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Abstract

Numerous studies have documented a relationship between income and wealth of a woman and domestic violence. One such factor that could potentially impact domestic violence is the gold endowment a woman receives at the time of marriage. India presents a unique setting in which to test this relationship as, despite being unlawful, both dowry practices and domestic violence continue to prevail. As actual marital endowments may endogenously affect spousal match quality, I use the deviation of the price of gold at the time of marriage from its long term trend as a source of exogenous variation to proxy for initial marital endowment and examine its effect on domestic violence. Results show a positive and significant effect of an unusually high price of gold at the time of marriage on domestic violence.

Keywords: domestic violence; dowry; intra-household bargaining

JEL Codes: J12, J14 & J16

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1 Introduction

A number of studies have documented the effect of economic independence of women on domestic violence, both in developed and developing countries and have found mixed results. Greater economic independence of the wife may increase her options outside marriage, thereby reducing the risk of domestic violence (Farmer and Tiefenthaler, 1997). A reduction in the male-female wage gap also reduces domestic violence by improving the woman's intra-household bargaining power (Aizer, 2010). An individual's independence can be enhanced through several mechanisms. While the most extensively researched mechanism is through the employment of the woman², the examination of effects of alternative factors that may enhance the bargaining power of women within the household has been relatively limited.

Several recent studies in the context of India have examined the effect of unearned income on domestic violence. Heath and Tan (2014) show that unearned income improves a woman's autonomy within the household and can raise her labour supply. In contrast, Anderson and Genicot (2015) find that property rights for women increase both domestic violence and suicide rates and intensified the preference for having sons (Bhalotra et al., 2018a).

Dowry payments at the time of marriage is one such channel that could potentially have an effect on intra-household bargaining. Dowries in India typically contain elements of two types: assets transferred to the groom or his family (groom price) and

²Although employment does improve the bargaining power of the woman within the household, research shows divergent effects of women's employment on domestic violence in developing countries (Chin, 2012).

assets transferred to the bride (pre-mortem inheritance/endowments/bequests). Early studies in India treated dowry as a groom price paid to the groom or to the groom's parents, a practice which although widespread is illegal. An emerging literature, however, has explored the potential that dowry may be far more complex and may include components that are of a bequest nature (Arunachalam and Logan, 2016; Botticini, 1999). In contrast to groomprice, bequest dowries are endowments to the bride as a form of pre-mortem inheritance. Since groomprice is illegal, systematic research on this issue has proved difficult due to the lack of adequate data on dowry transfers. This picture is further clouded by issues of endogeneity and by the fact that the very division between groomprice and bequest dowries appears less straightforward, given that in practice women tend to retain little or no control over cash dowry (Chan, 2014).

Gold dowry on the other hand, is typically given in the form of jewellery and is likely to stay under the control of the woman (Jejeebhoy and Halli, 2005; Mehrotra, 2004; Srinivasan and Bedi, 2007). This paper establishes the link between women's gold endowment at the time of marriage and domestic violence. India's insatiable appetite for gold jewellery is well known (Patel and Chandavarkar, 2006). I explore the possibility that dowry in India may contain elements that fulfill both; the groomprice motive and the bequest motive. As actual marital endowments may endogenously affect spousal match quality, I use the deviation of the price of gold at the time of marriage from its long term trend as a source of exogenous variation to proxy for initial marital endowment. I hypothesize that the bride's parents respond to a high price of gold at the time of marriage and estimate its effect on domestic violence within the marriage. Since the price of gold is set outside of India, it provides plausibly exogenous variation in the

initial endowment of the bride and groom. I find that a higher price of gold at the time of marriage relative to its long term trend increases the likelihood of domestic violence. A one Indian Rupee per gram increase in the stochastic component of the price of gold at the time of marriage increases the likelihood of domestic violence by 1.6 percentage points. The results remain robust to conditioning on several socio-demographic, temporal and spatial factors.

I do not find evidence of alternative mechanisms that may be driving this effect. Specifically, I use the price of oil at the time of marriage as a placebo test and find no effects of the price of oil on domestic violence. This suggests that the results are not an artefact of general market fluctuations and that the price of gold is of particular significance in the Indian marriage market. I also show that the bride's parents do not respond to a high price of gold by postponing the marriage date and that the effects are not driven by adjustments in marital match characteristics.

The contribution of this paper is both methodological and substantive. Methodologically, by using the price of gold at the time of marriage as a proxy for marital endowments, (i) it circumvents the problem of endogeneity that would arise from using actual marital endowments; (ii) it establishes a causal link between the price of gold at the time of marriage and domestic violence in a limited data availability context. Substantively the study adds to the literature on intra-household bargaining and domestic violence and on dowry motives (Section 2 provides a review) and their effects on the welfare of women by showing that, all things equal, women who were married when the price of gold was high report significantly more violence.

The rest of this paper is organized as follows. Section 2 and Section 3 provide a background on dowry and domestic violence in India respectively. Section 4 describes the data and analytical sample. Section 5 presents a discussion on the potential behavioural responses of the bride's parents to the price of gold in the marriage market and outlines the identification strategy. Section 6 reports the results and Section 7 tackles several robustness checks and tests for alternative explanations. Section 8 discusses potential sample selection and measurement biases in the estimate and Section 9 concludes.

2 Dowry in India

Dowry practices continue to be widespread in spite of being prohibited by law³. Historically, dowry was given as a voluntary gift to the bride. It was viewed as an economic safety net for the bride and the groom or the groom's family had no claims to it, even after the death of the bride⁴ (Bühler, 1964). Chiplunkar and Weaver (2017) provides a detailed historical overview of the evolution of dowries in India and discusses major theories of dowry. At present, the value of the dowry given is linked to the financial capacity of the bride's family and increases with the positive attributes of the prospective groom (Becker, 1991)(Anderson, 2007). It is a non-trivial amount at approximately twice the annual household income of the bride and cash and gold are two of the most prevalent forms of dowry in India, alongside silver, land, car, house or other assets

³The Dowry Prohibition Act, 1961.

⁴*What (was given) before the (nuptial) fire, what (was given) on the bridal procession, what was given in token of (Such Property), as well as a gift subsequent and what was given (to her) by her affectionate husband, shall go to her offspring (even) if she dies in the lifetime of her husband.* - The Laws of Manu (c. 200 AD).

(Chiplunkar and Weaver, 2017).

Recent research into dowry in South Asia has led to two distinct theories of dowry motives: bequest as a pre-mortem inheritance and groomprice as a price that clears the marriage market (Botticini and Siow, 2003). Although scholars have documented an increasing transformation of dowry from bequest to groomprice (Banerjee, 1999; Srinivas, 1984), a dowry basket characteristically contains elements of both. Research has found these different regimes of dowry to have heterogeneous effects on women's welfare (Arunachalam and Logan, 2016). For instance, Bloch and Rao (2002) find that husbands may use violence to extract greater returns from the wife's family in the form of additional groomprice payments and Sekhri and Storeygard (2014) find that husbands use violence as a means to smooth consumption by extracting higher utility from the wife in the face of adverse shocks. On the other hand, bequest dowries may improve the bargaining power of the woman within the household (Suen et al., 2003; Zhang and Chan, 1999) and may thus mitigate domestic violence against women (Brown, 2009; Srinivasan and Bedi, 2007).

Dowry elements with groomprice motives are usually a direct transfer of assets to the groom or the groom's family in the form of cash, land, residential property etc. Bequest dowries are less likely to involve cash-only transfers, as brides have limited control over cash-only transfers. Dowry elements with bequest motives are usually a direct transfer of assets to the bride in the form of property or jewellery. India holds 11% of the world's gold stock, and 75% of this stock is in the form of jewellery (Grubb, 2015; Starr and Tran, 2008). Gold is one of the primary elements of dowry in India

and is almost always given to the bride in the form of jewellery. Studies show that 75% of women in India claimed that their jewellery remained with them after marriage (Basu, 1999). Anthropological evidence suggests that women exercise considerable control over their gold jewellery (Gandhi, 2013; Mehrotra, 2004). Often a woman has her own locked trunk or a locker at a bank in which she stores her jewels (Hershman, 1981). Also, on separation or divorce, a woman is entitled to her bequest dowry by law (Choudhary, 2015).

The existing literature on the effects of dowry on women's welfare in general, and on domestic violence in particular, has mostly assumed a dowry to fulfil one motive or the other; ie. a dowry is either given as a groomprice to the groom or his family or given as a bequest to the bride. In this paper, I allow for a dowry to have elements of both with potentially heterogeneous effects on domestic violence.

3 Background on Domestic Violence

3.1 Externalities and Costs of Domestic Violence

Domestic violence has far-reaching consequences not just for the victim of abuse and for the household, but also for the economy of a country as a whole. The medical, policing and judicial costs due to violence have been quantified in a few developed countries as staggering amounts, from 1.1 billion Canadian Dollars in Canada (Zhang, 2012) to 23 billion British Pounds per annum in Great Britain (Walby, 2004). Over the years, a number of in-depth analyses have been conducted to determine the causes and quantify the effects of domestic violence (Tauchen et al., 1985) (Farmer and Tiefenthaler, 1997)

(Iyengar, 2009). The number of such studies done in developing countries is limited because of the lack of nationally representative data of good quality. This void in the literature is of particular significance as the negative effects of violence is likely to have spillover effects in these countries due to the continued persistence of adverse social and economic conditions. Predictably, the estimated rate of violent death in low and middle income countries is twice that of a high income country (Waters et al., 2004).

3.2 Prevalence and risk factors of domestic violence

Although most societies look down upon gendered violence, the reality in India is that it is often endorsed under the garb of cultural practices, collective norms or religious beliefs. The estimates of the prevalence of domestic violence in itself varies among differing reports, from 17% (Martin et al., 1999) to 41% (Peedicayil et al., 2004). One possible explanation is the non-standardization of survey questions regarding violence in the various reports; differences in the subjective interpretation of violence may also play a role. However, a more likely explanation is the under-reporting of incidences due to the social stigma attached to violence (Kishor and Johnson, 2004) and/or the underestimation of violence itself. The actual prevalence of violence in India is therefore thought by experts to be much higher than reported.

Peedicayil et al. (2004) estimate the prevalence of physical violence and determine the factors associated with violence in India. Overall, 41% of their sample had experienced some form of physical violence. Factors that are associated with the risk of domestic violence include having husbands who consume alcohol, husbands having an affair, husbands accusing the wife of having an extramarital affair and dowry harass-

ment. Other significant risk factors include a husband's low education, a husband's substance abuse, no social support, three or more children and household crowding. Recent studies have also identified financial stress faced by the household as a significant risk factor in determining domestic violence. As India is an agrarian society, local precipitation shocks have also been shown to have an effect on domestic violence: in periods of drought, husbands may attempt to extract more surplus from the wife to smooth their own consumption, thereby increasing domestic violence and dowry deaths (Sekhri and Storeygard, 2014).

4 Data

I use data from the National Family and Health Survey (NFHS 3 and NFHS 4)⁵, India's version of the Demographic Health Survey (IIPS and ICF, 2017). NFHS 3 was fielded between November, 2005 and August, 2006, and is the third of a series of cross-sectional NFHS surveys while NFHS 4 was fielded between January, 2015 and December, 2016. Both surveys are based on a sample of households that is representative both at national and state level. The dataset contains a rich variety of information, including individual and household characteristics, and a domestic violence module.

4.1 Domestic Violence

The aim of this paper is to analyze the effect of the price of gold at the time of marriage on physical violence towards the wife by the husband within the marriage. I focus on

⁵NFHS 1 did not have a domestic violence module. I do not use NFHS 2 as it only has binary records of physical violence which are prone to measurement error as compared to the detailed 7 dimensional questions asked in NFHS 3 and NFHS 4.

physical violence as it is measured in greater detail in the NFHS 3 and NFHS 4 and is recorded more precisely than other forms of violence.

In order to minimize measurement error, one woman was selected at random from each household for the domestic violence module. The module was administered subject to privacy being obtained. The domestic violence module was asked at the end of the interview so that the interviewer had built a rapport with the respondent. Violence in the NFHS 3 and NFHS 4 is measured using the modified Conflict Tactics Scale (CTS) (Straus et al., 1973) using the following set of questions: *(Does/Did) your (last) husband ever do any of the following things to you?*

1. *Slap you?*
2. *Twist your arm or pull your hair?*
3. *Push you, shake you, or throw something at you?*
4. *Punch you with his fist or something that could hurt you?*
5. *Kick you, drag you or beat you up?*
6. *Threaten to attack you with a knife, gun or any other weapon?*
7. *Try to choke you or burn you on purpose?*

Each of the above questions were allowed five responses as follows:

- *Never*
- *Not in the last 12 months*
- *Sometimes during the last 12 months*
- *Often during the last 12 months*

Table 1: Responses to each component of physical violence

Ever been slapped by husband	N	Percent
Never	56,004	76.05
Not in the last 12 months	4,507	6.12
Sometimes in the last 12 months	11,518	15.64
Often during the last 12 months	1,613	2.19
Ever had arm twisted or hair pulled by husband	N	Percent
Never	66,871	90.81
Not in the last 12 months	1,453	1.97
Sometimes in the last 12 months	4,440	6.03
Often during the last 12 months	878	1.19
Ever been pushed, shook or had something thrown by husband	N	Percent
Never	66,161	89.84
Not in the last 12 months	1,669	2.27
Sometimes in the last 12 months	4,905	6.66
Often during the last 12 months	907	1.23
Ever been punched with fist or hit by something harmful by husband	N	Percent
Never	68,911	93.58
Not in the last 12 months	982	1.33
Sometimes in the last 12 months	3,084	4.19
Often during the last 12 months	665	0.9
Ever been kicked or dragged by husband	N	Percent
Never	68,804	93.43
Not in the last 12 months	1,046	1.42
Sometimes in the last 12 months	3,116	4.23
Often during the last 12 months	676	0.92
Ever been threatened with knife/gun or other weapon by husband	N	Percent
Never	73,158	99.34
Not in the last 12 months	93	0.13
Sometimes in the last 12 months	260	0.35
Often during the last 12 months	131	0.18
Ever been strangled or burnt by husband	N	Percent
Never	72,787	98.84
Not in the last 12 months	136	0.18
Sometimes in the last 12 months	493	0.67
Often during the last 12 months	226	0.31
Ever any emotional violence	N	Percent
No	65,403	88.81
Yes	8,239	11.19
Ever any sexual violence	N	Percent
No	68,918	93.59
Yes	4,724	6.41
Total	73,642	100

This table presents the responses of the analytical sample of women to each of the domestic violence components. The first 7 panels present the statistics for physical components of violence while the last 2 panels present the statistics of emotional and sexual violence

The 4 response options to the 7 questions are coded as ordinal variables ranging from 0 to 4 in the order listed above with 0 being *No*. The summary statistics of the responses to each of these questions is provided in the first 7 panels of Table 1.

26.08% of the analytical sample reported having experienced at least one form of physical violence. For my preferred estimation, I define violence as a binary indicator with 1 indicating the presence of any form of violence as this allows us to interpret the results with ease.

I ensure that the results are not sensitive to alternative ways of coding the measure of violence. Firstly, I created an ordinal measure of domestic violence that is equal to the number of kinds of physical violence the respondent is exposed to. This is an index (0, 7) which is 0 if domestic violence does not exist in the household and progressively adds 1 for a non-zero response to each of the 7 questions mentioned above. Table 2 provides the summary statistics of the components of domestic violence of this index. Secondly, given that all 7 questions are eliciting correlated dimensions of physical violence, I use the first component of a polychoric principle component analysis on all of the 4 responses to the 7 dimensions of violence. This first principle component accounts for 81% of the overall variability of domestic violence.

Table 2: Cumulative ordinal index of domestic violence

Cumulative ordinal index of violence	N	Percent
No Violence	54,438	73.92
Ever been slapped by husband	8,775	11.92
Ever been pushed, shook or had something thrown by husband	4,029	5.47
Ever had arm twisted or hair pulled by husband	2,603	3.53
Ever been punched with fist or hit by something harmful by husband	1,633	2.22
Ever been kicked or dragged by husband	1,533	2.08
Ever been threatened with knife/gun or other weapon by husband	458	0.62
Ever been strangled or burnt by husband	173	0.23
Total	73,642	100

4.2 Analytical Sample

The analysis is restricted to ever-married women who were a part of the domestic violence module. In addition, the sample only includes marriages that occurred after 1991 to improve the strength of the identification (See discussion in Section 4.3).

The analysis conditions on various socio-demographic factors that have been previously shown to have an association with domestic violence in the context of India. Table 3 presents the weighted ⁶ means of the socio-demographic variables for the analytical sample in Column 3. The average height of women in the sample is 15.2 metres and is representative of the national average. Woman's height is used as an indicator for her overall stock of health (Strauss and Thomas, 2007) in the estimations. 83% of the sample are from a Hindu households. Other major religions represented in the sample are Muslims at 12% and Christians at 2% . Remaining religions such as Jain, Sikh, Jews etc. are combined into an other religion category, due to low numbers in these categories, who represent 3% of the analytical sample. 25% of the sample of women belong to a high caste and 34% of the household are from urban locations. The DHS constructs a wealth index using a principle component analysis based on information regarding ownership of household items, dwelling characteristics, home construction materials and access to a bank or post office. This score is then divided into population quintiles with each quintile given a rank from 1 (poorest) to 5 (richest). 17% of the analytical sample is from the poorest wealth quintile while 22% are from the richest quintile. 25% of the women do not have any schooling and 24% have more than 10

⁶Domestic violence weights provided in the NFHS are used to account for differential probability of selection into the domestic violence module.

years of schooling. 21% have been married for less than 4 years and 35% of women in the sample have been married for longer than 15 years.

Table 3: Summary statistics of analytical sample by violence reported

Variable	Categories	(1) Mean	(2) Mean-No violence	(3) Mean- Violence	(4) t-test*
Height		15.21 (0.6)	15.26	15.14	0.00
Religion	Hindu	0.83	0.75	0.79	0.00
	Muslim	0.12	0.10	0.10	0.63
	Christian	0.02	0.09	0.07	0.00
	Other Religions	0.03	0.06	0.04	0.00
Caste	Schedule Caste	0.20	0.16	0.23	0.00
	Schedule Tribe	0.09	0.17	0.17	0.69
	Other Backward Caste	0.46	0.36	0.40	0.00
	High Caste	0.25	0.30	0.20	0.00
Location of household	Urban	0.34	0.38	0.32	0.00
	Rural	0.66	0.62	0.68	0.00
Wealth quintile	Poorest	0.17	0.12	0.24	0.00
	Poorer	0.19	0.16	0.23	0.00
	Middle	0.20	0.20	0.21	0.00
	Richer	0.21	0.23	0.20	0.00
	Richest	0.22	0.29	0.12	0.00
Years of schooling	No Schooling	0.25	0.21	0.35	0.00
	< 5 years	0.13	0.13	0.18	0.00
	6 - 10 years	0.38	0.40	0.35	0.00
	> 10 years	0.24	0.27	0.11	0.00
Years of marriage	< 4 years	0.21	0.26	0.15	0.00
	5 - 9 years	0.23	0.28	0.28	0.99
	10 - 14 years	0.21	0.26	0.30	0.00
	> 15 years	0.35	0.21	0.26	0.00
N		73,642	54,438	19,204	

Means weighted by survey weights to account for differential probability of selection into domestic violence module.

*p-value of a t-test of unequal means

Standard deviation reported in parenthesis.

Columns 2 and 3 presents the means of the socio-demographic variables by whether any form of physical violence was reported or not respectively. The p-values of a t-test of unequal means between these groups, presented in Column 4 show that, as expected, almost all these characteristics are significantly different between women who report violence and women who do not. On average, respondents who report violence are shorter from lower castes, from rural households, have less education and are from lower wealth quintiles.

4.3 Price of Gold

The identification strategy used in this paper is similar to that used by Bhalotra et al. (2018b) to estimate the effect of dowry burden on son-preferring behaviours in India where the authors find that anticipated dowry costs proxied by a gold price hike in 1980 causes sex selective abortions.

I speculate that a high price of gold at the time of marriage reduces the share of gold jewellery in the dowry basket. This reduces the value of assets the bride has direct control over, and in turn exposes her to a higher risk of domestic violence by reducing her bargaining power within the marriage. Since there exist no data that observe gold dowry amounts⁷, I am unable to formally test this hypothesis at the individual level. Nonetheless gold demand statistics in India seem to justify this assumption. Firstly, the demand for gold in India is higher during the traditional wedding months from September through January (Wood and Wachman, 2010)(Jadhav, 2015). Thus, in spite of wealth accumulation for the purpose of dowry from birth of the daughter, families do purchase gold at the time of marriage with an approximate purchase of 20 to 2000 grams per wedding (Bhandari, 2013)(Afonso, 2014). Secondly, the demand for gold is highly responsive to changes in its relative price (Patel and Chandavarkar, 2006). This means that at any point in time and even during the marriage-driven, high-demand months of September to January, the amount of gold purchased is lower when the price of gold is high (Ghosal, 2015).

⁷Rural Economic and Demographic Survey (REDS), Indian Human Development Survey (IHDS) and Survey of Women and Fertility (SWAF) all have questions that elicit some measures of dowry such as perceptions of average payments, cash value of transfers made at time of marriage, whether gold was part of dowry (yes/no). To my knowledge, none of these surveys have actual amounts of gold dowry given.

India imports 92% of its gold demand. The price of gold is determined by the London Price Fix twice a day and is external to the country. The national demand for gold in India is then determined through the interplay of this international gold price, share prices (rate of return on alternative financial assets), GDP, the exchange rate and rate of household financial savings (Vaidyanathan, 1999). I use data on the monthly price of gold in Indian Rupees (INR) per gram from the World Gold Council. So, although there is no spatial variation in the instrument as the price of gold is set outside India, there is considerable temporal variation for identification with 297 data points (January, 1992 to September, 2016).

Post-independence India had a closed economy characterized by a desire for self-sufficiency. Rigid control of gold sales and taxation led to an extensive black market of gold through smuggling. Thus, gold prices within the country were not determined through previously mentioned global market forces, but by local market forces (Vaidyanathan, 1999). In 1991, on the verge of bankruptcy, India's economy changed drastically when it adopted more liberal economic policies. Due of this structural break, the estimation is restricted to women who were married post 1991, after which we would expect the world price of gold to be a more accurate measure of the Indian price of gold ⁸.

⁸Re-estimating the results on the sample of women who were married before 1991 shows that the price of gold at month of marriage does not have a significant effect on domestic violence in marriages that occurred before 1991.

5 Identification

5.1 Marriage Market Equilibrium

95% of marriages in India are arranged by the parents of the prospective bride and groom well in advance of the actual marriage (Rubio, 2014). A potential bride and groom are matched according to individual characteristics such as age, education and wealth and household characteristics such as caste or religion. I assume that the search for a match is costless and that these characteristics are observable by both; the bride's family and the groom's family.

In a marriage arranged by the parents of the prospective spouses, dowry is thought of as the price that clears the marriage market (Becker, 1991). In equilibrium, a woman of quality q_w will match with a man of quality q_m conditional on match characteristics and a dowry payment such that this is the match with the highest possible utility. D is the dowry basket which contains X_w which is the amount of gold given to the woman as a bequest. Assume a model where the utility of the match and the dowry value is determined at the time the match is fixed as:

$$U(q_w, q_m) = u(q_w, q_m) + D \quad (1)$$

Subsequently, when the marriage occurs, the bride's family faces the following constraint:

$$D = pX_w + Y_m \leq S + pG \quad (2)$$

Y_m which is the amount of cash given to the man as groomprice. S is the savings

and G is the stock of gold of the brides parents at the time the match is fixed ⁹. This is the budget constraint subject to which the dowry basket and therefore the marital match is determined. p is the price of gold at the time of marriage.

Figure 1 shows the trade off between cash and gold in the dowry basket. P_1 is the initial price of gold at the time the match is fixed. Subsequently, assume that the parents of the bride face a higher price, P_2 at the time of marriage. For parents who are already holding some amount of gold, Equation (2) implies that this is a positive wealth shock.

- **Case 1:** X_w is fixed in quantity and Y_m is fixed

If cash amount Y_m is also fixed, parents stay at point A in Figure 1. A change in the price of gold would have no effect on the composition of the dowry basket.

- **Case 2:** X_w is fixed in quantity and Y_m is flexible

Parents would move to point C in Figure 1 such that the amount of gold in the dowry basket remains the same. A change in the price of gold will not change the amount of gold the bride receives. The value of the gold the woman receives will be higher.

- **Case 3:** X_w is fixed in value and Y_m is fixed

If the specific gold amount X_w of the dowry basket has not been fixed, this allows bride's parents to respond to a change in the price of gold such that:

$$pX_w = \alpha D$$

$$Y_m = (1 - \alpha)D \quad \text{and} \quad 0 \leq \alpha \leq 1$$

⁹There is evidence (Anukriti et al., 2016) that parents save over the life course of the daughter and so it is necessary to account for the gold stock in the family. Using an exogenous shift in an anti-dowry law in India, Alfano (2017) also show that the differential pecuniary costs of sons and daughters have an effect on parents fertility decisions.

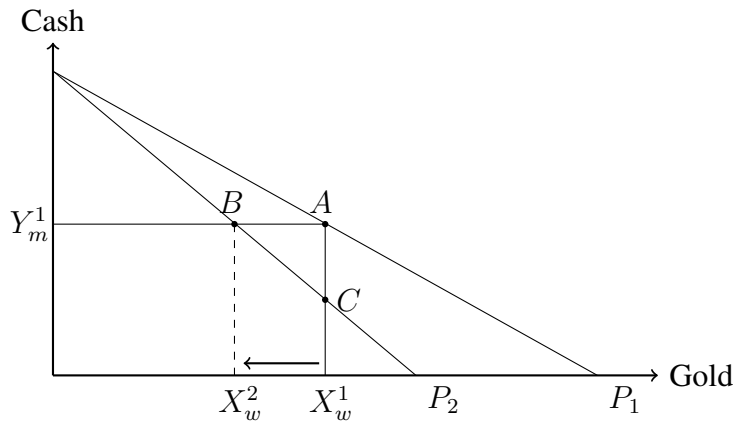
where α the share of the gold component in the dowry basket.

Parents move to point B in Figure 1 where the bride receives a lower amount of gold jewelry.

- **Case 4:** X_w is is fully flexible

In the case when neither the amount nor the value of X_w is fixed at the time the match is arranged, gold jewelry is simply a thought of as a voluntary gift from the parents of the bride to the bride. In this case, the probability that the bride receives gold at the time of marriage is lower when the P_2 is higher. Conditional on receiving gold jewelry, the amount of gold she receives will also likely be lower when P_2 is higher.

Figure 1: Dowry Basket Composition



In Case 1, the price of gold should have no effect on the composition of the dowry basket. The effect of increasing the amount of cash in the dowry basket on domestic violence in Case 2 is mixed. Also, the value of gold that the woman receives is higher in Case 2 and I examine this to some extent in Section 7.2. On the other hand changing the cash amount in the dowry basket in Case 2 may have unintended effects on domestic violence that I do not capture.

However, in Cases 3 and 4, there is a clear incentive for the parents of the bride to give a lower amount of gold which would likely increase domestic violence.

5.2 Econometric Specification

Following from above, I test if a woman who has a lower amount of gold endowment at the time of marriage is likely to have a lower threat point in the household¹⁰. This section outlines the empirical specification and proceeds to discuss the validity of the real price of gold in India as a plausibly exogenous source of variation.

The identifying equation for woman i , in state s married in month m is:

$$Y_{ism} = \alpha_0 + \beta_1 \hat{P}_i + \beta_2 C_i + \beta_3 S_s + \beta_4 M_m + \varepsilon_{ism}$$

where,

$$\hat{P}_i = P_r - P_{trend}$$

Y_{ism} is the domestic violence experienced by the woman i in state s and month of marriage m ;

\hat{P}_i is the difference from the trend of the real price of gold at the month of marriage of the woman;

C_i are socio-demographic controls at the woman level;

S_s are state fixed effects;

M_m are month fixed effects;

¹⁰The threat point could for instance take the form of divorce or, given the social stigma surrounding divorce in India, could more likely take the form of separation.

ε_{ism} is the error term.

Table 4 presents the summary statistics of the indexed price of gold series. The average price of gold at time of marriage for the analytical sample was 6.92 INR per gram of gold with a standard deviation of 6.09 INR. I use the Hodrick-Prescott high-pass filter to separate the time series of the price of gold into its trend and stochastic components. The stochastic component of the price of gold at the time of marriage has a mean of 0 and a standard deviation of 0.84 INR. Figure 2 presents the trend and stochastic components of the price of gold between Jan, 1992 to Sep, 2016, the time-frame of analysis.

Table 4: Price of gold summary statistics

Variable	Mean	SD	Min	Max
Price of gold at month of marriage	6.92	6.09	2.41	24.99
- stochastic component	0.00	0.84	-2.83	4.78
- trend	6.92	5.98	2.62	21.63
Price of gold at month of survey	15.96	6.77	6.10	23.63
- stochastic component	-0.20	1.23	-2.83	2.02
- trend	16.16	7.15	6.18	21.67

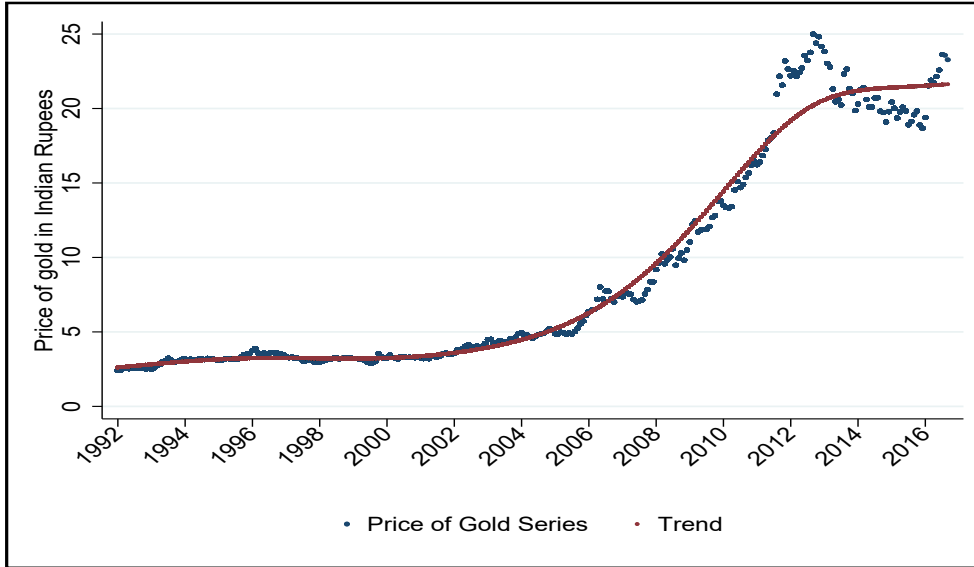
Price of gold is the monthly price of gold per gram of gold in Indian Rupees indexed to 1999 prices.

Data Source: World Gold Council

India's socioeconomic conditions vary considerably, especially between northern and southern states. State fixed effects have been included in all models to capture state specific effects. Further, fixed effects for the month of marriage have been included to account for seasonal variations in marriage, which is of particular significance in an agrarian society.

The identification rests on the concept of unearned income, much in the same vein as inheritance rights for women. Thus, the assumption being made is that the price

Figure 2: Price of gold series and trend at month of marriage



Price of gold is the monthly price of gold per gram of gold in Indian Rupees from Jan, 1992 to Sep, 2016 indexed to Jan, 1999
Data Source: World Gold Council

of gold effects the economic resources and bargaining power of the woman within the household at the time of marriage.

The price of gold at the time of marriage may affect spousal match quality. I investigate this possibility by regressing the match characteristics on several key variables between the bride and groom on the price of gold and report the results in Section 7.3.2.

Given that gold market analysts often fail to accurately predict gold price trends because of the inherent uncertainty in gold price fluctuations, there is no compelling reason to believe that the average individual is able to accurately do so. Consequently, there is no reason to believe that the price of gold at marriage would influence pre-marital investments in prospective brides or grooms in anticipation of future gold prices. On the other hand women may delay marriage if the price of gold is too high. I examine this by confirming that the price of gold is not associated with the age at marriage of the women in Section 7.3.3.

6 Results

Table 5 presents the ordinary least square regression results investigating the relationship between the deviation of the price of gold from its long term trend at the time of marriage and domestic violence. Domestic violence is measured as a binary indicator with 1 indicating that violence was reported. Column 1 presents the bivariate estimates, column 2 conditions on month fixed effects, survey fixed effects and a linear trend for year of marriage¹¹. Column 3 additionally conditions on state fixed effects while column 4 additionally conditions on individual characteristics of the woman such as height, duration of marriage and years of schooling. Column 5 presents the full specification which additionally includes household characteristics of religion, caste, wealth and urban v. rural location of the household.

I find that a higher price of gold at the time of marriage increases the predicted probability of domestic violence within the household with an estimated coefficient of 5.4 in column 5. The average marginal effect of price of gold on domestic violence is 1.6. This means that the probability of violence being reported increases by 1.6 percentage point for each INR increase in the stochastic component of the price of gold. This suggests that parents may be responding to a higher price of gold by reducing the amount of gold in the dowry basket. Figure 3 presents the average marginal probability for each of the 36 states and union territories in India. The significant effects are driven by Andhra Pradesh, Bihar, Lakshadweep, Madhya Pradesh, Manipur, Nagaland, Delhi and Punjab.

¹¹Flexibly controlling for year of marriage by including quadratic and cubic terms have no significant predictive power

Table 5: Effect of price of gold on domestic violence

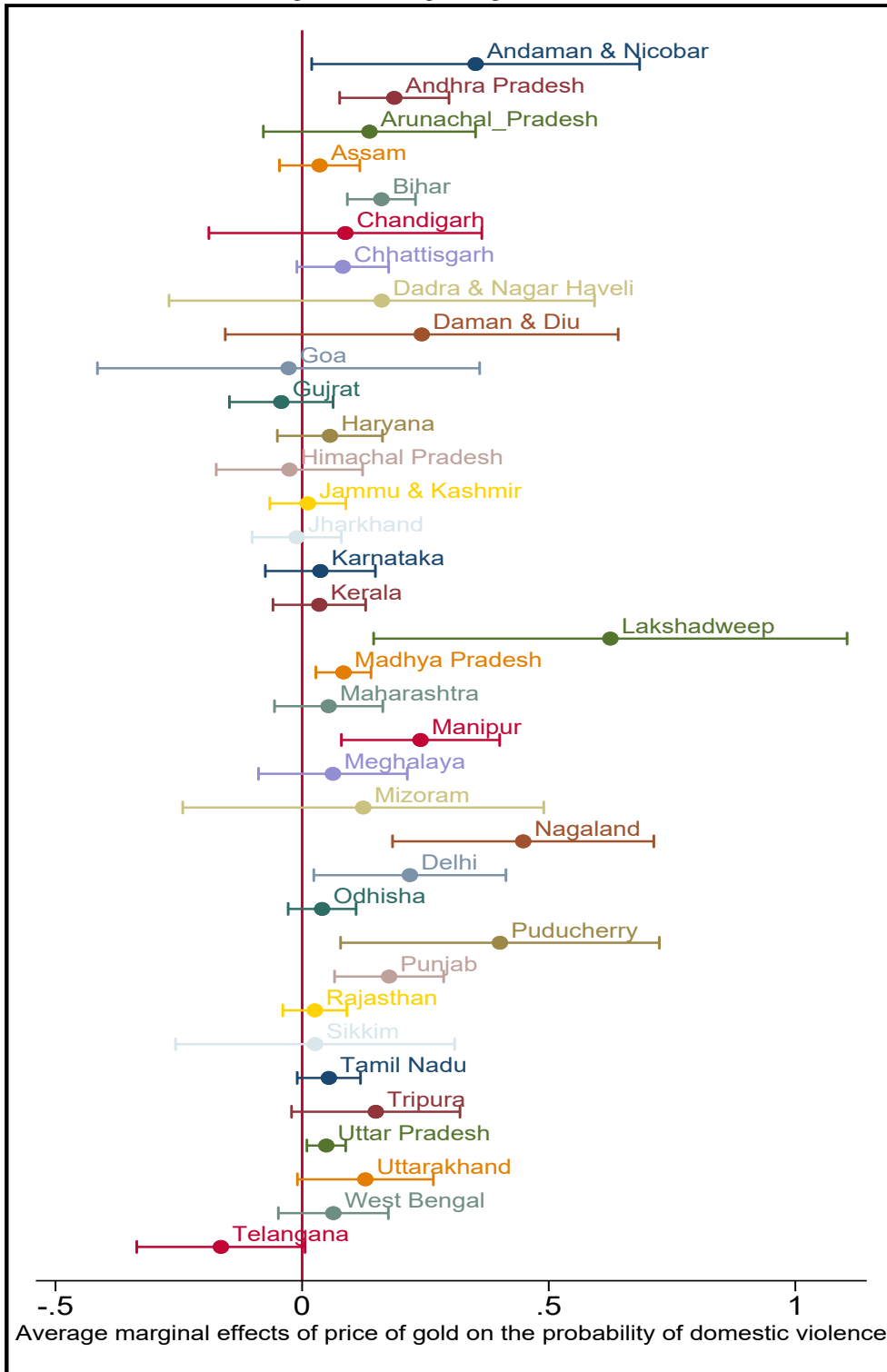
	(1)	(2)	(3)	(4)	(5)
	Violence	Violence	Violence	Violence	Violence
Price of gold	0.014 (0.015)	0.022** (0.010)	0.022** (0.010)	0.053*** (0.011)	0.054*** (0.011)
Height				-0.095*** (0.009)	-0.055*** (0.009)
Years of schooling: < 5 years				-0.060*** (0.017)	0.004 (0.017)
6 - 10 years				-0.307*** (0.013)	-0.146*** (0.015)
> 10 years				-0.698*** (0.018)	-0.384*** (0.020)
Years of marriage: 5 - 9 years				0.237*** (0.031)	0.235*** (0.031)
10 - 14 years				0.209*** (0.046)	0.210*** (0.045)
> 15 years				0.044 (0.074)	0.039 (0.071)
Muslim					0.006 (0.019)
Christian					-0.068*** (0.026)
Other					-0.054** (0.026)
Schedule Caste					0.192*** (0.017)
Schedule Tribe					0.072*** (0.019)
Other Backward Caste					0.074*** (0.015)
Rural					-0.120*** (0.013)
Poorer					-0.093*** (0.017)
Middle					-0.206*** (0.017)
Richer					-0.312*** (0.019)
Richest					-0.633*** (0.023)
N	73642	73642	73642	73642	73642
mean (dep var)	0.261	0.261	0.261	0.261	0.261

Robust standard errors clustered at month and year of marriage in parenthesis *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Dependent variable is a binary indicator with 1 indicating violence.

Reference categories are < 4 years of marriage, No schooling, Hindu, High caste, Urban and Poorest.

Column 1 presents the results of a bivariate probit estimation. Column 2 additionally conditions on month of marriage fixed effects, year of marriage trend and survey fixed effects. Column 3 includes state fixed effects. Column 4 adds wife's individual characteristics of years of schooling and years of marriage. Column 5 adds household characteristics of religion, caste, location of household and wealth quintile.

Figure 3: Average marginal effects for each state



Average marginal effects from a probit estimation of the monthly price of gold at the time of marriage on domestic violence in each state. All estimates conditional on the independent variables included in the main result in Column 5, Table 5.

Woman's height decreases the predicted probability of domestic violence as expected. I find an inverse U-shaped relationship between years of schooling and domestic violence. There is a persistent negative effect of longer marriage duration on the probability of domestic violence. Women from schedule caste, schedule tribe and other backward castes are more likely to report domestic violence than women belonging to a high caste. Women from rural areas also have a lower predicted probability of violence as compared to women from urban areas¹². I also find a significantly negative wealth gradient in the predicted probability of domestic violence.

In Table 6, I check if the results are sensitive to the method of coding of violence and the choice of the estimator. Column 1 reports the estimates of a poisson regression with the dependent variable coded as a count from 0 to 7 and Column 2 reports the estimates of a linear probability model where the dependent variable is the first component of a polychoric principle component analysis of the 4 responses to the 6 domestic violence questions. The positive relationship between the price of gold at the time of marriage and domestic violence continue to be significant and positive in both cases.

In Table 7, I estimate the effects on sub samples by thresholds to the trend of the price of gold at the time of marriage. In column 1, I restrict the analysis to women who were married at a months when the price of gold was within +/- 0.07 standard deviations of the long term trend of the price of gold. In Column 2, I restrict the analysis to women who were married between +/-0.08 to +/-0.2 standard deviations of the long term trend and in Column 3, I restrict the analysis to women who were married in a month when

¹²There are no significant interaction effects between the location of the household and price of gold. Splitting the sample into urban and rural households also maintains the main findings.

Table 6: Alternative ways of coding physical violence

	(1) Violence	(2) Violence
Price of gold	0.075*** (0.017)	0.020*** (0.005)
Years of schooling: < 5 years	-0.011 (0.022)	-0.036** (0.014)
6 - 10 years	-0.216*** (0.020)	-0.142*** (0.011)
> 10 years	-0.621*** (0.035)	-0.227*** (0.013)
Years of marriage: 5 - 9 years	0.402*** (0.049)	0.119*** (0.017)
10 - 14 years	0.424*** (0.066)	0.140*** (0.028)
> 15 years	0.291*** (0.099)	0.082* (0.046)
Muslim	0.053* (0.027)	0.018 (0.013)
Christian	-0.133*** (0.041)	-0.055*** (0.015)
Other	-0.025 (0.041)	-0.018 (0.016)
Schedule Caste	0.295*** (0.025)	0.144*** (0.013)
Schedule Tribe	0.134*** (0.029)	0.028** (0.013)
Other Backward Caste	0.101*** (0.023)	0.025*** (0.009)
Rural	-0.186*** (0.017)	-0.076*** (0.008)
Poorer	-0.144*** (0.023)	-0.124*** (0.016)
Middle	-0.307*** (0.025)	-0.213*** (0.016)
Richer	-0.518*** (0.029)	-0.301*** (0.017)
Richest	-1.023*** (0.036)	-0.424*** (0.019)
N	73642	73642
mean (dep var)	0.581	0.000
sd (dep var)	1.238	1.000

Robust standard errors clustered at month and year of marriage in parenthesis
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Reference categories are < 4 years of marriage, No schooling, Hindu, High caste, Urban and Poorest.

Column 1 reports the estimates from a poisson regression and the dependent variable is a count from 0 to 7.

Column 2 reports the estimates from an ordinary least squares regression where the dependent variable is the first component of a polychoric principle component analysis of the responses to the 6 components of domestic violence standardized to have a mean of 0 and standard deviation of 1.

Additional Controls: All controls used in the main results in Column 5, Table 5.

the price of gold was at least +/-0.3 to +/-0.5 standard deviations away. In Column 4, I restrict the analysis to the subsample of women who were married when the deviation of the price of gold was above +/- 0.51 standard deviation from its long-term trend. These cutoffs were chosen to maintain an approximately equal number of observations in each sub-sample. The results remain positive in all cutoffs but is precisely estimates only in the estimation where the deviations are further away from the trend.

Table 7: Effects by thresholds of price of gold to its trend

	(1)	(2)	(3)	(4)
	Violence	Violence	Violence	Violence
Price of gold	0.206 (0.300)	0.020 (0.094)	0.036 (0.041)	0.037*** (0.010)
N	18997	18538	18217	17890
mean (dep var)	9.280	0.278	0.259	0.225

Robust standard errors clustered at month and year of marriage in parenthesis
 *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Column 1 reports the estimates for the subsample of women who were married when the price of gold was within +/-0.07 standard deviations from its trend.

Column 2 reports for the subsample of women who were married when the price of gold was between +/-0.08 to +/-0.2 standard deviations from its trend.

Column 3 reports for the subsample of women who were married when the price of gold was between +/-0.3 to +/-0.5 standard deviations from its trend.

Column 4 reports for the subsample of women who were married when the price of gold was above +/-0.51 standard deviation from its trend.

Additional Controls: All controls used in the main results in Column 5, Table 5

Figure 2 shows that considerable variation in the deviation of the price of gold is post the year 2012. In Table 8, I check if the results remain consistent to the inclusion of period fixed effects for 1996-1999, 2000-2003, 2004-2007, 2008-2011 and 2012-2016. I find that inclusion of these fixed effects reduce the effect size very little and that the results remain significant.

Table 8: Effect of price of gold on domestic violence

	(1)	(2)	(3)	(4)	(5)
	Violence	Violence	Violence	Violence	Violence
Price of Gold	0.014 (0.012)	0.050*** (0.013)	0.044*** (0.012)	0.050*** (0.012)	0.050*** (0.012)
1996 - 1999		-0.046*** (0.017)	0.049 (0.030)	0.072** (0.033)	0.073** (0.032)
2000 - 2003		-0.098*** (0.019)	0.087* (0.050)	0.086* (0.052)	0.081 (0.051)
2004 - 2007		-0.214*** (0.023)	0.053 (0.070)	0.028 (0.070)	0.023 (0.069)
2008 - 2011		-0.229*** (0.026)	0.134 (0.094)	0.099 (0.094)	0.099 (0.094)
2012 - 2016		-0.590*** (0.037)	-0.132 (0.123)	0.027 (0.124)	0.030 (0.122)
Height				-0.096*** (0.009)	-0.055*** (0.009)
Years of marriage: 5 - 9 years				0.175*** (0.036)	0.174*** (0.035)
10 - 14 years				0.153*** (0.047)	0.157*** (0.047)
> 15 years				-0.063 (0.077)	-0.065 (0.075)
Years of schooling: < 5 years				-0.060*** (0.017)	0.005 (0.017)
6 - 10 years				-0.306*** (0.013)	-0.146*** (0.015)
> 10 years				-0.696*** (0.018)	-0.383*** (0.020)
Muslim					0.006 (0.019)
Christian					-0.067*** (0.026)
Other					-0.054** (0.026)
Schedule Caste					0.191*** (0.017)
Schedule Tribe					0.072*** (0.019)
Other Backward Caste					0.073*** (0.015)
Rural					-0.119*** (0.013)
Poorer					-0.093*** (0.017)
Middle					-0.206*** (0.017)
Richer					-0.312*** (0.019)
Richest					-0.632*** (0.023)
N	73642	73642	73642	73642	73642
mean (dep var)	0.261	0.261	0.261	0.261	0.261

Robust standard errors clustered at month and year of marriage in parenthesis *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Dependent variable is a binary indicator with 1 indicating violence.

Reference categories are < 4 years of marriage, No schooling, Hindu, High caste, Urban and Poorest.

Column 1 presents the results of a bivariate probit estimation. Column 2 additionally conditions on month of marriage fixed effects, year of marriage trend, period fixed effects and survey fixed effects. Column 3 includes state fixed effects. Column 4 adds wife's individual characteristics of years of schooling and years of marriage. Column 5 adds household characteristics of religion, caste, location of household and wealth quintile.

7 Robustness Checks

In this section, I test if the above result is robust to several checks. First, I ensure that the price of gold is truly randomly assigned to each woman. Second, I explore the effect of deviations of the price of gold at the time of survey on domestic violence. Third, I explore potential alternative mechanisms that may be driving the results in the forms of market effects, adjustments of marital match characteristics and potential postponement of marriage. Finally, I check if the relationship holds for the 7 sub components of physical violence and for emotional & sexual violence.

7.1 Price of gold at the time of marriage

I assume that the price of gold at the time of marriage is exogenous to factors that determine the marital match. To some extent, this can be tested in the data by examining if the price of gold is truly randomly assigned to each woman. I regress the price of gold at time of marriage on the independent variables used in the main results to check if these have predictive power in determining the price of gold that the woman faces at the time of marriage. I find that marital duration is the only predictor with some significance. I ensure that the estimates in Table 5 are not sensitive to excluding marital duration as a covariate.

7.2 Price of gold at the time of survey

The identification of this paper rests on the assumption that when the price of gold at the time of marriage is higher than its long-term trend, the bride receives a lower gold

endowment. An alternative hypothesis is that it is not the price of gold at the time of marriage that matters, but the price of gold at the time the violence occurred. As an additional check, I examine if the results hold to the inclusion of the deviation of the price of gold at the time of survey from its long term trend and present the results in Table 9. The mean of the stochastic component of the price of gold at the time of survey is -0.20 with a standard deviation of 1.23 INR (Summary statistics presented in Table 4). I find that the deviation of the price of gold at the month of survey has a significant negative effect on domestic violence and that the effect of the price of gold at the time of marriage remains positive and significant. This supports the hypothesis that women who are married when the price of gold is high are likely to be receiving a lower gold endowment and that the value of this stock is lower when the price of gold at the time of survey is low thereby leading to higher violence. In Column 2, I check if the trend in the price of gold series has an independent effect on the probability of violence and find that it does not.

The deviation in the price of gold at the time of survey would arguably only be relevant for respondents who actually reported the presence of violence in the 12 months preceding the survey. To test this, I restrict the analytical sample to respondents who had non-missing information on the timing of violence and code responses of "*Not in the last 12 months*" to zero. I continue to find a positive significant relationship between the deviation in the price of gold at the time of marriage and domestic violence (table not shown).

Table 9: Effects conditional on price of gold at time of survey

	(1)	(2)
	Violence	Violence
Price of gold at month of marriage	0.056*** (0.011)	0.055*** (0.011)
Price of gold at month of survey	-0.061*** (0.007)	-0.061*** (0.007)
Trend in the price of gold at month of marriage		-0.002 (0.003)
Height	-0.054*** (0.009)	-0.055*** (0.009)
Years of schooling: < 5 years	0.004 (0.017)	0.004 (0.017)
6 - 10 years	-0.146*** (0.015)	-0.146*** (0.015)
> 10 years	-0.387*** (0.020)	-0.383*** (0.020)
Years of marriage: 5 - 9 years	0.245*** (0.030)	0.228*** (0.030)
10 - 14 years	0.232*** (0.044)	0.198*** (0.045)
> 15 years	0.080 (0.069)	0.025 (0.070)
Muslim	0.011 (0.020)	0.006 (0.019)
Christian	-0.074*** (0.026)	-0.068*** (0.026)
Other	-0.047* (0.026)	-0.054** (0.026)
Schedule Caste	0.189*** (0.017)	0.192*** (0.017)
Schedule Tribe	0.080*** (0.019)	0.072*** (0.019)
Other Backward Caste	0.067*** (0.015)	0.074*** (0.015)
Rural	-0.119*** (0.013)	-0.120*** (0.013)
Poorer	-0.092*** (0.017)	-0.093*** (0.017)
Middle	-0.205*** (0.017)	-0.206*** (0.017)
Richer	-0.309*** (0.019)	-0.312*** (0.019)
Richest	-0.626*** (0.023)	-0.632*** (0.023)
N	73642	73642
mean (dep var)	0.261	0.261

Robust standard errors clustered at month and year of marriage in parenthesis *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Dependent variable is a binary indicator with 1 indicating violence.

Reference categories are < 4 years of marriage, No schooling, Hindu, High caste, Urban and Poorest.

Additional Controls: All independent variables used in the main results in Column 5, Table 5.

7.3 Alternative Mechanisms

7.3.1 Market Fluctuations

A deviation from the long term trend of the price of gold may signal inflation or other economic fluctuations that could potentially have a direct impact on the bargaining power within the household and by extension on domestic violence. I use the deviation of the price of crude oil at the month of marriage from its long term trend to examine if the effect is an artifact of unobservable market fluctuations.

Gold is a major contributor to India's import bill, second only to crude oil imports. Both crude oil and gold are dollar denominated assets. In the long run, the prices of gold and oil are correlated. As the price of crude oil rises, the price of gold also increases as gold is known to be a good hedge against inflation. I use monthly data from the US Energy information Administration (Reuters, 2017) for Europe Brent Spot prices for crude oil per Barrel¹³. Table 10 examines the effect of deviations from the long term trend of crude oil prices at the month of marriage on domestic violence conditional on the socio-demographic, spatial and temporal controls used in the main results. I find a fairly precisely estimated zero effect of the price of oil on domestic violence which suggests that at the time of marriage, the short term fluctuations in the price of gold in particular seem to matter for intra-household bargaining.

¹³I use monthly US dollar to Indian Rupee exchange rate from Federal Reserve Economic Data to convert the US Dollar prices to Indian Rupees.

Table 10: Effect of price of oil on domestic violence

	(1)	(2)	(3)	(4)	(5)
	Violence	Violence	Violence	Violence	Violence
Price of Oil	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000** (0.000)	0.000** (0.000)
Height				-0.095*** (0.009)	-0.055*** (0.009)
Years of schooling: < 5 years				-0.060*** (0.017)	0.004 (0.017)
6 - 10 years				-0.307*** (0.013)	-0.146*** (0.015)
> 10 years				-0.696*** (0.018)	-0.383*** (0.020)
Years of marriage: 5 - 9 years				0.198*** (0.031)	0.194*** (0.030)
10 - 14 years				0.171*** (0.046)	0.170*** (0.045)
> 15 years				-0.017 (0.075)	-0.024 (0.073)
Muslim					0.006 (0.019)
Christian					-0.068*** (0.026)
Other					-0.055** (0.026)
Schedule Caste					0.191*** (0.017)
Schedule Tribe					0.072*** (0.019)
Other Backward Caste					0.073*** (0.015)
Rural					-0.120*** (0.013)
Poorer					-0.092*** (0.017)
Middle					-0.205*** (0.017)
Richer					-0.311*** (0.019)
Richest					-0.631*** (0.023)
N	73642	73642	73642	73642	73642
mean (dep var)	0.261	0.261	0.261	0.261	0.261
mean (indep var)	9.975	9.975	9.975	9.975	9.975
sd (indep var)	507.016	507.016	507.016	507.016	507.016

Robust standard errors clustered at month and year of marriage in parenthesis *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Dependent variable is a binary indicator with 1 indicating violence.

Reference categories are < 4 years of marriage, No schooling, Hindu, High caste, Urban and Poorest.

Column 1 presents the results of a bivariate probit estimation. Column 2 additionally conditions on month of marriage fixed effects, year of marriage trend, period fixed effects and survey fixed effects. Column 3 includes state fixed effects. Column 4 adds wife's individual characteristics of years of schooling and years of marriage. Column 5 adds household characteristics of religion, caste, location of household and wealth quintile.

7.3.2 Marital Matching

Since dowry is the price at which the marriage market clears in India, at equilibrium, the amount of dowry may have an effect on groom characteristics. Since I only expect the amount of gold in the dowry basket to be affected and not the value of the dowry basket as a whole (which would almost definitely have a cash component if not other physical asset components), I do not expect the exogenously set price of gold to have an effect on groom or match characteristics. This is in line with Chan (2014), who suggests that it is likely that the groomprice component of dowry, and not the bequest component, is likely used for *purchasing* spousal attributes.

However, to address this possibility, I test this in the data by examining if the price of gold at the time of marriage has any effects on key spousal match characteristics, such as differences in age, education and income between the bride and groom in Table 11. The dependent variable in Column 1 is the difference in age between the husband and wife, the difference in education (measured in single years) in Column 2 and whether the husband earns more (binary indicator) in Column 3¹⁴. I do not find any significant effects of the price of gold on these key match characteristics.

7.3.3 Age at Marriage

A possible concern with using the price of gold at the time of marriage as a proxy for gold endowment at the time of marriage could be that the price of gold may have an effect on the age at which the woman gets married. It is conceivable that a higher price of gold at the time of marriage induces families to postpone the marriage in anticipation

¹⁴Sample size in Column 3 is lower due to item non-response in the dependent variable.

Table 11: Robustness Checks

	Marital Match Characteristics			
	(1) Difference in age	(2) Difference in education	(3) Difference in earnings	(4) Wife's age at marriage
Price of gold	-0.015 (0.019)	-0.022 (0.019)	-0.000 (0.005)	-0.009 (0.017)
Years of schooling: < 5 years	0.029 (0.051)			-0.240*** (0.044)
6 - 10 years	0.231*** (0.047)			0.133*** (0.043)
> 10 years	-0.251*** (0.062)			2.048*** (0.076)
Years of marriage: 5 - 9 years	0.031 (0.065)	-0.113 (0.084)	0.017 (0.018)	
10 - 14 years	0.116 (0.098)	-0.126 (0.109)	0.018 (0.024)	
> 15 years	0.221 (0.151)	-0.032 (0.171)	0.033 (0.039)	
Muslim	0.300*** (0.052)	-0.119** (0.056)	0.027* (0.015)	-0.650*** (0.048)
Christian	-0.084 (0.078)	-0.578*** (0.064)	-0.050*** (0.015)	1.551*** (0.064)
Other	-0.498*** (0.077)	-0.328*** (0.074)	-0.009 (0.019)	0.847*** (0.073)
Schedule Caste	-0.012 (0.047)	0.410*** (0.050)	-0.010 (0.012)	-0.553*** (0.038)
Schedule Tribe	-0.140** (0.059)	0.434*** (0.055)	-0.030** (0.013)	-0.288*** (0.050)
Other Backward Caste	0.128*** (0.042)	0.271*** (0.043)	-0.013 (0.010)	-0.414*** (0.033)
Rural	-0.147*** (0.035)	0.470*** (0.039)	0.001 (0.009)	-0.344*** (0.032)
Poorer	0.019 (0.052)	0.223*** (0.057)	-0.001 (0.011)	0.069* (0.041)
Middle	0.106* (0.057)	0.211*** (0.056)	-0.012 (0.013)	0.398*** (0.047)
Richer	0.163*** (0.057)	0.028 (0.058)	-0.029** (0.013)	1.015*** (0.053)
Richest	-0.140** (0.062)	-0.345*** (0.059)	-0.099*** (0.014)	1.859*** (0.063)
N	73642	73642	16481	73642
mean (dep var)	4.975	1.29	0.648	19.345
sd (dep var)	4.073	4.084		4.007

Robust standard errors clustered at month and year of marriage in parenthesis *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Dependent variable in Columns 1 & 2 are differences in age and education respectively. Dependent variable in column 3 is a binary indicator which is 1 if man earns more than woman. Dependent variable in column 4 is wife's age at marriage.

Column 3 has lower number of N due to missings in the dependent variable.

Reference categories are < 4 years of marriage, No schooling, Hindu, High caste, Urban and Poorest.

Additional controls: All independent variables used in the main results in Column 5, Table 5

of a future drop in the price. I test this relationship in the analytical sample and find no significant effect of the price of gold on the age at marriage in Column 4 of Table 11. This also supports the theory that parents of the bride have some degree of flexibility when deciding on the gold component of the dowry basket.

7.4 Alternative Measures of Violence

In the main results, violence is coded as the first component of several dimensions of physical violence. In Table 12, I examine whether the effect is driven by a particular component of the violence. Each column in the table represents each of the 7 components of physical violence. Panel A presents probit estimates where the dependent variable is coded as a binary with 1 indicating violence and Panel B presents poisson estimates where the dependent variable is a count of the responses outlined in Section 4.1. I reassuringly find that the relationship remains positive in all dimensions of physical violence and that the effect is fairly precisely estimated for all but two dimension of physical violence which is likely due to lower numbers in these components.

The dataset also included questions on emotional and sexual violence. Unlike physical violence, these are far less detailed with the respondents being asked "*Have you ever experienced any form of emotional violence?*" and "*Have you ever experienced any form of sexual violence?*" which merely provided binary indicators. Nonetheless, in Table 13, I report the estimates of a probit regression of the price of gold at the time of marriage on these types of violence. I find a positive relationship between price of gold at the time of marriage and both types of violence although the estimate on sexual violence is less precisely estimated. This is unsurprising as, unlike the physical violence

questions, these are not linked to specific behaviours and expects women to subjectively assess what she constitutes sexual violence.

Table 12: Effect of price of gold on each component of domestic violence

	(1) Violence	(2) Violence	(3) Violence	(4) Violence	(5) Violence	(6) Violence	(7) Violence
Panel A - Probit Estimates							
Price of gold	0.057*** (0.011)	0.046*** (0.010)	0.047*** (0.013)	0.032** (0.013)	0.025* (0.014)	0.021 (0.027)	0.026 (0.017)
N	73642	73642	73642	73642	73642	73642	73642
mean (dep var)	0.240	0.102	0.092	0.064	0.066	0.007	0.012
Panel B - Poisson Estimates							
Price of gold	0.070*** (0.014)	0.082*** (0.019)	0.080*** (0.023)	0.055** (0.026)	0.047* (0.026)	0.055 (0.081)	0.052 (0.049)
N	73642	73642	73642	73642	73642	73642	73642
mean (dep var)	0.440	0.193	0.176	0.124	0.126	0.014	0.024
sd (dep var)	0.831	0.602	0.581	0.497	0.500	0.177	0.236

Robust standard errors clustered at month and year of marriage in parenthesis *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

In Panel A, dependent variables are binary with 1 indicating the presence of violence in the marriage.

In Panel B, dependent variables are count variables from 0-7 with higher numbers indicating more violence.

Additional controls: All controls used in the main results in Column 5, Table 5

Dependent variables in each column are:

Column (1) spouse ever twisted her arm or pull her hair

Column (2) spouse ever pushed, shook or threw something

Column (3) spouse ever punched with fist or something harmful

Column (4) spouse ever kicked or dragged

Column (5) spouse ever threatened or attacked with knife/gun or other weapon

Column (6) spouse ever tried to strangle or burn

Table 13: Probit estimates of effects on emotional and sexual violence

	(1) Emotional Violence	(2) Sexual Violence
Price of gold	0.037*** (0.009)	0.026** (0.010)
Years of schooling: < 5 years	0.002 (0.021)	-0.009 (0.024)
6 - 10 years	-0.076*** (0.018)	-0.093*** (0.022)
> 10 years	-0.227*** (0.025)	-0.231*** (0.030)
Years of marriage: 5 - 9 years	0.141*** (0.027)	0.141*** (0.032)
10 - 14 years	0.133*** (0.041)	0.188*** (0.046)
> 15 years	0.069 (0.064)	0.194*** (0.075)
Muslim	0.059*** (0.022)	0.030 (0.028)
Christian	-0.075** (0.030)	-0.105*** (0.036)
Other	-0.108*** (0.033)	-0.004 (0.040)
Schedule Caste	0.157*** (0.019)	0.105*** (0.023)
Schedule Tribe	0.105*** (0.023)	-0.032 (0.029)
Other Backward Caste	0.064*** (0.017)	-0.023 (0.020)
Rural	-0.113*** (0.016)	-0.035* (0.019)
Poorer	-0.072*** (0.023)	-0.110*** (0.025)
Middle	-0.154*** (0.021)	-0.137*** (0.026)
Richer	-0.287*** (0.026)	-0.285*** (0.029)
Richest	-0.464*** (0.028)	-0.477*** (0.033)
N	73642	73642
mean (dep var)	0.112	0.064

Robust standard errors clustered at month and year of marriage in parenthesis *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Dependent variables in both columns are coded as binary with 1 indicating violence.

Reference categories are < 4 years of marriage, No schooling, Hindu, High caste, Urban and Poorest.

Additional controls: All controls used in the main results in Column 5, Table 5

8 Discussion

The analytical sample consists of women who were alive at the time of the survey. This introduces sample selection in that women who died after marriage are not observed at the survey date. This would mean that the effect size is under biased and is likely a lower bound of actual effect size. Since these women were never observed, I am unable to create confidence bounds on this estimate.

The second potential source of bias could be non-response to the domestic violence module. Of the number of women who were married post 1991 and selected for the domestic violence module, less than 5% were not interviewed as privacy could not be obtained or for other reasons which suggests that bias due to non-response to the domestic violence module is likely to be low.

Finally there may be measurement error in the manner in which the dependent variable is measured which may bias the size of the estimate especially because domestic violence as a concept is fairly hard to measure. The data overcomes this to some extent by extracting information on very specific sub components of physical violence. Nonetheless there may be systematic under-reporting due to a social-desirability bias or due to heterogeneous thresholds of privacy. Given that there is a consensus in the previous literature that domestic violence is under-reported in surveys in India, this would again point to the effect size reported in this paper as being biased towards zero.

9 Conclusion

Dowry mechanics and its effects on intra-household bargaining and subsequent life cycle of the marriage is extremely hard to measure and estimate in a data scarce developing country context. Given the prevalence of both domestic violence and dowry practices in India, there is an inherent need for this data. However, the illegality of dowry and domestic violence and the subsequent under reporting of each could make further accurate data collection difficult and must be addressed methodologically for precision in future analysis.

This study constitutes a significant first step in demonstrating that the price of gold at the time of marriage is a source of exogenous variation in the initial endowment of the bride at the time of marriage. The persistent precision of the estimates adds to the existing literature by demonstrating that dowry practices continue to be widespread in India and on average a dowry basket is likely to contain a non-trivial amount of gold. The positive effect of the stochastic component of the price of gold at the time of marriage and domestic violence suggests that women who are married at times when the price of gold is higher than its long term trend are likely receiving a lower gold endowment.

Given that the blanket ban on dowry has failed in India, an alternative may be to ensure that the parents of brides to be are encouraged to provide dowries in the form of bequests to their daughters in a manner that the asset stays under her control. In addition to greater access to labour markets and increased financial inclusion this could potentially have welfare improving effects for women.

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