire was carefully designed to comprehensively understand marriage practices in rural Punjab, Sindh, and Khyber Pakhtunkhwa (KP) provinces of Pakistan. The questionnaire consists of three parts; the first contains questions on marital transfers received from the woman's own family and her husband's family, while the second has questions on the woman's autonomy and decision-making, along with questions on domestic violence. The third part of the questionnaire contains a detailed section on financial losses due to natural disasters and other wealth shocks. Because the second part contains sensitive questions to assess the wife's status in the marital household, we attempted to maintain the wife's privacy as much as possible, for example, by requesting a separate interview room so that the wife could answer without feeling pressure from other family members present in the house. Before going into the field to conduct interviews, we provided a training session to the enumerator teams, including conducting mock interviews, with a special focus on sensitive questions.

Descriptives

Table 1 presents the descriptive statistics for our dataset created from the sampled households. The top panel presents individual characteristics of our the respondents. About 75 percent of the respondents were women, while the remaining 25 percent are male, who responded to questions about marital transfers to their wives. The average person in our sample is 40 years of age, with less than one year of education in total. 32 percent of the individuals are engaged in some form of employment. The average monthly earning are about Rs. 8000 (USD 50).

The second panel presents the descriptive statistics for household level controls. The average monthly household income is about Rs. 26,000 (USD 170). The average household has about seven individuals currently residing in it, with 25 percent of the households living in a joint-family set-up, which is lower than the 40 percent intergenerational corresidence reported by Esteve and Liu (2018). The average number of children below the age of 5 is less than 1 child in the household. About 23 percent of the women have a father with some schooling, while almost all women have illiterate mothers. *Negative*

shocks and Positive shocks are the monetary values of losses due to all shocks experienced by the household in the last 5 years. The negative shocks include health shocks, job losses, crime, fires, crop losses etc. Positive shocks include profits, bonuses, government/NGO assistance, family transfers, etc. The average value of all negative shocks in the last five years are over Rs. 100,000, while the average positive shock is only above Rs. 5000. We also include village-level geographical controls for distance to the river and elevation, both measured in meters. The average household is less than a kilometer away from the nearest water body and situation at an elevation of 200 meters on average. The average depth of flooding at the village level was over 7 feet (2.1 meters), which is consistent with the official figures reported by OSHA.

The third panel presents the general marital information in our sample. The average person was married at the age of 19, about the same as the country average of 19.5 years (Marphatia et al., 2017). The average age difference between the husband and the wife is about 7 years. The education difference is less than half a year, with the husband having half a year more of schooling than the wife. Endogamy or Baradari marriages are widely practiced in both rural and urban Pakistan. In our sample, about 83 percent of couples are in an endogamous marriage. The most preferred pattern of marriage is between first cousins, with 64 percent marriages (Baradari), in which the bride and groom are from the same natal village, are also widely practiced.³ Lastly, about 30 percent of marriage in which a brother and a sister of one family marry a sister and a brother of another family.⁴

The fourth panel of Table 1 summarises the marital payments received by women in our sample, shown by province. Nearly all women receive either a dowry (92 percent) or a brideprice (93 percent). When broken down by provinces, dowry and brideprice have varying patterns in the provinces. Women in KP are more likely to receive both dowry and brideprice compared to other provinces. In the KP province, about 100 percent

³Previous qualitative studies show that consanguineous marriages are less likely to involve marital transfers. However, there is no general consensus in the quantitative literature on the effects of endogamy on women's status (Dyson and Moore, 1983; Jejeebhoy and Sathar, 2001; Rahman and Rao, 2004).

 $^{^{4}}$ Watta-Satta is more frequent in relatively low-income households, as bride exchange can reduce net marital expenses (Eglar, 1960). Watta-Satta, can also have the same benefits as endogamy, for example, Jacoby and Mansuri (2010) show that Watta-Satta marriages experience fewer marital conflicts, as the two families can make mutual retaliatory threats. However, this practice has been heavily criticised as it does not take into account the couple's opinion in the marriage arrangements.

women have received a brideprice, versus 98 percent receiving a dowry. In Punjab, about 82 percent sample receives a dowry and 83 percent received a brideprice. In Sindh, 98 percent women have received a dowry, while about 96 percent have received a brideprice. The variable *Dowry or Brideprice received* is an indicator of whether the woman received any form of marital payment, a dowry and/or a brideprice. All but 4 women have received some form of marital payment. Existing datasets from representative samples show that about 90 percent women received a marital asset (PRHS, 2001).

The variables *Total Dowry Rs.* and *Total Brideprice Rs.* are the initial endowment of marital transfers received at the time of marriage, measured in Pakistani Rupees. This is calculated by summing up the Rupee value of all items received as a marital transfer. The initial endowment of both dowry and brideprice is about the same, Rs. 50,000 (USD 322), with around Rs. 5500 more given as brideprice on average. When the respondents were asked to provide a monetary value for their marital assets, they were only able to recall the value at the time of marriage, since it is mentioned in the Nikahnama, where the highest-value asset that women received as dowry or brideprice is jewellery. The price of jewellery has fluctuated a lot in the past 10 years and it would be difficult to acquire a proper monetary measure for the amount of jewellery in current possession. Any current valuation would require going into each individual's marriage date, and estimating gold prices for the year or even month of marriage. Due to concerns over any potential measurement issues in the current valuation of marital assets, we opted against using deflated prices of assets, and only ask about the initial endowment of marital assets.

The variables *Dowry possession* and *Brideprice possession* are ordinal measures of the remaining dowry and brideprice, classified into five categories: possessing (1) none, (2) little, (3) half, (4) most, or (5) all of the initial endowment of dowry and brideprice. Nearly 35 percent of both marital assets are retained by the average respondent woman. Unlike in the case of India, dowry is also indeed treated as a parental transfer to the bride herself instead of the groom's family. It is also observed in the data that this is the only form of parental inheritance, given only 16 women in our sample (2.9 percent of the sampled women) received some post-mortem inheritance from their parents. Of these, 6 of the women gave their inheritance up to their brothers. These numbers are consistent with previous numbers on female inheritance in Pakistan (U.N.-Habitat, 2012).

The fifth panel shows the statistics for empowerment measures used in this study. In total, women can make two out of 18 decisions on their own, and almost nine out of 18 decisions together with their spouse. Our preferred empowerment index cut-off of 0.4 shows that about 91 percent women are disempowered in making decisions by self, while 51 are disempowered in making decisions with their partners.⁵ About 19 percent women have experienced physical abuse in the last 12 months, while 45 percent have experienced emotional abuse. These numbers are in line with existing data on domestic violence in Pakistan (Karmaliani et al., 2017). About 54 percent of the respondents have less than favourable attitudes towards domestic violence.⁶

Measuring empowerment - Disempowerment Index

Following Alkire et al. (2013), we generate a variant of the Women's Empowerment in Agriculture Index (WEAI), modifying the five dimensions empowerment (5DE) to fit our context. The WEAI has been designed to make comparisons of women's (dis)empowerment across countries, contexts and time. It is extensively used for measuring women's empowerment in the literature, especially in rural and agricultural settings (Alkire et al., 2013; Malapit et al., 2014). As agency and empowerment are experienced with different tasks and can be described and measured with different domains, Alkire (2007) suggests that most measures of agency and empowerment should be domain-specific. The WEAI is comprised of five domains and ten indicators, which allows the index to be broken down and compared across different dimensions. These include (1) decisions about agricultural production, (2) access to and decision-making power about productive resources, (3) control of use of income, (4) leadership in the community, and (5) time allocation. Our choice of indicators for the index overlaps with the WEAI, although the indicators and weights have been updated to reflect the Pakistani context. The choice of domains, indicators, and thresholds used for measuring (dis)empowerment, and their grounding in the theoretical and empirical literature on gender and household decision-making is explained in detail in this section.

 $^{{}^{5}}$ We also use alternative cut-offs for empowerment - the Alkire measure of 0.2 and a cut-off of 0.6. The disempowerment in decisions made by self is not different than our preferred cut-off. For disempowerment in decisions with spouse, the Alkire cut-off shows that 60 percent women are disempowered.

⁶We asked whether domestic violence is justified in certain scenarios e.g. the wife is negligent towards household chores, argues with the spouse, "disobeys" the spouse or the elderly in the house, etc.

The five domains of empowerment (5DE) in our analysis are measured using 18 indicators with their corresponding weights, to acquire a total score based on all indicators. We use the same term used in the seminal paper by Alkire et al. (2013): the Disempowerment Index. The higher the score in the index, the greater the (dis)empowerment faced by the woman. The construction of the index is summarized in appendix B. These domains and indicators descriptions are provided in Table 3. The 5DE used in our analysis include:

- 1. Decisions regarding children
- 2. Decisions on political participation and labour force participation
- 3. Decisions about fertility and birth control
- 4. Decisions on household expenditures
- 5. Decisions on mobility

Children's Outcomes The first domain in the disempowerment index measures women's decision-making ability regarding children's outcomes. For the domain on inter-generational outcomes, we include five indicators on the woman's ability to make decisions pertaining children in the household. These include decisions regarding children's (1) school attendance, (2) how they should be disciplined, (3) whether girls should be sent to school, (4) son's marriage, and (5) daughter's marriage. According to the literature on children's outcomes, improved decision-making power of the mother has shown to have positive inter-generational effects, with a larger share of budget used on food and on children's education and health (Doss, 2006; Quisumbing and Maluccio, 2003; Udry and Duflo, 2004). As women become more involved in household decision-making, they are also more gender-neutral (Bobonis, 2005; Lundberg et al., 1997; Rubalcava et al., 2009). Evidence also shows that income in the hands of women is associated with increased inter-generational welfare, by means of even increased girl's education (Duflo, 2003; Rubalcava et al., 2009).

Participation Following Narayan (2002), we include a participation domain, which captures key aspects of inclusion and participation in (1) the labour force, and (2) political activities. It is measured at the individual level, because even if opportunities exist for women to exercise leadership within the community, an individual may not

necessarily be able to take advantage of such opportunities — for example, if family members object to her participation in community or in political activities which would require women to spend time outside the house (Ahmad and Khan, 2016). There also exists a vast literature on the effect of labour force participation on their empowerment, and increased bargaining power in the household (Doss, 2006; Quisumbing and Maluccio, 2003; Udry and Duflo, 2004).

Fertility The next domain measures empowerment of women in fertility decisions. The indicators for the fertility domain include decisions on (1) desired fertility, (2)contraceptive use, and (3) type of contraceptive used. Women's empowerment in the literature appears to have positive affects on fertility choices of households. As the opportunity cost of time for women increases (with increased education or labour force participation), it is expected that fertility rate drops, and that income per capita, savings and asset accumulation increase (Dupas and Robinson, 2013; Schuler and Hashemi, 1994). Esteve-Volart (2004) also shows that exclusion of women from the labour market corresponds with lower female-to-male schooling ratios. In the Pakistani context, several studies use women's autonomy on contraception and reproductive choices as an indicator for empowerment (Jejeebhoy, 1995; Jejeebhoy and Sathar, 2001; Khan and Awan, 2011; Sathar and Kazi, 2000; Winkvist and Akhtar, 2000). Moreover, reproductive choices may even be dictated by family members other than the husband. For instance, Sultana et al. (1994) showed that mothers-in-law in Karachi have considerable influence over family planning decisions regarding young couples in the family.

Household expenditure The fourth domain measures women's decision-making power over household expenditures. The indicators included to measure empowerment in expenditure include decisions regarding (1) major consumption expenditures, (2) daily household expenditures, (3) children's education expenditures, (4) children's clothing expenditures, and lastly (5) medical expenditures. There is extensive research from developing countries, which shows that mothers/grandmothers allocated more resources to health and nutrition when they have decision-making power over household spending (Bobonis, 2005; Hoddinott and Haddad, 1995; Rubalcava et al., 2009; Udry and Duflo, 2004). Better nutritional status of mothers is also associated with better child health (Bhagowalia et al., 2015). Cross-country evidence also suggests that improvements in food security are often attributable to improvements in the status of women. Smith et al. (2003) show that gender equity can result in a 13 percent decrease in the number of malnourished children under the age of three. Similarly, Smith and Haddad (2000) find that the education of women alone explained 43 percent of the reduction of child malnutrition in selected developing countries during the period 1970–1995. Studies from Pakistan also find similar results between the status of women and expenditure on nutrition and health. Alderman and Garcia (1996) show that Pakistani households with more educated mothers have a lower incidence of undernourishment in children. Hou (2011) also finds that when Pakistani women have more decision-making power at home, budget shares shift toward their preferred goods, such as children's clothing and education, while children, particularly girls, are more likely to be enrolled in school. Moreover, consistent with the theory that women spend more efficiently on food consumption, there is also evidence that households with more empowered women eat more non-grain food items and consume healthier calories from food items such as fruits and vegetables when women have decision-making power in the households (Hou, 2011).

The last domain relates to mobility, the freedom of movement and the abil-Mobility ity to visit places alone. The indicator of mobility proxies for the agency of the womanto be mobile without seeking permission from others, rather than accessibility to different places. To measure empowerment in mobility, the following questions are considered: (1) visit to own family, (2) visit to in-laws, and (3) visits to friends/neighbours. Mobility gives women increased access to a variety of resources. Many constraints to development, such as women's lack of education, low labour force participation rates, and low rates of entrepreneurship, are linked to restrictions on women's mobility (Ahmad and Khan, 2016). Mason and Smith (2003) demonstrate that women's freedom of movement may be more limited because of social context rather than individual characteristics. Malhotra et al. (2002) also suggest that socio-cultural barriers limit women's freedom of movement and access to resources in comparison to men. Sathar and Kazi (2000) also use mobility as an indicator in their analysis for rural Pakistan and find regional differences within Punjab, suggesting that women from northern parts of the province have greater ease of mobility than those from the south.

Implicit Association Test - Measuring gender-bias

We estimate the implicit gender bias using a measurement tool developed by social psychology called Implicit Association Test (IAT) (Greenwald et al., 1998; Lane et al., 2007). The IAT is an experimental method introduced by Greenwald and Banaji (1995) and Greenwald et al. (1998), based on the idea that respondents who can pair two concepts more quickly in a categorisation task, have a stronger association for those concepts. Slower speed in associating certain pairs denotes mental processes that tend to perceive those pairs as less common. That is, the easier the mental task, the faster the response production and the fewer the errors made in the process. For example, a respondent with a higher gender bias will pair images of men in leadership roles faster than images of women in the same roles.

IATs are used to understand implicit cognitive processes e.g. subconscious perceptions, stereotypes, and biases. In recent years, the economics literature has also used this method to measure correlations between explicit behaviours and implicit biases e.g. racial biases and gender attitudes (e.g. Bertrand et al., 2005; Beaman, 2009; Carlana, 2017; Corno et al., 2019; Lowes et al., 2015). A particularly useful feature of IATs is that these experiments implicitly reveal attitudes that individuals may be uncomfortable disclosing (Corno et al., 2019). Thus, we use IATs in our study, to link subjective biases and perceptions on gender with more objective measures of gender bias. The methodology of calculating the implicit gender bias using the IAT experiment is explained in appendix B.

Empirical Strategy

Our basic model for establishing the impact of marital assets ownership on empowerment outcomes is:

$$Disempowerment_i = \beta_0 + \beta_1 Marital Asset possession_i + \beta_x X_i + \beta_u X_u + V_d + \varepsilon_i$$
 (1)

Our outcome variable, $Disempowerment_i$, defined at the individual level, is a dichotomous variable created using the disempowerment index cut-off i.e. if the disempowerment score is more than or equal to 0.40, the individual is assigned a value of 1, and 0 if their score is below 0.4. A second set of regressions replace $Disempowerment_i$ with measures of incidence of domestic violence and attitudes towards domestic violence. The outcomes are measured for individual i living in village v of district d.

Several observable characteristics at individual and household levels are included in the vector X_i .⁷ Marital Asset possession_i is our measure of marital assets ownership. This is an ordinal measure of how much of a woman's lifetime marital assets she still possesses (including all dowry and brideprice payments), ranking from 1 to 5. In the analysis, the marital assets will be categorised as dowry possession versus brideprice possession, where the former serves more as the parental inheritance (bequest model), while the second serves as transfer from the marital household (price model).

There are several issues with the measurement of marital assets that could bias the estimates on the effects on women's empowerment. First, the lack of data and poor quality of asset measurements: marital assets in the South Asian context include, among other items, cash, jewellery, electrical goods, furniture, clothing, household items, and livestock. Assessing the monetary value of such items at the time of marriage becomes a challenge. Secondly, endogeneity of marital assets would prevent from making causal inference regarding their effects on women's empowerment. For example, according to the price model, the groom's higher education level increases the amount of dowry. Similar to the endogeneity argument in the relationship between the level of education and labour market outcomes, the groom's parents may also increase human capital investment in their son to increase the future amount of dowry they receive (Makino, 2019). While the groom's education is information that we can capture (in the vector X_i), there are other unobserved confounders that simultaneously affect the possession of marital assets and the (dis)empowerment status of the women. These are captured as X_u in basic equation 1. In order to control for this endogeneity, we use the 2010 flood as an instrument for a large exogenous wealth shock.

Finally, district-specific time-invariant unobserved heterogeneity is taken into account by including district fixed effects V_d . ε_i captures the variation in $Disempowerment_i$ that is unexplained by the covariates.

⁷Individual characteristics include age and its squared term, education level, monthly income, work status and marital characteristics, e.g. gaps in education and age with the spouse. Household level controls would include variables on size, structure, and wealth status of the household. We also include additional marital information which would affect women's empowerment e.g. endogamous marriage, initial endowment of marital assets, age at marriage and information on the marital contract.

Our instrumental variable of flooding is defined at the village level (measured in feet of water flooding a sample village), given that it is highly unlikely that two houses in the same village suffered disproportionately from the same flood. The villages are chosen based on the incidence of flood in July 2010, giving us an exogenous variation in the loss of assets as a result. This is natural experiment that can help us exogenously identify the changes in the financial and physical assets of our sample households. At the same time, our instrument of flood level has no direct impact on a woman's empowerment in her marital household. While possession of marital assets can be endogenously related to the position of the woman in the family, this shock was so unprecedented in the sample areas, that this endogeneity is considered insignificant in our study. Moreover, in our sample, the level of asset possession is very low in the first place, where most respondents report that they do not retain much of their original brideprice. Under these circumstances, if all households experienced a shock, this reduces the possession of assets exogenously. In fact when asked about coping strategies due to the flood shock, many reported sale of assets as the main strategy. The most common response after none (40%) are informal borrowing (23%) and sale of assets, including jewelry (19%), followed by NGO assistance (9%), and the rest use up savings (8%). This is also clearly in line with the fact that marital assets are indeed the most liquid options compared to other assets and also something that can easily be carried when fleeing the flood. In view of the above, we consider these assets as exogenous at the time of/after the flood and use the flood as the particularly large wealth shock, which would reduce everyone's asset endowments. This removes the empowerment effect of other factors, as all suffered the wealth shock.

There is also a concern that the location of floods is not exogenous and location-specific geographical characteristics may be correlated with a further host of differences that are linked to female empowerment. This seems to be somewhat less of an issue as the 2010 flooding was of an unprecedented scale and affected many areas that were not usually flood-prone. Our sample villages did not experience any other flood at least 5 years before and after the 2010 flood. In order to strengthen the validity of the flood instrumental variable, we also control for location-specific geographical characteristics that might be correlated with our variable of interest. The villages that were affected by the flood might be inherently different than those that were not affected, e.g. geographical factors such as closeness to the river and elevation. We therefore add measures of distance to

the river from the village, and the village elevation level as geographical controls. These geographic controls should also capture all possible agricultural differences, that might affect female labour force participation and income from agriculture.

The exogenous variation in loss of assets due to the flood shock serves as an instrument in a *two stage residual inclusion* (2SRI) estimation following Terza et al. (2008), where the confounding residuals are taken from the first stage and captured within the second stage of the estimation. Therefore, the first stage establishes the effect of the flood on marital assets, and the second stage then examines the impact of assets on empowerment outcomes, including the predicted unobserved confounders from the first stage.

The first stage uses a ordered probit model to establish whether the instrument is effective in predicting the loss in assets along higher intensities of floods for individual i:

Marital Asset possession_i =
$$\beta_0 + \beta_1 Flood \ depth_v + \beta_x X_i + \beta_u X_u + V_d + \varepsilon_i$$
 (2)

where $Flood \ depth_v$ is the flooding depth level in village v. X_i are the observed exogeneous variables. X_u specifies the unobserved confounding factors and can be effectively calculated as $\beta_u \widehat{X_u} = \beta_1 Flood \ depth_v - Marital \ Asset \ possession_i$.

In the second stage of 2SRI, we substitute the unobserved confounders (X_u) with those predicted in the first stage $(\widehat{X_u})$. The second stage then establishes the impact of the change in asset possession as a result of the flood, on the empowerment of women, while controlling for the unobserved confounders:

$$Disempowerment_i = \beta_0 + \beta_1 \overline{(Marital Asset possession)}_i + \beta_x X_i + \beta_u \widehat{X_u} + V_d + \varepsilon_i \quad (3)$$

The 2SRI estimation is replicated with the incidence and attitudes towards domestic violence and the implicit gender bias IAT measure as dependant variables, as depicted in equation 4 and 5, respectively. Spousal Abuse_i includes several measures of domestic violence: physical abuse (*"if spouse has, in the last year, been physically abusive, i.e. kicked, slapped, threatened with a weapon."*), emotional abuse (*"whether husband has, in the last year, been verbally abusive, stopped from meeting friends/family, or denied money for household expenses"*), and lastly, questions about attitudes towards domestic violence (*"is it justified to beat a woman if she neglects her family, talks back at her*).

husband, ignores her household duties, or leaves the house without informing the husband"). Lastly, $D - Score_{ivd}$ is the IAT score for each individual, which is estimated using the data form the tablet experiment. The D - score is a continuous variable that determines the implicit bias within each individual in the data, where a lower score is considered a strong gender-neutral associativity within the individual.

$$SpousalAbuse_{ivd} = \beta_0 + \beta_1 (\overline{Marital \ Asset \ possession})_{ivd} + \beta_x X_{ivd} + \beta_u \widehat{X_u} + V_d + \varepsilon_i$$
(4)

$$D - Score_{ivd} = \beta_0 + \beta_1 \overline{(Marital Asset possession)}_{ivd} + \beta_x X_{ivd} + \beta_u \widehat{X_u} + V_d + \varepsilon_i$$
(5)

The domestic violence variables are dichotomous- if the response to any one of the physical abuse, emotional abuse, and attitudes question is a "yes", the domestic violence measures are then coded as 1. Individual, household, and marital information controls from the disempowerment regression are also added to the domestic violence estimation. Lastly, the D - score is a continuous variable that determines the implicit bias within each individual in the data, where a lower score is considered a gender-neutral associativity within the individual.

IV - Estimation Results

In this section we present the results for the effects of marital assets on women's empowerment.

We first estimate the effect of marital assets without controlling for endogeneity of the marital assets. Table 3 presents the results for equation 1, where we estimate a naive probit regression for empowerment effects of marital assets. Column 1 shows the effect of marital assets on household decision-making by self. We find no significant effects of marital assets on decision-making by self. Column 2 of Table 3 shows the effect of marital assets, dowry and brideprice possession, on disempowerment in decision making together with spouse. The regression shows no effect of brideprice possession, but dowry seems to increase disempowerment in household decision-making with spouse by 4 percentage points, which is a surprisingly counter-intuitive result. This effect is significant at 1 percent level. Without controlling for endogeneity, we do not find an empowering effect for asset ownership of women. In fact, the naïve estimates show that more dowry possession can in fact increase disempowerment by a small but significant amount.⁸

The naïve probit regression estimates should be interpreted with caution, as asset possession of women likely suffers from endogeneity. In order to control for the endogeneity of asset possession, we use an exogenous shock of flooding in the year 2010. The results of the instrumented assets possession are discussed next.

Table 4 presents the main results for the second stage of the 2SRI regressions of the effects of marital assets on disempowerment of women in our sample. Column 1 and 2 show the second stage regressions for dowry possession, while column 3 and 4 show the second-stage regressions for brideprice possession.⁹ The disempowerment variables are binary measures of empowerment, with column 1 and 3 showing decision-making by self (1 if decision made by self and 0 otherwise), and column 2 and 4 showing decision-making together with husband (1 if decision made together with husband and 0 otherwise). The discussion on the covariates and the variables of interest is presented under.

The 2SRI approach: Flood shock and Marital Asset ownership

The main variables of interest are *Dowry possession* and *Brideprice possession*, which are the ordinal measures of assets currently in possession of the woman. As shown in Table 4, asset ownership does not affect decision-making by self, but it does improve decision-making together with spouse. A higher dowry and brideprice ownership is associated with an increase in empowerment between 28 to 40 percentage points, significant at 10 percent and 5 percent level, respectively. The significance level improves to 1 percent when we cluster the standard errors at the village level. The effect size is rather large, which is expected due to the complier effect captured by an instrumental variable. However, the direction of the effects on decision-making by self (columns 1 and 3) is opposite that of decision-making with spouse, although the coefficients are imprecise. That is, there are no significant effects of marital asset possession on a woman's decision-making by herself, independent from her spouse or in laws. This is not a surprising result in the context of Pakistan, as very few women are making decisions on their own, even if they score high on decision-making with the spouse and have a better

 $^{^{8}}$ The covariates presented in the naive probit regression in Table 3 are in line with the main IV regression. For the sake of brevity, we only discuss covariates presented in Table 4

⁹We estimate separate 2SRI regressions for the two types of marital payments due to overindentification concerns, as we only use a single instrument.

socio-economic background. In a patriarchal setup as rural Pakistan, the main decisionmaker is always a male member of the household, either the woman's father-in-law, spouse, brother-in-law, or her son. Even at high levels of income and education, the woman is highly unlikely to be the main decision-maker in the household. Moreover, in a joint-family setup, there is also *hierarchy* in the decision-makers. Elder members of the family, mothers and fathers in particular, have a significant say in the decisions made within the household. Older women (i.e. the mother-in-law) would have more say in the household than the daughter-in-law (Mason and Smith, 2003). The second-best option to making decisions independently, would be to make decisions together with the spouse. This does not imply that women who make decisions together with other household members are less-empowered, as intrahousehold power structures are complex. The underlying assumption is that joint decision-making refers to equal bargaining power between household members, which is considered the optimal distribution of power (Biswas and Kabir, 2004; Lombardini and Garwood, 2017; Narayan-Parker, 2005).

One concern with the data on measures of empowerment is that men and women can have different responses to questions on household bargaining and decision-making. We rerun the analysis in Table 4 with separate regressions by gender for the 540 female respondents and 118 male respondents. The result are robust for the female sub-sample, where there is only significant effect for disempowerment in decision-making together with the spouse. The male sub-sample loses any significance which we attribute to the small sample size.¹⁰

The first stage is summarised at the bottom of Table 4.¹¹ The instrument used in our analysis, the flood depth measured in feet, is only able to predict reduction in brideprice and not dowry. If flood depth increases by one feet, it leads to a 1 percentage point decrease in brideprice possession. The flood shock does not seem to have an effect on a woman's dowry. Coming to the strength of the instrument, flood depth seems to be a good instrument for only brideprice, where the Wald-test of exogeneity is significant at 5 percent. In conclusion, flooding only has a negative effect on brideprice. As brideprice is given by the husband and his family, it is used as a first resort for consumption-smoothing. Even though legally the wife has to retain her brideprice, she does not have

¹⁰The estimates for the gender sample are not presented as they do not provide any additional insights into the findings.

¹¹The full regression for the first stage of the instrumental variable estimation is presented in appendix Table A1, where we estimate the effect of the flood shock on marital asset ownership.

full control over it, and it is the first asset to be used up in emergencies. As dowry is coming from her own family, she is more likely to retain it and have a better say in its usage.¹² The flood shock did not seem to have a negative effect on dowry. Women in our sample are more likely retain their dowry, as they plan on passing it on to their children for their marriages (usually jewellery). However, if a woman is able to retain most of her brideprice, there is an empowerment effect, which we see from the estimates in the second stage regressions. Therefore, for the remainder of the paper, we will only focus on the brideprice, where the flooding also serves as a good instrument.

The Covariates

The determinants of household empowerment in the 2SRI regression in Table 4 are in line with the existing literature on South Asia. Individual and household controls include gender, age and age-squared of the respondent, years of schooling, age difference with spouse, education difference with spouse, work status, household income, household size, joint-family status, and young children under the age of six years old.

As age of the respondent increases, they are more likely to make decisions together with their spouse. However, this effect turns opposite for elderly women, although the coefficients are too small to draw conclusions on the economic effect. This is in line with previous findings from South Asian countries, which show that age can influence a woman's relative status within the household. Alkire et al. (2013) in their study for Bangladesh find a larger percentage of women empowered in the age group 26–55 years, reflecting disempowerment for younger and elderly women. For Pakistan, Khan and Awan (2011), and Ahmad and Khan (2016) find similar results, where women aged 40–44 years have greater economic decision-making power than younger women. Similarly, Mason and Smith (2003) analyse women's empowerment among married women within the domestic sphere in Pakistan and find that age is positively and significantly correlated with economic decision making, input in family size decisions, and the freedom of movement. Age difference with spouse shows a small positive effect on empowerment, only significant at 10 percent. The magnitude of the effect is too small to be economically significant. Turning to years of schooling, as it improves skills and employability, higher education of women should theoretically translate into higher empowerment. However,

¹²Questions on coping strategies for losses due to flood show that sale of assets (including jewellery) was the main strategy of flood-affected households. Open-ended questions about the use of marital assets also show that respondents either sold their brideprice to cover for losses due to the flood shock, or returned to the husband's family during different occasions.

the empowering effect of education is not so evident in the South Asian context. Aslam et al. (2008) find a negligible effect of education on economic outcomes of women in Pakistan. This is due to the cultural attitudes against women's participation in paid work outside of the home. The authors suggest that while education plays an important role in choices of occupation for men, the effect only begins at higher levels of education for women, that is, after about ten years of schooling. Sraboni et al. (2013) also do not find a conclusive relationship between education levels and empowerment in their analysis of the WEAI for Bangladesh. Our analysis also does not find any significant empowerment effects of women's education. Both the coefficient and the significance level are too small. The education level in our sample is very low in the first place (less than a year of schooling on average). The difference in education with the spouse also shows that a higher education gap leads to lower decision-making power by self. A larger education gap is often associated with larger age and income gap, and early motherhood, which has been shown in the literature to have a disempowering effect (Zhang and Chan, 1999; Nazier and Ramadan, 2016; Carollo et al., 2019)

Household income and household size do not seem to improve women's empowerment. The household income variable is a pooled measure of incomes of all earning members of the household. Other studies on Pakistan have shown that women living in joint families (larger household size) are less empowered (Ahmad and Khan, 2016). Sengupta and Johnson (2006) find similar effects of living in a large joint family on selected indicators of women's empowerment for India. Even in urbanised regions, women living in joint families are less autonomous than women who do not live with their in-laws.

However, women's labour force participation seems to improve their decision-making in the household. Labour force participation improves decision-making by self by 5 percentage points (significant at 10 percent level), but not with with partner (the coefficients are imprecise). In rural Pakistan, few women have economic opportunities outside of agriculture, which is also the case for our sample. Previous studies have shown that women from lower income rural households, who usually work in the farms, have lower restrictions on their mobility, and therefore more engaged in production decision-making in the household. This is in contrast to women from wealthier families who do not work in the fields due to class-based segregation and are also expected to observe stricter gender segregation norms i.e *purdah* (Ahmad and Khan, 2016). Next, we include a set of covariates about the respondent's marriage, which could impact her decision-making ability in her marital household. The marital information includes having a say in her own marriage arrangement, whether the woman has read her Nikahnama (marriage certificate) and also currently possesses it, the amount of Haq-e-Mahr specified in her Nikahnama, conditions imposed on husband in the Nikahnama (right to divorce and paying dower), age at marriage, endogamy (marriage to first cousin, relative, or someone in the community), and finally initial endowment of brideprice (measured in Rupees). The variable Opinion marriage inquires whether the respondent was asked their opinion regarding her marital arrangements. Having a say in arranging own marriage seems to improve empowerment by 7 and 8 percentage points for decisions made by self. The variable lacks precision for decision made with partner, due to very few women responding in the affirmative. The variables Read Nikahnama and Have Nikahnama are indicators of whether the woman has read her own marriage certificate, and whether she possesses it. Even though the law requires that each marriage party reads and signs their own marriage certificate, and also retain one copy, more often than not, the guardian of the bride (male family member) signs the marriage certificate for her. In our data, the wife's copy is usually left behind with her parents, or with the marriage registrars (usually a mosque cleric). Having read their own Nikahnama (or it being read to her in case of illiteracy), increases her decision-making power with spouse, but decreases the decision-making power by self. Possession of Nikahnama does not have a significant effect on decision-making. This could be interpreted as awareness about marital laws and women's rights within the marriage, as the Nikahnama states that the marital assets are legally hers. Only 36 percent of the respondents in our sample are in possession of their marriage certificate. The variable Haq-e-Mahr amount, measured in Rupees, has no significant effect on the woman's empowerment. This is not surprising for our sample, as the average amount Haq-e-Mahr is only Rs. 6000. As discussed earlier, the payment for Haq-e-Mahr is only symbolic and only added to the marriage contract as it is mandatory to fill the form field (Oldenburg, 2002). Next, the variable Condition on husband is a proxy for right to divorce, where the marriage contract stipulates a fine on the husband in case he leaves the wife or takes a second wife. The effect is not significant, as very few women report having conditions imposed on the spouse. Regarding age at marriage, a younger bride does not have a significantly lower decision making power by self, although this effect might be overlapping those from the spousal age difference variable. This is different from other results that find that early marriage is often associated with higher domestic violence, early child-bearing and adverse consequences on female labour force participation and consequently, female empowerment (Cheong et al., 2017; Solanke, 2015; Singh and Anand, 2015).

Next, we include an indicator of endogamy, i.e. how a wife's relation to the husband effects her household decision-making. Endogamy is defined as marriage to a relative, either a first or second cousin, or distant relative. Endogamy does not seem to affect empowerment.

We also include an indicator for intergenerational co-residence, where the woman is currently living with her in-laws in the same household. The effect of living in a joint family is not significant.¹³ We also include monetary values of positive and negative shocks experienced in the last five years. Negative shocks do not seem to effect empowerment, however positive shocks have a small but significant effect on improving decision-making with spouse

Next, the variable Initial endowment - Brideprice is a monetary measures of marital assets/payments received when the woman first got married. We construct this measure by adding up the monetary value of all assets received at the time of marriage. A higher initial amount of dowry leads to slightly higher disempowerment, i.e. a thousand rupees increase in dowry and brideprice decreases decisions made independently by 0.1 percentage points. This relates to the price model, where a higher dowry is indicative of a higher value groom (or a lower value bride). This effectively implies that the 'gap' between the spouse is larger, thereby enhancing the disempowering effect of the woman. We also add a measure for how much marital asset the woman is currently retaining i.e. the initial endowment, reduced by the amount already used up. This is generated using the measure of the current asset possession, and is a continuous measure in rupees. This is a proxy for current endowment of marital assets that is generated from the initial endowment, reduced by how much she possesses now i.e. if she initially had Rs. 50,000, and now only has half, the current endowment is now Rs. 25,000. Women who possess more of their initial dowry are more likely to be empowered, but the effect is not economically significant.

¹³Descriptive statistics show that only 25 percent of the respondents are living together with their in-laws in the same house. This does not imply that there will be no influence of the elderly in-laws on the couple. Even if the couple is living in a separate unit, they are in close vicinity of their in-laws, usually the same block of houses.

Lastly, we include geographical controls to strengthen the validity of our instrument. The measures of elevation and distance to the nearest water body in metres do not show a significant effect on assets and empowerment both in the first or second stage.

Further measures of empowerment - Domestic violence and gender bias IAT experiment:

We replicate the disempowerment regression for the incidence and attitudes towards domestic violence as the dependant variables. Column 1, 2, and 3 of Table 5 presents the second-stage results for the effects of brideprice ownership on the incidence of physical and emotional abuse, and the attitudes towards domestic violence, respectively.¹⁴ The incidence of domestic violence questions were only asked from the female respondents, while the attitudes towards domestic violence questions were asked from all respondents (540 female and 118 male respondents). There is no effect of brideprice ownershipon physical, emotional abuse, or attitudes towards domestic violence. Women respondents report having better attitudes towards domestic violence, where the justification of domestic abuse reduces by 24 percentage points for female respondents.¹⁵

In summary, there is no conclusive evidence of the effects of women's brideprice ownership on domestic violence. The weakness of the results is likely due to under-reporting of domestic violence. Previous literature on domestic violence has shown that there is under-reporting of domestic violence in household surveys. The estimates of domestic violence are then a lower bound of the true effect (Khan and Klasen, 2019)

Column 4 of Table 5 presents the results for equation 5, where we estimate the association of marital assets with another measure of disempowerment in the form of implicit gender bias. The sample size is reduced to only 263 individuals, as the available tablets in some of the local offices of our survey partners had software compatibility issues. Further test results were dropped due to too few iterations to calculate a D-score measure. Due to the reduced sample size, the significance level of the results is reduced to only 10 percent, however the main finding is consistent with the explicit measures of gender bias in Table 4. The dependant variable is the measure of implicit gender bias, the D-score from the IAT experiment. The results are consistent with the estimates of the explicit gender bias in Table 4 using the disempowerment index i.e. women who are in possession of

¹⁴The first stage is the same as the main assets regression, presented in appendix Table A1.

¹⁵We also split the sample of attitudes towards domestic violence by gender, as it is likely that men and women respond differently to questions on domestic violence. The domestic violence attitudes estimates are insignificant, regardless of sample restrictions.

a higher brideprice have a lower implicit gender bias score, by about 10 percent (only significant at 10 percent level). Many of the controls also lose their significance due to a smaller sample size (coefficients not presented).

We also use the IAT D-score to measure the association between implicit and explicit measures of gender bias. Figure 1 shows the OLS estimates for the association between IAT D-score and decision-making.¹⁶ The analysis is repeated for each component of empowerment index, i.e. the number of decisions in the household made for childraising, fertility, mobility, participation, expenditure, and a sum of all decisions. Panel (a) of figure 1 shows the regressions coefficients for number of decisions made by self. Consistent with rest of the analysis in the paper, there are no significant effects for decision-making by self; all except mobility decisions are insignificantly related to gender-bias. A higher gender-bias leads to 16.5 percent more mobility decision-making, although the coefficient is only significant at 10 percent level. This result might seem counter-intuitive at first, but previous work has shown that women from rural households enjoy higher mobility, as they have to work outside of the house. As rural agricultural households in Pakistan are more traditional, they are likely to show a higher gender-bias (Khan and Awan, 2011). The complimentary regressions for decision-making with partner are presented in panel (b) of figure 1. Respondents who have a higher D-score for the IAT by one unit, fertility decisions decrease by 23 percent, while mobility decisions decrease by 12 percent. Overall, the decisions made with partner decrease by 80 percent for individuals with a higher gender bias, although this result is only significant at 10 percent level. We also repeat the analysis for the disempowerment cut-off of 0.4 using a probit analysis. The coefficient on the IAT D-score for decision-making with partner is positive and significant at 5 percent level, i.e. women with a higher gender bias are also disempowered in household decision-making, by 37 percentage points. We do not find any significant association between gender bias and decisions made by self.¹⁷ The remaining controls are in line with existing literature on decision-making, except for labour force participation: women in work make fewer decisions with partner. As this is a naive

¹⁶As the dependant variable in these regressions is merely a measure of the total number of decision made in each indicator, a negative coefficient on the D-score (more gender-biased) implies that women are making fewer decisions and are less-empowered. This should not be confused with the disempowerment index measure in Table 4, where a positive coefficient implies higher disempowerment. Full regressions available on request.

¹⁷Results not presented for the sake of brevity.

OLS regression, the results should be interpreted with caution due to the endogeneity of women's employment.

Robustness checks:

As robustness checks for the preferred 0.4 cut-off and the binary measure of empowerment, we replicate the analysis using (1) the 0.2 cut-off used in Alkire et al. (2013), (2) a 0.6 cut-off of disempowerment, (3) a continuous measure of empowerment, and (4) an unweighted sum of all decisions made by the respondent woman.

According to the Alkire et al. (2013) cut-off, individual is disempowered if his or her inadequacy score is greater than 20%. This is the same as saying that an individual is identified as empowered in 5DE if he or she has adequate achievements in four of the five domains, enjoys adequacy in some combination of the weighted indicators that sum to 80% or more. Similarly, we use a cut-off 0.6 above our preferred cut-off of 0.4, which assigns individuals as disempowered if their inadequacy score is greater than 60 i.e. the individual is empowered in only 2 out of 5 domains. The binary measure of empowerment can lead to a loss of information in decision-making, therefore we also use continuous measures as further robustness checks. The continuous weighted measure is just the sum of the weighted indicators within each domain, without setting an arbitrary cutoff point, which identifies the empowered women. The construction of the weighted sum is summarised in appendix B. Lastly, we use a simple unweighted sum of the total number of decisions the respondent woman can make, out of the 18 decisions summarised in Table 2. This measure does not apply relative weights to indicators within the composite index due to a lack of normative context of what women surveyed experience as the most important characteristic of empowerment. That is, all indicators are considered equally important for the measurement of empowerment. Using an unweighted measure can circumvent any potential biases that might arise due to the choice of weights, as it does not differentiate between certain types of decisions regarding the relevance for women's empowerment, e.g. whether making large unusual expenditures instead of day to day expenditure decisions is more or less empowering.

The coefficients of all robustness checks are summarised in appendix Table A2. Each coefficient presents the variable of interest for a separate regression for the effects of brideprice ownership on different measures of empowerment. The table presents the

second stage estimates at different cut-offs of the disempowerment index, as well as a continuous and unweighted measure. The continuous measure is estimated as a weighted sum of the empowerment indicators, where the value goes from 0 to 1. Unweighted sum is calculated by adding all decisions a woman can make by herself and together with her spouse, summing to 18. The first stage is the same as presented in column 2 of table A1.¹⁸ The results remain robust for different cut-offs above and below our preferred empowerment index cut-off of 0.4, as well as the continuous and the unweighted measure of empowerment. The Alkire method uses a cut-off of 0.2 for the multidimensional disempowerment index. Using the Alkire cut-off, over 60 percent of the women are disempowered in decision-making with the spouse, while our preferred cut-off of 0.4shows about 50 percent of women are disempowered in decision-making with spouse. Decision-making by self are very low for all cut-offs. Only 10 percent of women are empowered in decisions made by self given all cut-offs. The coefficients summarised in Table A2 show that women who possess more brideprice are about 54 percentage points more likely to be empowered. This is in line with the estimates from our preferred cut-off of 0.4, which shows that brideprice possession improves empowerment by 44 percentage points. The continuous measure of the empowerment index is calculated as a weighted sum of total decisions a woman can make in the given categories, and it runs from 0 to 1. As the dependant variable in the regressions for the continuous measure and the unweighted measure are a measure of the total number of decision made in each indicator, a positive coefficient implies that women are making more decisions and are more-empowered. This should not be confused with the disempowerment index measure using the cut-offs, where a positive coefficient implies lower empowerment. The continuous measures gives a similar estimate as the binary measure, where there is an empowerment effect for brideprice possession. i.e. a higher ownership of brideprice leads an improvement in the decision-making power of sampled women by 31 percent. We also replicate the analysis for an unweighted sum of all decisions made by self and with spouse. These are in line with the weighted continuous and binary measures of empowerment, where brideprice seems to have an empowering effect for women who

make 6 more decisions together with their spouses. The first stage for these regressions remains the same as presented in appendix Table A1.

retain their marital assets i.e. women who possess a higher brideprice can on average

¹⁸Full regressions available on request.

These results show that our results are not driven by specification or cut-off selections, as the estimates consistently find that brideprice has an empowering effect.

V - Conclusion

In this paper, we estimate the determinants of marital payments in Pakistan, and whether these payments correlate with the wife's bargaining power in her marital household. We use the 2010 flood as an instrument to conduct a two stage residual inclusion (2SRI) estimation, to determine the effects of this wealth shock on asset possession and subsequently, on women's empowerment. The differential impact of the flood across districts helps tease out the impact of this natural disaster on women's inheritance and empowerment. We also test for associations between implicit and explicit measures of gender bias in our sample households.

Our estimation results show that in rural Pakistan, marital asset possession is associated with a higher status of women in the household. Specifically, retaining a higher brideprice leads to an increase in the empowerment of women, where more women in the sample report joint decision-making with husband in the household. We observe that the flood only had a statistically significant effect on brideprice, implying that these marital assets were indeed used as a consumption-smoothing mechanism in the aftermath of the flood. On the other hand, dowry possession was not found to be affected by the flood. Since these are assets that the woman have inherited from her family, the use and possession of these are largely under her control. It appears that contrary to the literature on dowry in India, the religious context in Pakistan might influence the use of dowry differently. Consequently, the women's (dis)empowerment status is unaffected by the possession of dowry in our study.

From the second set of 2SRI estimation, there appear to be no significant effects of asset possession on the incidence of domestic violence, where we believe there is underreporting of spousal abuse in our sample. Our study also employs a technique from social psychology, gender IATs, to explore the channel of gender norms, and how they influence women's (dis)empowement. Gender unequal associativity amongst the sample also tenders increasing disempowerment, where women might be more willing to choose more traditional roles and the subordinate position in the household. Our study contributes to the literature on women's asset ownership in two major ways. First, it provides empirical evidence on the effect of women's asset ownership in Pakistan, where the overall empirical evidence remains scarce for intrahousehold allocation of resources. We control for endogeneity of marital assets by using a wealth shock, which is previously missing from the literature in Pakistan. Secondly, we try to link explicit measures of gender-bias with implicit attitudes towards gender using the IAT experiment methodology adopted from psychology, which is a new addition to the economics literature.

The marital customs of dowry and brideprice have been an important policy topic in recent years. Although dowry is not legally banned, there are laws restricting the amount paid by the bride's family¹⁹ due its alleged negative consequences (Makino, 2019). Moreover, there are also laws which aim to protect women's parental inheritance and marital payments such as Haq-e-mehr and brideprice.²⁰ However, these laws are rarely implemented in the country and a majority of women are still deprived from their rightful parental and marital inheritances. In order to formulate effective policy for enhancing women's welfare, the effect of marital assets should be examined, as in a country with poor implementation of property rights for women and a weak legal system, a marital transfer might be the only lucrative asset that women receive/retain and act as their only financial source of protection in her marriage.

¹⁹The Dowry and Bridal Gifts (Restriction) Act of 1976, amended in 2016.

²⁰The Prevention of Anti-Women Practices Act of 2011.

	Freq.	Mean	S.D.
Individual characteristics			
Female	718	0.75	0.43
Age	718	39.50	11.90
Years of schooling	718	0.77	1.72
Working	718	0.32	0.47
Earnings	176	Rs.8,007	Rs.15,890
Father literate	718	0.232	0.42
Mother literate	718	0.032	0.17
Household characteristics			
HH Income	718	Rs.26,326	Rs.55,668
Household size	718	6.97	3.20
Children in hh	718	0.585	0.97
Joint family	718	0.25	0.43
Negative shocks	718	Rs.135.056	Rs.566.367
Positive shocks	718	Rs.5.320	Rs.42.512
Flood depth (feet)	718	7.64	3.5
Distance to the river (m)	718	799.2	1498.2
Elevation (m)	718	198.7	200.2
Marital information			
Opinion marriage	718	0.47	0.50
Read Nikahnama	718	0.36	0.48
Have Nikahnama	718	0.36	0.48
Right to divorce	350	0.22	0.41
Mahar amount	718	Rs.6.348	Rs.47.129
Condition husband	718	0.07	0.25
Marriage age	718	19.83	4 85
Age difference	718	7.02	13.87
Education difference	718	0.51	1.56
Endogamy	718	82.9	0.38
Watta Satta Marriage	718	0.29	0.45
Marital Asset		0.20	
Dowry received	718	0.92	0.26
KP	240	0.98	0.14
Punjab	240	0.82	0.39
Sindh	238	0.98	0.14
Total Dowry Rs.	718	Rs.49.801	Rs.169.916
Dowry possession	718	1.65	1.26
Brideprice received	718	0.93	0.26
KP	240	1.00	0.00
Punjab	240	0.83	0.38
Sindh	238	0.96	0.20
Total Brideprice Rs.	718	Rs.55.393	Rs.180.243
Brideprice possession	718	1.7	1.33
Dowry and Brideprice received	718	0.99	0.074
Empowerment measures			
Decision-making - self	718	2.15	4.30
Decision-making with partner	718	8.68	6.87
Disempowerment - by self	718	0.91	0.28
Disempowerment - with spouse	718	0.51	0.50
Physical abuse	540	0.19	0.39
Emotional abuse	540	0.45	0.49
Attitudes towards DV	718	0.54	0.49

TABLE 1: Descriptive Statistics

Domain	Indicator	Weight	Domain weight
Children			0.2
	School attendance	0.025	
	Discipline	0.025	
	Daughter schooling	0.05	
	Son marriage	0.05	
	Daughter marriage	0.05	
Fertility			0.2
	Children number	0.1	
	Birth control use	0.05	
	Birth control type	0.05	
Participation			0.2
	Political participation	0.1	
	Labour force participation	0.1	
Expenditure			0.2
	Consumption	0.05	
	Household	0.05	
	Child education	0.05	
	Child clothing	0.025	
	Medical expenditure	0.025	
Mobility			0.2
	Visit to Family	0.1	
	Visit to In-laws	0.05	
	Visit to Friends	0.05	

TABLE 2: Disempowerment Index - Dimensions and Indicators

Source: Authors' calculations

Disempowerment cut-off	Decisions by Self	Decisions with Partner
Naive estimation		
Brideprice possession	-0.01	-0.01
Endeprice Possession	(0.01)	(0.02)
Dowry possession	0.01	0.05***
	(0.01)	(0.02)
Female	-0.06**	0.09*
	(0.03)	(0.05)
Age	0.01**	-0.02***
8-	(0.00)	(0.00)
Age-squared	-0.00***	0.00***
0 1	(0.00)	(0.00)
Years schooling	0.00	0.00
0	(0.01)	(0.01)
Age difference	0.00	-0.00***
0	(0.00)	(0.00)
Education difference	0.02***	-0.02*
	(0.01)	(0.01)
Children in hh	-0.03**	-0.02
	(0.01)	(0.02)
LFP	-0.05**	0.05
	(0.02)	(0.04)
HH income	-0.00***	0.00*
	(0.00)	(0.00)
HH size	0.01***	-0.00
	(0.00)	(0.01)
Opinion marriage	-0.08***	0.02
	(0.02)	(0.03)
Read nikah	0.05**	-0.26***
	(0.02)	(0.04)
Have nikah	0.00	0.01
	(0.02)	(0.04)
Mahar amount	-0.00**	0.00
	(0.00)	(0.00)
Condition husband	0.03	-0.01
	(0.03)	(0.09)
Marriage age	0.00	0.00
	(0.00)	(0.00)
Endogamy	0.04	-0.00
	(0.02)	(0.04)
Watta Satta	0.02	-0.04
	(0.03)	(0.04)
Mother literature	0.00	0.01
	(0.05)	(0.10)
Father literature	-0.08***	0.08**
-	(0.03)	(0.04)
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1 0	1	

 TABLE 3: Effects of Asset ownership on Women's Disempowerment - Naive estimation

Disempowerment cut-off	Decisions by Self	decisions with Partner
Naive estimation		
Inlaws in HH	0.01	0.02
	(0.03)	(0.04)
Negative shocks	0.00	0.00
	(0.00)	(0.00)
Positive shocks	0.00	-0.00***
	(0.00)	(0.00)
Initial endowment Dowry	0.01^{***}	0.00^{**}
	(0.00)	(0.00)
Initial endowment Brideprice	0.00	0.00
	(0.00)	(0.00)
Current endowment Dowry	-0.00	-0.00**
	(0.01)	(0.00)
Current endowment Brideprice	-0.00	-0.00
	(0.00)	(0.00)
Elevation level	-0.00*	0.00
	(0.00)	(0.00)
Distance to river	-0.00	-0.00
	(0.00)	(0.00)
District FE	\checkmark	\checkmark
Observations	718	718

Notes: Clustered (village-level) standard errors appear below coefficients in parentheses. * = significant at 10%; ** = significant at 5%; *** = significant at 1%

Disompowerment out off	Decisions Solf	w/ Portnor	Decisions Solf	w/ Dortnor
Second stage estimates	Decisions - Den	W/ I al tilei Bridoprico	Decisions - Sen	W/ Tartiler Brideprice
Second-stage estimates	Dowry	Dildeprice	Dowry	Brideprice
Dowry possession	-0.00	-0.28*		
	(0.12)	(0.15)		
Bari possession			-0.06	-0.44***
			(0.11)	(0.16)
resid	0.00	0.31**	0.05	0.41***
	(0.12)	(0.14)	(0.10)	(0.15)
female	-0.06*	0.08	-0.05	0.17***
	(0.03)	(0.06)	(0.04)	(0.06)
age	0.01**	-0.02***	0.01*	-0.02***
~8~	(0.00)	(0.01)	(0, 00)	(0.01)
age?	-0.00***	0.00***	-0.00**	0.00***
ago <u>-</u>		(0,00)	(0,00)	(0,00)
Vears schooling		0.00	0.01	0.01
Tears schooling	(0.01)	(0.00)	(0.01)	(0.01)
Ago difforence		0.00*	(0.01)	0.01)
Age unierence		(0,00)	(0.00)	-0.00
Education difference		(0.00)	(0.00)	(0.00)
Education difference	(0.02^{-1})	-0.02^{-0}	(0.02^{-1})	-0.01
		(0.01)	(0.01)	(0.01)
Children in nn	-0.03	-0.02	-0.03^{++}	-0.02
		(0.02)	(0.01)	(0.02)
LFP	-0.05**	0.04	-0.05**	0.07^{*}
	(0.02)	(0.04)	(0.02)	(0.04)
HH income	-0.00***	0.00	-0.00**	0.00
		(0.00)	(0.00)	(0.00)
HH size	0.02**	0.00	0.02***	0.00
<u> </u>	(0.01)	(0.01)	(0.01)	(0.01)
Opinion marriage	-0.08***	0.01	-0.08***	0.00
	(0.02)	(0.04)	(0.02)	(0.04)
Read nikah	0.05***	-0.27***	0.05*	-0.27***
	(0.02)	(0.04)	(0.03)	(0.04)
Have nikah	0.00	0.01	0.00	-0.01
	(0.02)	(0.04)	(0.03)	(0.04)
Mahar amount	-0.00**	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Condition husband	0.03	0.00	0.03	-0.01
	(0.03)	(0.08)	(0.04)	(0.07)
Marriage age	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
endogamy	0.04	-0.03	0.04	0.00
	(0.02)	(0.05)	(0.03)	(0.04)
Watta Satta	0.02	-0.02	0.02	-0.04
	(0.03)	(0.04)	(0.03)	(0.04)
Mother literature	0.00	-0.01	0.00	0.02
	(0.05)	(0.12)	(0.06)	(0.10)
Father literature	-0.08***	0.06	-0.08***	0.07^{*}
	(0.03)	(0.04)	(0.03)	(0.04)
Inlaws in HH	0.01	-0.01	0.01	0.02
	(0.03)	(0.04)	(0.03)	(0.04)
Negative shocks	0.00	0.00	0.00	0.00
0	(0.00)	(0.00)	(0.00)	(0.00)
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TABLE 4: Effects of Asset ownership on Women's Disempowerment

Disempowerment cut-off	Decisions - Self	w/ Partner	Decisions - Self	w/ Partner
Second-stage estimates	Dowry	Brideprice	Dowry	Brideprice
Positive shocks	0.00	-0.00***	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Initial endowment Dowry	0.01***	0.00^{***}	0.01^{**}	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Initial endowment Brideprice	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Current endowment Dowry	-0.00	-0.01***	-0.00	-0.00
	(0.01)	(0.00)	(0.01)	(0.00)
Current endowment Brideprice	-0.00	-0.00**	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Elevation level	-0.00*	0.00	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Distance to river	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
	,	,	,	,
District FE	✓	\checkmark	\checkmark	\checkmark
Observations	718	718	718	718
First-Stage				
Flood depth	-0.003	-0.003	-0.01***	-0.01***
	(0.003)	(0.003)	(0.003)	(0.003)
Wald-test of exogeneity	1.12	1.12	7.61	7.61
$\text{Prob} > \text{Chi}^2$	0.29	0.29	0.006	0.006

Notes: Clustered (village-level) standard errors appear below coefficients in parentheses. * = significant at 10%; ** = significant at 5%; *** = significant at 1%

Physic Brideprice possession Residual				
Brideprice possession Residual	ical DV	Emotional DV	Attitudes DV	IAT
Residual	-0.12	0.17	-0.11	-0.10*
Residual	(0.19)	(0.18)	(0.18)	(0.05)
	0.12	-0.12	0.10	0.09
	(0.17)	(0.16)	(0.16)	(0.06)
Female			-0.24^{***}	-0.18
			(0.06)	(0.19)
Individual characteristics	\rightarrow	>	>	>
HH characteristics	\rightarrow	>	>	>
Marital information	\rightarrow	>	>	>
Village-level controls	\rightarrow	>	>	>
District FE	>	>	>	>
Observations	540	540	718	263
First-Stage				
Flood depth -0	0.01^{***}	-0.01^{***}	-0.01^{***}	-0.01^{***}
	(0.003)	(0.003)	(0.003)	(0.003)
Wald-test of exogeneity	7.61	7.61	7.61	7.61
$Prob > Chi^2$	0.006	0.006	0.006	0.006

The dependant variable in column 4 is continuous measure of the gender bias D-score estimated from the IAT results. Clustered (village-level) standard errors appear below coefficients, in parentheses. * = significant at 10%; *** = significant at 5%; *** = significant at 1% fects. Note



FIGURE 1: IAT Gender bias

(a) Decisions make by self



(b) Decisions made with partner

Notes: The panels in Figure 1 show regressions coefficients on the number of decisions made in each dimension of empowerment, versus the D-score from the gender-bias IAT for a sample of 263 individuals. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. A higher gender bias (increase in D-score by 1 unit) leads to fewer decisions made together with partner. Full regressions are available on request.

Appendix A

Flood depth -0.01*** 0.00 Female -0.76*** 0.24 (0.18) (0.19) Age -0.00 -0.02 (0.02) (0.02) (0.02) Age-squared -0.00 -0.00 (0.00) (0.00) (0.00) Years schooling -0.06 0.01 (0.01) (0.01) (0.01) Age difference -0.02*** -0.02*** -0.03 0.04 (0.04) Children in hh 0.06 0.06 (0.01) (0.11) (0.13) HH income 0.00 0.00** (0.02) (0.03) (0.13) HH income 0.00 (0.00) Opinion marriage 0.23* 0.11 Haad nikah 0.11 -0.14 (0.13) (0.13) (0.13) Mahar amount (0.00) (0.00) (0.01) (0.01) (0.01) endogany -0.05 0.42*** (0.13	Marital Asset Ownership First stage estimates	Dowry Possession	Brideprice Possession
(0.00) (0.00) Female (0.18) (0.19) Age -0.00 -0.02 (0.02) (0.02) (0.02) Age-squared -0.00 -0.00 (0.00) (0.00) (0.00) Years schooling -0.06 0.01 (0.05) (0.04) (0.04) Age difference -0.02*** -0.02*** (0.01) (0.01) (0.01) Education difference -0.03 0.04 (0.04) (0.04) (0.04) Children in hh 0.06 0.00 1LFP -0.04 0.22 (0.13) (0.13) (0.13) Hi income (0.00) (0.00) (0.02) (0.03) (0.13) Opinion marriage 0.23* 0.11 Have nikah 0.11 -0.14 (0.13) (0.13) (0.13) Marriage age -0.00 0.03*** (0.13) (0.16) (0.16) Mo	Flood depth	-0.01***	-0.00
Female -0.76*** 0.24 Age (0.18) (0.19) Age -0.00 -0.02 (0.02) (0.02) (0.02) Age-squared -0.00 -0.00 (0.03) (0.04) (0.04) Age difference -0.02*** -0.02*** (0.01) (0.01) (0.01) Education difference -0.03 0.04 (0.04) (0.04) (0.04) Children in hh 0.06 0.06 (0.04) (0.13) (0.13) HH income 0.00 0.000 (0.02) (0.03) (0.13) Opinion marriage 0.23* 0.11 (0.13) (0.13) (0.13) Mahar amount 0.00*** 0.00* (0.02) (0.03) (0.13) Mahar amount 0.00*** 0.00* (0.01) (0.01) (0.01) Matriage age -0.00 0.03** (0.01) (0.13) (0.16) </th <th></th> <th>(0.00)</th> <th>(0.00)</th>		(0.00)	(0.00)
(0.18) (0.19) Age -0.00 -0.02 Age-squared -0.00 -0.00 (0.02) (0.00) (0.00) Years schooling -0.06 0.01 (0.01) (0.04) (0.04) Age difference -0.02^{***} -0.02^{***} (0.01) (0.01) (0.01) Children in hh 0.06 (0.06) (0.04) (0.21) (0.14) (0.14) (0.13) (0.13) HH income 0.00 0.00^{**} (0.02) (0.03) (0.13) HH income (0.02) (0.33) (0.13) (0.13) (0.13) HH income (0.03) (0.13) (0.13) (0.13) (0.13) Hariage (0.00) $(0.00^*$ (0.01) (0.01) (0.01) endogamy -0.05 0.42^{**} (0.13) (0.13) (0.14)	Female	-0.76***	0.24
Age 0.00 0.02 Age-squared -0.00 -0.00 (0.00) (0.00) (0.00) Years schooling -0.06 0.01 (0.05) (0.04) (0.04) Age difference -0.02^{***} -0.02^{***} (0.01) (0.01) (0.01) Education difference -0.03 0.04 (0.04) (0.04) (0.04) Children in hh 0.06 0.067 LFP -0.04 0.22 (0.14) (0.13) (0.13) Hincome (0.00) (0.00) (0.02) (0.03) (0.13) Opinion marriage 0.23* 0.11 (0.13) (0.13) (0.13) Have nikah 0.11 -0.14 (0.14) (0.13) (0.13) Gondition husband -0.03 -0.28 (0.01) (0.01) (0.04) endogamy -0.05 0.42*** (0.13) (0.16) <th>Ago</th> <td>(0.18)</td> <td>(0.19) 0.02</td>	Ago	(0.18)	(0.19) 0.02
Age-squared $-0.00'$ $-0.00'$ Years schooling $-0.06'$ 0.01 Age difference -0.02^{***} -0.02^{***} -0.03 0.04 0.01 Education difference -0.03 0.04 (0.01) (0.01) (0.01) Education difference -0.03 0.04 (0.04) (0.06) (0.07) LFP -0.04 0.22 (0.14) (0.13) (0.13) HH income 0.00 0.00^{**} (0.00) (0.00) (0.00) Opinion marriage 0.23^* 0.11 (0.13) (0.13) (0.13) Have nikah 0.111 -0.14 (0.13) (0.13) (0.13) Marriage age -0.00 0.03^* (0.01) (0.01) (0.01) endogamy -0.12 -0.28^* (0.13) (0.16) (0.16) Marriage age -0.00	Age	(0.02)	(0.02)
(0.00) (0.00) (0.00) Age difference -0.02^{***} -0.02^{***} 0.011 (0.01) (0.01) Education difference -0.03 0.04 0.041 (0.04) (0.04) Children in hh 0.066 0.066 (0.04) (0.14) (0.13) HF -0.08^{***} -0.12^{***} (0.02) (0.03) 0.00^{**} (0.14) (0.13) (0.13) HF ize -0.08^{***} -0.12^{***} (0.02) (0.03) (0.13) Opinion marriage (0.23) (0.13) Gonol (0.00) (0.00) Mahar amount (0.13) (0.13) Mahar amount (0.00) (0.00) Codamy -0.03 -0.28 (0.01) (0.01) (0.01) endogamy -0.05 -0.42^{***} (0.13) (0.13) (0.16) Matriage age <	Age-squared	-0.00	-0.00
Years schooling -0.06 0.01 Age difference -0.02*** -0.02*** Image: Construction of the second		(0.00)	(0.00)
Age difference (0.03) (0.04) Education difference (0.01) (0.01) Education difference (0.04) (0.04) Children in hh 0.06 (0.06) Children in hh 0.06 (0.07) LFP -0.04 0.22 (0.14) (0.13) (0.00) HH income (0.00) (0.00) Opinion marriage 0.23^* 0.11 (0.13) (0.13) (0.13) Read nikah 0.11 -0.12^{***} (0.13) (0.13) (0.13) Mahar amount 0.00^{***} 0.00^* (0.00) (0.00) (0.00) Condition husband -0.03 -0.28 (0.13) (0.16) (0.16) Matriage age -0.00 0.03^{***} (0.12) (0.24) (0.22) Matriage age -0.00 0.01 (0.13) (0.16) (0.16) Matriage age	Years schooling	-0.06	0.01
Instruct (0.01) (0.01) Education difference -0.03 0.04 (0.04) (0.04) (0.04) Children in hh 0.06 0.06 (D1) (0.14) (0.13) HH income 0.00 0.00*** (D00) (0.00) (0.00) HH size -0.08*** -0.12*** (D13) (0.13) (0.13) Popinion marriage $(0.23)^*$ (0.13) Read nikah 0.39^{***} 0.26^{**} $(0.00)^*$ $(0.00)^*$ $(0.00)^*$ Mahar amount 0.00^{***} 0.00^* (0.01) (0.01) (0.01) endogamy -0.05 0.42^{***} Matriage age -0.00 0.03^{**} (0.13) (0.16) (0.16) Mother literature 0.33 0.12 (0.39) (0.32) (0.24) Matriage age -0.00 0.03^{**} (0.01) (0.13) (0.16) Mother literature 0.29^{**} $0.39^{$	Age difference	-0.02***	(0.04) -0.02***
Education difference -0.03 0.04 (0.04) (0.04) (0.04) Children in hh 0.06 0.06 (0.06) (0.07) LFP -0.04 0.22 (0.14) (0.13) HH income 0.00 0.00^{**} 0.00 0.00^{**} 0.12^{***} 0.013 (0.13) (0.13) Opinion marriage 0.23^* 0.11 (0.13) (0.13) (0.13) Read nikah 0.39^{***} 0.26^{**} (0.13) (0.13) (0.13) Mahar amount 0.00^{**} 0.00^* 0.001 (0.00) (0.00) Condition husband -0.03 -0.28 (0.13) (0.16) (0.16) Watta Satta -0.12 -0.28^{**} (0.15) (0.14) (0.32) Father literature -0.33 0.12 (0.39) (0.32) (0.32) Fa	lige unicience	(0.01)	(0.01)
(0.04) (0.04) (0.04) Children in hh 0.06 0.06 LFP -0.04 0.22 (0.14) (0.13) HH income 0.00 0.00** (0.00) (0.00) (0.00) HH size -0.08*** -0.12*** (0.13) (0.13) (0.13) Opinion marriage 0.23* 0.11 (0.13) (0.13) (0.13) Read nikah 0.11 -0.14 (0.13) (0.13) (0.13) Mahar amount 0.00*** 0.00* (0.00) (0.00) (0.00) Condition husband -0.03 -0.28 (0.13) (0.13) (0.16) Marriage age -0.00 0.03** (0.01) (0.01) (0.01) endogamy -0.05 0.42*** (0.15) (0.16) Matriage age -0.00 -0.32* (0.15) (0.14) (0.14) Matriage age <td< td=""><th>Education difference</th><td>-0.03</td><td>0.04</td></td<>	Education difference	-0.03	0.04
Children in hi 0.06 0.06 LFP -0.04 0.22 Image: 10.00 0.001 0.000 HH income 0.00 0.000** Image: 10.00 0.000 0.000 HH size -0.08*** -0.12*** Image: 10.00 0.001 0.001 Opinion marriage 0.23* 0.11 Image: 10.13 0.13 0.13 Read nikah 0.39*** 0.26** Image: 10.11 -0.14 0.013 Mara amount 0.00*** 0.00* Image: 10.00 0.001 0.001 Condition husband -0.03 -0.28 Image: 10.00 0.001 0.001 Image: 10.00 0.011 0.011 Image: 10.011 0.011 0.011 Image: 10.022 0.28* 0.02 Image: 10.011 0.011 0.011 Image: 11.1 -0.12 -0.28* Image: 11.1 -0.02 0.033 Image: 12.1		(0.04)	(0.04)
LFP (0.00) (0.01) HH income (0.00) (0.00) HH size -0.08^{***} -0.12^{***} (0.02) (0.03) (0.03) Opinion marriage 0.23^* 0.11 (0.13) (0.13) (0.13) Read nikah 0.39^{***} 0.26^{**} (0.13) (0.13) (0.13) Have nikah 0.11 -0.14 (0.00) (0.00) (0.00) Condition husband -0.03 -0.28 (0.01) (0.01) (0.01) endogamy -0.05 0.42^{***} (0.13) (0.16) (0.13) Matriage age -0.00 0.03^** (0.01) (0.13) (0.16) Matriage age -0.02 0.22^** (0.13) (0.16) 0.12 matriage age -0.00 0.032 Father literature 0.29^{**} 0.39^{***} (0.14) $(0$	Children in hh	0.06	0.06
HH income (0.14) (0.13) HH size -0.08^{***} -0.12^{***} (0.00) (0.00) (0.00) Opinion marriage 0.23^* 0.11 (0.13) (0.13) (0.13) Read nikah 0.39^{***} 0.26^{**} (0.13) (0.13) (0.13) Have nikah 0.11 -0.14 (0.14) (0.13) (0.13) Mahar amount 0.00^{***} 0.00^* (0.00) (0.00) (0.00) Condition husband -0.03 -0.28 (0.22) (0.24) (0.61) endogamy -0.05 0.42^{***} (0.13) (0.16) Matriage age -0.00 0.03^{**} (0.13) (0.16) (0.16) Matriage age -0.00 0.32^{*} (0.13) (0.16) (0.14) Index satta -0.12 -0.28^{*} (0.15) (0.14) <t< td=""><th>LFP</th><td>-0.04</td><td>0.22</td></t<>	LFP	-0.04	0.22
HH income 0.00 0.00^{**} HH size (0.00) (0.00) Opinion marriage 0.23^* 0.11 Opinion marriage 0.23^* 0.11 Read nikah 0.39^{***} 0.26^{**} (0.13) (0.13) (0.13) Have nikah 0.11 -0.14 (0.14) (0.13) (0.13) Mahar amount 0.00^{***} 0.00^* (0.00) (0.00) (0.00) Condition husband -0.03 -0.28 (0.22) (0.24) (0.21) Marriage age -0.00 0.03^{**} (0.13) (0.16) (0.16) Watta Satta -0.12 -0.28^* (0.15) (0.16) (0.16) Mother literature -0.33 0.12 (0.39) (0.32) (0.14) Inlaws in HH 0.04 0.43^{***} (0.00) (0.00) (0.00) Inital endowment Dowry <th></th> <td>(0.14)</td> <td>(0.13)</td>		(0.14)	(0.13)
HH size (0.00) (0.00) HH size -0.08^{***} -0.12^{***} (0.02) (0.03) Opinion marriage 0.23^* 0.11 Read nikah 0.39^{***} 0.26^{**} (0.13) (0.13) (0.13) Have nikah 0.11 -0.14 $(0.00)^*$ $(0.00)^*$ 0.00^* Mahar amount 0.00^{**} 0.00^* (0.00) (0.00) (0.00) Condition husband -0.03 -0.28 Marriage age -0.00 0.33^{**} (0.01) (0.01) (0.01) endogamy -0.12 -0.28^* Matriage age (0.13) (0.16) Watta Satta -0.12 -0.28^* Mother literature 0.29^{**} 0.39^{***} (0.15) (0.14) (0.14) Inlaws in HH 0.04 0.43^{***} (0.00) (0.00) (0.00) Postitve shocks	HH income	0.00	0.00**
Initial endowment Brideprice $-0.08^{-101} - 0.12^{-11}$ (0.02) (0.03) Opinion marriage $(0.23^*$ 0.11 (0.13) (0.13) (0.13) Read nikah 0.39^{***} 0.26^{**} (0.13) (0.13) (0.13) Have nikah 0.11 -0.14 (0.14) (0.13) (0.13) Mahar amount 0.00^{***} 0.00^* (0.00) (0.00) (0.00) Condition husband -0.03 -0.28 (0.22) (0.24) (0.13) marriage age -0.00 0.03^{**} (0.01) (0.01) (0.01) endogamy -0.05 0.42^{***} (0.13) (0.16) 0.42^{***} Matria Satta $-0.12^{-0.28^*}$ (0.13) (0.16) Mother literature -0.33 0.12^{-12} (0.32) (0.32) (0.32) Father literature 0.02^{**} 0.39^{***} (0.01) (0.14) (0.14)	IIII -i	(0.00)	(0.00)
Opinion marriage (0.23^*) (0.11) Read nikah 0.39^{***} 0.26^{**} (0.13) (0.13) (0.13) Have nikah 0.11 -0.14 (0.14) (0.13) Mahar amount 0.00^{***} 0.00^* (0.00) (0.00) (0.00) Condition husband -0.03 -0.28 (0.22) (0.24) (0.01) endogamy -0.05 0.42^{***} (0.01) (0.01) (0.01) endogamy -0.05 0.42^{***} (0.13) (0.16) Watta Satta -0.12 -0.28^* (0.15) (0.16) Mother literature -0.33 0.12 (0.39) (0.32) (0.43^{***}) (0.15) (0.14) (0.14) Inlaws in HH 0.04 0.43^{***} (0.00) (0.00) (0.00) Positive shocks -0.00 -0.00^{***}	HH Size	(0.02)	(0.03)
(0.13) (0.13) (0.13) Read nikah 0.39^{***} 0.26^{**} Have nikah (0.13) (0.13) Have nikah 0.11 -0.14 (0.13) (0.13) Mahar amount 0.00^{***} 0.00^* (0.00) (0.00) (0.00) Condition husband -0.03 -0.28 (0.22) (0.24) Marriage age -0.00 0.33^{**} (0.01) (0.01) (0.01) endogamy -0.55 0.42^{***} (0.13) (0.16) Watta Satta -0.12 -0.28^* (0.15) (0.16) Mother literature 0.29^{**} 0.39^{***} (0.15) (0.14) (0.14) Inlaws in HH 0.04 0.43^{***} (0.00) (0.00) (0.00) Positive shocks -0.00 -0.00^{***} (0.01) (0.01) (0.01) Initial endowment D	Opinion marriage	0.23*	0.11
Read nikah 0.39^{***} 0.26^{**} Have nikah (0.13) (0.13) Mahar amount 0.00^{***} 0.00^* Mahar amount 0.00^{***} 0.00^* Condition husband -0.03 -0.28 (0.22) (0.24) Marriage age -0.00 0.33^{**} (0.01) (0.01) (0.01) endogamy -0.55 0.42^{***} (0.13) (0.16) Watta Satta -0.12 -0.28^* (0.15) (0.16) Mother literature -0.23^* $0.32)$ Father literature 0.29^{**} 0.39^{***} (0.15) (0.14) (0.14) Inlaws in HH 0.04 0.43^{***} (0.00) (0.00) (0.00) Positive shocks -0.00 -0.00^{***} (0.01) (0.01) (0.01) Initial endowment Dowry -0.06^{***} -0.02^{***} (0.01) (0.01) (0.01) Initial endowment Brideprice -0.22^{***}		(0.13)	(0.13)
Have nikah (0.13) (0.13) Mahar amount 0.00^{***} 0.00^* Mahar amount 0.00^{***} 0.00^* Condition husband -0.03 -0.28 Marriage age -0.00 0.03^{**} Marriage age -0.00 0.03^{**} (0.13) (0.16) endogamy -0.05 0.42^{***} (0.13) (0.16) Watta Satta -0.12 -0.28^* (0.15) (0.16) Mother literature -0.33 0.12 (0.39) (0.32) Father literature 0.03^{***} (0.15) (0.14) (0.14) Inlaws in HH 0.04 0.43^{***} (0.00) (0.00) (0.00) Positive shocks -0.00 -0.00^{***} (0.01) (0.01) (0.01) Initial endowment Dowry -0.06^{***} -0.02^{***} (0.01) (0.01) (0.01) Initial endowment Brideprice 0.22^{***} 0.07^{***} (0.01) (0.01) (0.02)	Read nikah	0.39***	0.26**
Initial 0.11 -0.14 Mahar amount (0.14) (0.13) Mahar amount (0.00) (0.00) Condition husband -0.03 -0.28 Marriage age (0.01) (0.01) endogamy -0.05 0.42^{***} Matriage age (0.01) (0.01) endogamy -0.05 0.42^{***} Matriage age (0.13) (0.16) Watta Satta -0.12 -0.28^{*} Mother literature -0.33 0.12 Mother literature 0.29^{**} 0.39^{**} Mariage shocks -0.00 0.04^{***} Mother literature 0.29^{**} 0.39^{**} Mother literature 0.29^{**} 0.39^{**} Mother literature 0.04^{***} 0.04^{***} Mother literature 0.29^{**} 0.39^{***} Inlaws in HH 0.04 0.43^{***} Mother literature 0.00 -0.00^{***} Initial endowment Dowry -0.00 -0.00^{***} Initial endowment Brideprice	Have nikah	(0.13)	(0.13) 0.14
Mahar amount 0.00^{***} 0.00^{*} Mahar amount 0.00^{***} 0.00^{*} Condition husband -0.03 -0.28 Marriage age -0.00 0.03^{**} Marriage age -0.00 0.03^{**} Marriage age -0.05 0.42^{***} Mather and the age of the age	Have mkan	(0.14)	(0.13)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Mahar amount	0.00***	0.00*
Condition husband -0.03 -0.28 Marriage age -0.00 0.3^{**} (0.01) (0.01) endogamy -0.05 0.42^{***} (0.13) (0.16) Watta Satta -0.12 -0.28* (0.15) (0.16) Mother literature -0.33 0.12 Father literature 0.29^{**} 0.39^{***} (0.15) (0.14) Inlaws in HH 0.04 0.43^{***} Negative shocks -0.00 -0.00 Positive shocks -0.00 -0.00 (0.00) (0.00) (0.00) Initial endowment Dowry -0.00 -0.03^{***} (0.01) (0.01) (0.01) Initial endowment Brideprice -0.06^{***} -0.02^{***} (0.01) (0.01) (0.02) Current endowment Brideprice 0.22^{***} 0.07^{***} (0.06) (0.02) 0.02 Elevation level 0.00 0.00 (0.00) (0.00)		(0.00)	(0.00)
Marriage age (0.22) (0.24) Marriage age -0.00 0.3^{3**} (0.01) (0.01) endogamy -0.05 0.42^{***} (0.13) (0.16) Watta Satta -0.12 -0.28^* (0.15) (0.16) Mother literature -0.33 0.12 (0.39) (0.32) Father literature 0.29^{**} 0.39^{***} (0.15) (0.14) Inlaws in HH 0.04 0.43^{***} (0.00) (0.00) (0.00) Positive shocks -0.00 -0.00 (0.00) (0.00) (0.00) Initial endowment Dowry -0.00 -0.03^{***} (0.01) (0.01) (0.01) Initial endowment Brideprice -0.06^{***} -0.02^{***} (0.01) (0.01) (0.02) Current endowment Brideprice 0.22^{***} 0.07^{***} (0.06) (0.02) (0.00)	Condition husband	-0.03	-0.28
Image rege 0.00 0.00 endogamy -0.05 0.42^{***} Watta Satta -0.12 -0.28* Mother literature -0.33 0.12 Father literature 0.39** 0.39*** Mother literature 0.29** 0.39*** Mother literature 0.29** 0.39*** Mother literature 0.04 0.43*** Mother literature 0.29** 0.39*** Mother literature 0.29** 0.39*** Mother literature 0.04 0.43*** Mother literature 0.004 0.43*** Mother literature 0.004 0.43*** Mother literature 0.004 0.43*** Mother literature 0.004 0.43*** Mother literature 0.00 0.00 Positive shocks -0.00 -0.00 Mother literature 0.001 (0.01) Initial endowment Dowry -0.00 -0.02*** Mother literature 0.001 0.05*** Mother literature 0.001 0.00 Current endowment Bridepr	Marriage age	-0.00	(0.24) 0.03**
endogamy -0.05 0.42^{***} Watta Satta -0.12 -0.28^* Mother literature -0.33 0.12 Mother literature 0.39^* 0.32 Father literature 0.29^{**} 0.39^{***} Mother literature 0.04 0.43^{***} Mother literature 0.004 0.43^{***} Mother literature 0.004 0.43^{***} Mother literature 0.004 0.43^{***} Mother literature 0.00 0.00 Positive shocks -0.00 -0.00^{***} Mother literature 0.00 0.001 Initial endowment Dowry 0.01 0.05^{***} Mother literature 0.001 0.02^{**} Mother literature 0.001 0.02^{**}	inannago ago	(0.01)	(0.01)
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	Observations	718	718

Table A1: Effects of Flood on Asset ownership - First stage

Notes: Clustered (village-level) standard errors appear below coefficients in parentheses. *=significant at 10 %; **=significant at 5 %; ***=significant at 1 %

Robustness checks	Decisions by Self	Decisions with Partner
Second-stage estimates		
0.4 Cut-off		
Bari possession	-0.06	-0.44**
	(0.10)	(0.16)
0.2 Cut-off		
Brideprice possession	-0.05	-0.54***
	(0.09)	(0.17)
$0.6 \mathrm{Cut}$ -off		
Brideprice possession	-0.14	-0.35**
	(0.12)	(0.16)
Continuous measure		
Brideprice possession	-0.16	0.31^{***}
	(0.10)	(0.12)
Unweighted sum		
Brideprice possession	0.89	6.11^{***}
	(1.60)	(2.00)
Individual characteristics	✓	\checkmark
HH characteristics	\checkmark	\checkmark
Marital information	\checkmark	\checkmark
Village-level controls	\checkmark	\checkmark
District FE	\checkmark	\checkmark
Observations	718	718
First-Stage		
Flood depth	-0.01***	-0.01***
_	(0.003)	(0.003))
Wald-test of exogeneity	7.61	7.61
$\text{Prob} > \text{Chi}^2$	0.006	0.006

Table A2: Effects of Asset ownership on Women's Disempowerment - Robustness checks

Notes: Each coefficient presents the variable of interest for a separate regression for the effects of brideprice ownership on different measures of empowerment. The table presents the second stage estimates at different cut-off of the disempowerment index, as well as a continuous and unweighted measure. The continuous measure is estimated as a weighted sum of the empowerment indicators, where the value goes from 0 to 1. Unweighted sum is calculated by adding all decisions a woman can make by herself and together with her spouse, summing to 18. The first stage is the same as presented in column 2 of table A1. Clustered (village-level) standard errors appear below coefficients in parentheses. *=significant at 10 % ; **=significant at 5 % ; ***=significant at 1 %

Appendix B

Methodology for calculation the Disempowerment index

We follow the methodology used in Alkire et al. (2013) to calculate the disempowerment index. We further adapt the index to the Pakistani context using the cut-off used in Ahmad and Khan (2016).

Coding Disempowerment Indicators:

The disempowerment index requires an empowerment threshold for each indicator, to dichotomize the information and ranking on each indicator. The indicators' empowerment threshold is given by cut-offs along an ordered ranking. These cut-offs, noted as z_i , are determined such that an individual *i* is considered empowered if their rank in that indicator x_i is below the cut-off, that is, if $x_i < z_i$. The cut-offs of each indicator are coded as two separate binary measures, of whether the woman can make decisions in each indicator (i) by herself or (ii) together with her spouse.

After identifying the indicators and their corresponding cut-offs, the weights for each indicator in the disempowerment index need to be assigned. The sum of all indicator weights equals 1. Since the five dimensions of the disempowerment index are equally weighted, each of them receives a weight of 1/5. The indicators within each dimension are weighted according to their importance in the Pakistani context, given by w_i . For example, visit to family gets a higher weight than visit to the in-laws, as husband would impose fewer restrictions on the woman to visit his family, than her family. Due to patrilocality, the woman will have to make a longer trip to visit her own family than her husband's family. This can lead to potential disagreements with the spouse. Similarly, decisions on children's marriages get a higher weight than decisions on children's schooling, as marriage are a higher-stake decision and usually a larger

expenditure than schooling. The weight assigned to participation is the same as used in previous studies using the WEAI in South Asia.

The disempowerment score of each person is calculated by taking a weighted sum of the empowerment indicators. Based on the whether they are empowered (0) or not (1) in each indicator x_i , the weighted aggregate score for each individual lies between 0 and 1.

Formally:

$$C_i = w_1 I_{1i} + w_{2i} I_{2i} + \dots + w_{di} I_{di}$$

where:

- $I_i = 1$ if an individual is disempowered in indicator i, 0 otherwise.
- $C_i(k)$ is the weighted sum of all indicator, or the disempowerment score of individual i,
- w_i is the weight attached to indicator i with $\sum_{i=1}^d w_i = 1$

The score increases with the number of indicators the individual is found to be disempowered in, and reaches its maximum of 1 when the person is disempowered in all decision-making component indicators. A person who is completely empowered in all indicators receives a score equal to 0.

Identifying the Disempowered: Since each individual can receive a score lying between 0 and 1, a second cut-off is required, in order to identify which individual can be classified as disempowered. Following Ahmad and Khan (2016), a cutoff of 0.40 is used to identify the disempowered women in Pakistan.²¹ This second cut-off is denoted by (k). In this way, a woman is considered disempowered if their empowerment score C_i is equal or greater than the disempowerment cut-off of 0.4. For those whose empowerment score is above 0.4, this value is replaced by 1. For those whose disempowerment score is below the cut-off, this is replaced by 0. That is:

 $C_i > k$, then $C_i(k) = 1$, and

 $C_i \leq k$, then $C_i(k) = 0$

 $^{^{21}\}mathrm{We}$ also use the Alkire cut-off of 0.2 as a robustness check.

We select the disempowerment cut-off of 40 percent, as half of the individuals are labeled as disempowered in decision-making with spouse. For the Alkire cut-off of 0.20, the disempowerment levels were very high and more than 90 percent of the women were disempowered in decision-making by self, and 60 percent in decision-making with spouse. The cut-off of 0.40 means that the individual is empowered in at least three out of the five domains, i.e. an individual is disempowered if their inadequacy score is greater than 40 percent. This is the same as saying that an individual is identified as empowered in 5DE if their adequate achievements in three of the five domains, enjoys adequacy in some combination of the weighted indicators that sum to 60 percent or more.

Methodology for calculation of the implicit gender bias IAT score

Gender-bias IAT methodology:

In the gender-bias IAT used in this study, players are presented two sets of stimuli: images of individuals either in traditional or non-traditional roles, and images of either pleasant or unpleasant objects. Non-traditional roles for women (e.g. police officer) and men (e.g. child care), can be implicitly associated with pleasant images (e.g. sweets) or unpleasant images (e.g. mosquito), depending on each individual. Therefore, if one has a negative implicit view of women taking up what they traditionally consider a male occupation or leadership role, they would sort the image of the policewomen (or other images showing women in leadership roles) to the same side of the screen as the mosquito (or other unpleasant images) quickly, and vice versa. The easier and quicker the sorting of images of women in leadership roles on the side of the unpleasant images, the stronger is the underlying association of women to traditional roles, i.e. a higher implicit gender bias. If there is no underlying association, then sorting women in non-traditional roles with good images should take the same amount of time as sorting women in non-traditional roles and unpleasant images together.

We created templates for the IAT experiment using an open-source platform, *OpenSesame*²², which we uploaded onto Android tablets provided by our local data collection partners, NRSP. Screenshots from the tablet version of IAT stimuli used in this study are presented below in figure B1.

²²OpenSesame is a program to create experiments for psychology, neurosciences, and experimental economics, developed by Mathôt et al. (2012).

D-score Estimation:

The IAT measure of interest is the D-score, which measures the positivity of the implicit association of the target (Greenwald, Nosek, and Banaji 2003; Lane et al. 2007). The D-score is calculated as:

$$D - score = \frac{[Mean(latency^{-ve})Mean(latency^{+ve})]}{SD(latency^{both})}$$

where:

- *Mean*(*latency*^{-ve}) is the recorded average response time for the block in which the male (female) images are paired with unpleasant (pleasant) images.
- Mean(latency^{+ve}) is the average response time for the block in which male (female) images are paired with pleasant (unpleasant) images.
- SD(*latency^{both}*) is the standard deviation of the response time during both blocks.

If the participant is able to sort the various objects more rapidly when the male images is matched with pleasant images, then $Mean(latency^{-ve}) > Mean(latency^{+ve})$ and the D-score is positive. The D-score is increasing in the participant's implicit bias in favour of men, and thus implies a higher gender bias.



Figure B1: IAT Gender bias - Stimuli for gender roles.

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