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Abstract

Early marriage persists in many countries despite legal prohibition. We investigate the role of income shocks and bride price norms in the context of Turkey. We use data from the Turkey Demographic and Health Surveys 1998 to 2018 and exploit rainfall shocks as an exogenous source of variation of household income. To study the role of marital payments, we interact our measures of shocks with a province-level indicator based on past prevalence of bride-price. Our results show that girls exposed to a severe drought during adolescence have a higher probability to be married before 15 if living in provinces with a high prevalence of bride price. We find more arranged and forced marriages after severe shocks in those provinces. Our results suggest that daughter marriage as a response to mitigate negative income shocks is not limited to the poorest countries and still participates to household strategies in Turkey.

ملخص

يســـتمر الزواج المبكر في العديد من البلدان على الرغم من الحظر القانوني. نقوم بالتحقيق في دور صـــدمات الدخل ومعايير أســـعار العروس في ســياق تركيا. نســتخدم بيانات من الدراســات الاســتقصــائية الديموغرافية والصــحية في تركيا من 1998 إلى 2018 ونســتغل صـدمات هطول الأمطار كمصـدر خارجي للتنوع في دخل الأسرة. ولدراسـة دور المدفوعات الزوجية، نتفاعل مع مقاييس الصـدمات لدينا مع مؤشر على مســـتوى المقاطعة بناءً على انتشـــار ثمن العروس في الماضي. تظهر نتائجنا أن الفتيات القاطنات في مناطق معرضـــة للجفاف الشـديد خلال فترة المراهقة لديهن احتمال أكبر للزواج قبل سـن 15 عامًا إذا كن يعشـن في مقاطعات ذات معدل انتشـار مرتفع لأسـعار العروس. نجد المزيد من الزيجات المرتبة والقسرية بعد الصـدمات الشـديدة في تلك المقاطعات. تشـير نتائجنا إلى أن زواج الابنة كاستجابة للتخفيف من صدمات الدخل السلبية لا يقتصر على أفقر البلدان ولا يزال يشارك في استراتيجيات الأسرة في تركيا.

1 Introduction

Although many countries have passed laws to contain the highly detrimental practice of child marriage[1], including the setting of a minimum age at marriage, lack of enforcement or persistence of unregistered unions contribute to explaining the still high proportion of girl marriage. According to the UNICEF, although the prevalence of child marriage is declining in most parts of the world, over the 2015-2022 period still 19% of girls aged 20-24 in the world were married under 18.[2] Such a persistence raises the question of the underlying economic motivations and cultural norms that laws, either imperfectly implemented or publicized, cannot discourage.

Turkey is a striking example of a middle-income country which at some point had moved towards alignment with the European Union, and where the practice of child marriage persists in spite of legislative development. In Turkey, after the 2002 reform of the civil code which is still in force at the time of writing, the minimum legal age at marriage was raised to 18 instead of 15, with exceptions allowing marriage at age 17 (with parental consent) or even 16 (in exceptional circumstances). However, still today, the prevalence of child marriage is high in Turkey, although the practice is unevenly distributed across the country. According to data from the Turkey Demographic and Health Survey, in 2018, 23% of married women aged 20-24 were married before the age of 18, and 4% before the age of 15.

Identifying the drivers of such a practice and its persistence is key, given the long-lasting negative consequences of marrying as a child on women and their offspring. Studies find that marrying too young is associated with a lower educational attainment for women (Field and Ambrus, 2008) and their children (Chari et al., 2017; Delprato et al., 2017), greater health risks for mother and child (Santhya et al., 2010; Santhya, 2011; Prakash et al., 2011), in particular during pregnancy and delivery (Raj, 2010; Paul, 2018), a higher probability for women to be victim of domestic violence (Santhya et al., 2010), a lower

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[1]Following the literature, child marriage in this paper means marriage before the age of 18, unless specified otherwise.

[2]https://data.unicef.org/wp-content/uploads/2019/10/XLS_Child-marriage-database_May-2023.xlsx, accessed March 2024

bargaining power within the household and a greater exposure to poverty (Raj, 2010). Preventing child marriage is thus a key factor to promote gender equality.

Previous works in various disciplinary fields have contributed to elucidating the reasons behind early marriage. Economists, in particular, have emphasized the role played by marriage to attenuate negative income shocks. Marrying daughters can indeed be part of an informal insurance strategy of the parents' household (Rosenzweig and Stark, 1989), but it is also a financial resource when a bride price is paid by the groom to the bride's parents. Corno et al. (2020) have shown that negative income shocks are associated with an increase in the probability of child marriage in sub-Saharan Africa, especially where the practice of bride price is the most prevalent. Their results have been confirmed by a subsequent analysis focused on rural Tanzania (Corno and Voena, 2023), but other works such as Khan (2024) on Pakistan, or Hotte and Lambert (2023) on Senegal, provide more nuanced evidence. However, what all contributions to this literature have in common is that they all study low-income or lower-middle income countries, which could suggest that child marriage in relation with households' financial constraints is an issue limited to poor countries only.

We address the issue of child marriage and marital norms in the very different context of Turkey. The country is classified as an upper-middle income country by the World Bank since 2004, and yet, in some regions, bride price norms are still prevalent and child marriage, although illegal, keeps being practised. In this article, we simultaneously explore the impact of droughts on the probability of child marriage in Turkey, and the role played by the prevalence of norms of marriage payments. We use cross-sectional data from the Turkey Demographic Health Surveys (TDHS) collected from 1993 to 2018 that we matched with weather and agricultural data at the province level. Turkey is divided in 81 provinces (*iller*) that correspond to the European NUTS-3 level. In order to explore the role played by bride price on early marriage, we identify among these 81 provinces those where the practice of bride price is the most widespread, by constructing a historical measure of bride price prevalence based on information on actual bride price payments collected among the older cohorts of married women surveyed in the 1993 and

1998 waves of the TDHS. To address the issue of unregistered unions that could tend to minimize the real extent of the practice of child marriage in public statistics, we exploit information contained in the TDHS about the type of union (civil, religious, or both), and the timing of the different ceremonies. Indeed, since no age limit is set for religious ceremonies, the time span between the two ceremonies, for women who married religiously first, may be an indicator of disguised early marriage, in the sense that underage girls would be married religiously and the union would be regularized by a civil ceremony only after the girl has reached the official age to be legally married.

The characteristics of the agricultural sector in Turkey suggest that adverse weather shocks may have major consequences on household income and consumption: although the agricultural sector represents only 9.2% of GDP, it employs 25% of the workforce. In the 2013 DHS, 33% of surveyed women for which we have information on the occupation of their husband are married to a man working in the agricultural sector. Family farms are predominant, and the average farm size is small (6.5ha) (Van Leeuwen et al., 2011). In the 2000s, self-production represented about 20% of the food consumption of rural households (Tekgüç, 2012). Drought is a major risk to agricultural production in Turkey (OECD. et al., 2021), but formal insurance against drought is virtually nonexistent over the period studied. A government supported crop insurance scheme (TARSIM) was launched in 2005, but it did not cover drought before 2021, and is still underdeveloped.[3] In order to verify that droughts represent an adverse income shock in the Turkish context, we first test the impact of weather shocks on agricultural production at the province level. We define two indicators for moderate and severe droughts, and find that they significantly reduce cereal production and total agricultural production, which validates the use of droughts as a proxy for negative income shocks.

Our empirical analysis shows that girls exposed to at least one severe drought episode when aged 12 to 14 have a 2.5 percentage points higher probability to be married before the age of 15, compared to girls exposed to a similar shock in provinces with a low

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[3]In 2021, only 21% of farmers had taken out the agricultural public crop insurance, according to Serpil Günal, general manager of TARSIM, interviewed by the Hürriyet Daily News in April 2022. A village based drought yield insurance was introduced as a separate instrument in the TARSIM program only in 2021.

prevalence of bride price. This 2.5 point increase represents 23% of the mean probability (0.11) of early marriage in our sample of married women, and 33% of the mean probability (0.075) of early marriage in the subsample of married women exposed to a severe drought in provinces with a low prevalence of bride price. Moreover, for those of them who married religiously first, the civil ceremony is delayed by four and a half months. Whatever their marital status at the time of the survey, women exposed to severe drought have 8 month less of education on average when living in provinces with a high prevalence of bride price. Last, in provinces with a high prevalence of bride price, girls exposed to a severe drought during adolescence are more likely to enter an arranged union, without their consent. They marry younger and less educated grooms, compared to girls exposed to the same shock in provinces where bride price is infrequent. Moderate droughts, which are associated in smaller reductions in agricultural production and yields, are found to have little impact on marital outcomes, except on endogamy, defined here as unions with kins, which decreases in provinces with a high prevalence of bride price. Diverging results depending on the prevalence of bride price suggests that endogamy may be perceived by households as a substitute informal insurance mechanism where bride price is infrequent.

Our paper first relates to the growing literature in economics that explores the influence of cultural traditions – such as dowry, patrilocality, and polygyny that are widely-practiced among populations of more than a billion people – on individual and household behaviors (Bau and Fernández, 2021; Anderson and Bidner, 2021).[4] Most empirical papers addressing the effects of marital norms on household and individual decisions exploit data from African countries or from India. We contribute to this literature by emphasizing the role of bride price on girl marriage in response to weather shocks in the context of a fast growing middle-income country whereas the literature until now has focused on low-income countries. We show that severe droughts increase early marriage for girls, only where the practice of bride price is the most frequent, which provides a within-country validation of the hypotheses and cross-country findings of Corno et al. (2020) in a non-African context.

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[4]The fact that cultural traditions affect decision-making has long been understood by anthropologists (Goody and Tambiah, 1973).

Second, by investigating the impact of rainfall shocks and bride price on arranged and endogamous marriages and on relative bride and grooms' characteristics, we contribute to the relatively scarce literature (Mobarak et al., 2013; Molotsky, 2019; Khalifa, 2021) that explores the impact of shocks and norms on the characteristics of resulting unions, beyond age at marriage. In particular, Mobarak et al. (2013) find that an exogenous increase in household wealth reduces consanguineous marriages. In line with these results, our findings suggest that in provinces with a low prevalence of bride price, the practice of endogamous marriage seems to be an alternative informal insurance or credit mechanism for households faced with moderate shocks in environments where bride price prevalence is low. Although early marriage is often implicitly associated with arranged and forced marriage, we add to this literature by formally showing the impact of shocks and bride price norms on those two dimensions. Last, our finding that women exposed to severe droughts and prevalent bride price norms also marry younger and less educated grooms suggests that shocks interact with norms affect spousal matching in a way that may have adverse long-lasting consequences for those women and their offspring.

Last, we contribute to the literature exploring the impact of rainfall shocks on household coping strategies by investigating simultaneously the impact of shocks of different intensity. In the Turkish context, we find that only severe shocks increase child marriage. This result suggests that formal or informal insurance mechanisms are available in response to moderate shocks, but it also raises concerns regarding the ability of the country, as well as many other middle-income countries, to implement tools adapted to larger and more frequent shocks induced by climate change.

The structure of the paper is as follows. Section 2 presents the literature and context. The data are described in Section 3. Section 4 presents our empirical model and discusses identification issues. Results are shown in Section 5 and Section 6 concludes.

2 Literature and context

2.1 Early marriage, marriage characteristics and norms in the literature

Given the negative consequences of early marriage for women and their children, it is crucial to understand its determinants. We know that the legal interdiction of child marriage is insufficient to reduce the practice, in many contexts, including the Turkish one. Among factors explaining child marriage, economic difficulties have been shown to be a major determinant. Poverty is associated with a higher rate of child marriage, one explanation being that marrying a daughter relieves her parents of the responsibility to provide for her (Lee-Rife et al., 2012). The literature exploiting exogenous economic shocks provides mixed evidence. Negative shocks can be associated with lower marriage rate and may delay the entry into marriage, due to low prospects for establishing a self-sufficient household (Palloni et al., 1996). But idiosyncratic economic shocks can also accelerate marriages (Kumala Dewi and Dartanto, 2019), notably in countries where parents have a higher say in the marital decision than their offspring and where marriages can improve their informal insurance network. Our paper builds on Corno et al. (2020), who go one step further, by trying to understand how the impact of negative income shock can be magnified by the custom of bride price exchanges, that increases parents' incentives for marrying their daughter as a child.

Corno et al. (2020) show that women are more likely to marry before the age of 18 following a negative shock to their parent's income in Sub-Saharan Africa (SSA), due to the practice of bride price. On the contrary, in India, where dowry are exchanged, the authors show that negative income shocks have no effect on women's age at marriage. According to their work, in SSA, in the event of a negative income shock, parents are encouraged to accelerate their daughter's marriage in order to collect the bride price and thus smooth out the decline in their consumption. Corno and Voena (2023) provide consistent evidence focusing on rural Tanzania. In contrast, in the context of Pakistan,

Khan (2024) finds that adverse shocks during teenage year do not have a clear-cut effect on the probability to be married in villages where bride price are exchanged. The absence of impact can be due to the fact that other coping mechanisms exist. Similarly, in the context of Senegal where bride price are exchanged, Hotte and Lambert (2023) do not find that negative income shocks during adolescence increase the probability of early marriage.

Our work thus contributes to this literature by addressing the issue in a new context, Turkey, and with a methodology distinct from Corno et al. (2020) who exploit in their main analysis variations in bride price norms between large geographical areas (SSA and India) or countries. For lack of data on contemporary bride price norms, Corno et al. (2020) use information regarding different ethnic groups' marital practices from the Atlas of pre-colonial societies (Muller et al., 2010). In this paper, our analysis is based on the within-country variation in the practice of bride price payments, which allows us to mitigate for unobservable heterogeneity between countries. Our measure of the prevalence bride price is computed from survey data rather than from ethnographic work whom representativeness can be questioned (White and Brudner-White, 1988). While Corno and Voena (2023) exploit village-level variations in bride price practices, our analysis is at the province level, but Corno and Voena (2023) focus on rural Tanzania, whereas our data are representative at the national level and include urban areas that may also be affected by agricultural shocks through the channel of food prices. Unlike Khan (2024), we exploit rainfall shocks rather than more questionable self-reported measures of income shocks.

If age at marriage is crucial for woman's well-being and has focused much of the attention of researchers, other characteristics of marriage may impact women's welfare, such as co-residence with in-laws, patrilocality, consanguinity between spouses (referred to in this paper as endogamy), individual consent to an arranged marriage, or rank in the marriage (in polygamous contexts). The literature on these aspects is scarcer (exceptions are Mobarak et al. (2013); Molotsky (2019); Khalifa (2021)). We discuss several of these dimensions, namely consanguinity (endogamy), arranged marriage, and consent, as we

have rare information on these characteristics in the TDHS.

The practice of endogamy can go hand in hand, for women, with a lower say in expenditure decisions, as shown by Rahman and Rao (2004) in the context of South Asia and a study on rural Pakistan confirms the detrimental effect of consanguinity on children's health Mete et al. (2020). Ghosh et al. (2023), using 19th and 20th century US state-level bans against cousin marriage, also show that this type of marriage can contribute to impede development in the long run. Other works nevertheless highlight that it can decrease the occurrence of intimate partner violence (Weimer, 2019). The relationship between arranged marriages and well-being has been less investigated. The practice still raises the question of individual consent to the choice of the partner, which could have consequences on marital well-being: on this matter, the literature is relatively scarce because the lack of data is even more critical. The literature on the links between arranged or self choice marriage and marital satisfaction provides mixed evidence (Arif and Fatima, 2015; Xiaohe and Whyte, 1990).

A strand of the literature is exploring the factors that determine the occurrence of practices such as endogamous or arranged marriages. The advantage of the practice of arranged marriages partly resides in the informal insurance that it provides to the parents (Rubio, 2014), but it is challenged by industrialization and urbanization according to the upholders of the Modernization theory (Adams, 2010; Goode, 1963). Since the practice has already been shown to be linked with the demand of ex-ante insurance of the parents, it seems relevant to explore whether arranged marriage of daughters could also be a way to deal ex-post with the occurrence of negative shocks. This is especially likely in regions where bride prices are exchanged, and where the incentive to quickly marry a daughter are stronger. Indeed, arranged marriages are potentially a way to reduce the time needed to find a suitable partner. We could also observe a mechanical increase in arranged marriages if early marriages are more frequent after a negative income shock and if early marriages are disproportionately arranged by the parents. To our knowledge, whether the interaction between the frequency of the bride price and negative income shocks increases or not the practice of arranged marriage is a question that has never been

formally investigated before.

Regarding the practice of endogamy, three major motives have been identified in the literature. Endogamy is a way to improve the property retention within the family (Goody, 1983). It can also facilitate the exchanges of women and therefore the occurrence of marriages within the group, in a system where marriage is used as a repayment for past matrimonial debts (Lévi-Strauss, 1967). Endogamy has also been shown to meet a parental demand for insurance (Hotte and Marazyan, 2020). But only a very small part of this literature exploits exogenous economic shocks or focuses on the role played by marital payments in union characteristics. To our knowledge, the only paper on the topic is Mobarak et al. (2013), which looks at the impact of a flood in Bangladesh. The authors show that brides from non-flooded households received larger dowry payments and were less likely to be married with relatives. We investigate the same question, using negative income shock in the Turkish context. A negative income shock could have an ambiguous effect on endogamy: it could increase endogamous marriages (if the family wants to marry quickly their daughter) but also make them less probable if the families of potential grooms are also affected by the shock. It seems relevant to investigate the interaction of the bride price practice and income shocks, as the potential impacts can be ambiguous. Indeed, the impact of the interaction between bride price custom and the occurrence of a negative income shock can be negative on child marriage if bride prices are lower when the bride and grooms are relatives. But it could also be positive if bride price amounts do not depend on the nature of the marriage (endogamous or not).[5]

2.2 Marriage and bride price payments in the Turkish context

In the Turkish tradition, marriages are commonly arranged, although children may provide informal consent (Van Eck, 2002). Early marriage is associated with the norm of women's virginity before marriage that determines the honor (*namuz*) of their male relatives. A virgin woman will also obtain a higher bride price (Tutku, 2013). Elopement of

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[5]According to the TDHS 1993, the proportion of unions with a bride price exchanged is not significantly different in endogamous versus non-endogamous unions but the TDHS data do not allow us to explore potential differences in amounts paid, as bride price amounts are not recorded.

a bride to avoid an arranged marriage or loss (or alleged loss) of virginity before marriage may result in honour crime perpetrated by the bride's husband, father, brother or uncle.

Poverty, especially in rural areas, has been related to the practice of bride price: parents accept a bride price for their daughters, often pulling them out of school at a very young age to secure that they have a husband and that the parents receive what the girl is worth while she is young and virgin (Tutku, 2013).[6] Bride price used to be associated with either a large age difference between spouses (parents marrying their teenage daughter to an older man) or marriage with a first or second cousin. These strategies aimed at ensuring that the little wealth or commodity a family had did not pass into a new bloodline (Tutku, 2013). Although no quantitative data exist on the amount of the bride price and its financial significance for (poor) households, the fact that such strategies were documented suggests that its amount was not anecdotal. Although these strategies may be less frequently at stake today, endogamous marriages are still frequent. Kaplan et al. (2016) measure the prevalence of endogamous marriage in Turkey and its correlation with socio-demographic and obstetric risk factors, using survey data collected in 2013 among 4900 married women. In their data, the prevalence of endogamous marriage amounts to 18.5%, and of these, 57.8% were first cousin marriages. They find endogamous marriage to be positively correlated with living in an extended family, a low education level, a younger age at first marriage, and a poor perceived economic status. In our sample, a bride price has been exchanged in 25% of marriages with a relative, when it is the case of only 14% of non-endogamous marriages.

Yüksel-Kaptanoğlu and Ergöçmen (2014) provide a descriptive analysis of trends in early marriage in Turkey from 1978 to 2008, and explore associated factors, based on data from the 1978 Turkish Fertility Survey and the 2008 wave of the TDHS. They find significant associations with lower levels of education and geographical location

As for the legal context, since negotiations for Turkey's membership to the European Union started in 2005, violence against women in the country has been under the mi-

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[6]In a more recent context, Yaman (2020), who relies on interviews and focus groups with 120 Syrian women in Istanbul confirms the economic role of child marriage, as a "survival strategy" to avoid extreme poverty, and sometimes perceived by mothers as a better option than child labor.

croscope of NGOs, feminist organizations, and European Union's officials, that pushed Turkey into the process of modernization of the law. Part of this process is the reform of the Civil Code in 2001 including for instance equal rights for spouses over property acquired during marriage. In 2002, as mentioned above, a reform included a revision of minimum age of marriage. The process of modernization came to a halt with the withdrawal of Turkey from the Convention of Istanbul in 2021. Since the AK Party's accession to power, there were attempts at introducing Islamist legislation. A form of legal pluralism is observed and is investigated by Yilmaz (2021).

3 Data

3.1 Data on marriage in Turkey

The main data source used in this article is the Turkey Demographic and Health Survey (TDHS), collected every five years from 1993. In total, our main sample is made of a pooled cross-section of around 37,000 girls and women aged 15 and over, surveyed in 1998, 2003, 2008, 2013 and 2018-2019, among which about 23,000 are married. The 1993 wave is used to construct our indicator of bride price prelavence (see below). Standard Demographic and Health Surveys (DHS) are particularly suited to our study, as they contain detailed characteristics of women's marital history. TDHS are particularly rich on this aspect, compared to DHS conducted in many other countries, as they contain detailed information on childhood place of residence and on women's first union. In particular, we know whether the ceremony was civil, religious, or both, and in the latter case, which ceremony took place first and the time span between the two ceremonies. As mentioned in the introduction, a longer time interval between the two ceremonies may be indicative of child marriage. Our interpretation is supported by data provided by the Turkish national statistical institute about the form of solemnization by age groups and by Yüksel-Kaptanoğlu and Ergöçmen (2014). In 2016, 97% of married women aged 20 and over were married with both a civil and a religious solemnization. This proportion drops to 81.8% for girls aged 15-19, while they are 17.7% to be in unions with a religious

solemnization only. In addition, we know whether the union was endogamous, whether the groom was a close relative of the mother or the father, whether it was arranged, and if so, whether the bride consented to her parents' choice.[7] We further exploit available information on the age and eduction of the groom[8]. Last, we know whether a payment was made to the bride's family but we have no information on amounts paid. 16.6% of married women in our sample report that a bride price was paid at their first union. The proportion tends to increase for younger cohorts (21.8% among women born after 1988) who contain, by construction, a higher proportion of women married at a younger age. We do not use directly individual data on bride price payments, as they are very likely endogenous. Instead, we take advantage of the availability of this information to construct a province-level measure of the historical prevalence of bride money payments (detailed in the next subsection).

We focus on women born in 1969 and thereafter, for whom we have data on weather shocks during adolescence. Figure 1 represents the prevalence of early marriage for women born from 1969 to 2002 in the TDHS. A clear declining trend is observed for very early marriage, especially in the 1980s. However, among women born in the early 1990s, around 2% were married before the age of 15. The share of women married under the age of 18 was on a downward slope until 1985, and then stabilized around 20-25%, with a possible drop for the cohorts born in the late 1990s that is to be confirmed in future TDHS waves. Note that the 2002 law, which set to 18 the minimum legal age at marriage, and should have applied to women born after 1984, appears to have had little effect on the prevalence of marriage before 18.[9]

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[7]Information on consent is not collected in the 2003 wave.

[8]While age of the groom is available for women's first union, education of the groom is provided for the current union only. However, only 2.2% of women in our sample had more than one union.

[9]Similar graphs with the year of marriage instead of the year of birth on the x axis actually reveal a small and temporary decrease in the share of early marriage in 2002 and 2003, followed by a rebound as soon as 2004. The 2002 law does not seem to have significantly affected the slowly declining trend of early marriage practices.

Figure 1: Share of early marriage by year of birth, 1969-2002
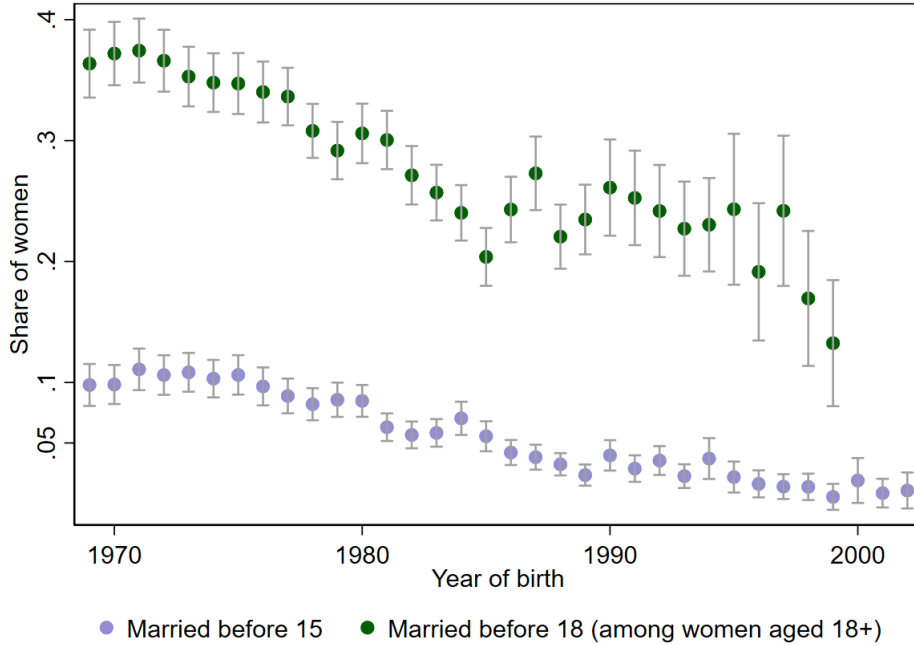
3.2   Province-level prevalence of bride money payments

Turkey is divided into 81 provinces corresponding to NUTS-3 statistical regions, and province is the most precise location available in the TDHS. The country is characterized by a large divide between modern Western cities and more rural and traditional areas, mostly in the East and in Central Anatolia (Aşık et al., 2023). In order to study the role of bride price payment on incentives to marry daughters early, we construct a province-level variable measuring the prevalence of the practice of bride price. We use for this purpose information contained in the first two wave of the TDHS, collected in 1993 and 1998: we compute for each province the weighted[10] share of women born in this province who declare that a bride price was paid on the occasion of their first union. To avoid endogeneity issues, since our estimation sample is made of women born after 1969,

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[10]Using TDHS weights. Note that the TDHS are representative at the level of the major five regions (West, South, Central, North, and East), and at the smaller NUTS 1 regional level (12 regions) for "selected indicators" without further detail (Turkey DHS 2018, final report, Appendix A). By computing a bride price indicator at the finer NUTS 3 (province) level, we may introduce noise in our measure, which would tend to bias our results towards zero.

we compute the province-level share of bride price practice by restricting the sample to women married before 1981, ie before the oldest cohort of women in our estimation sample (born in 1969) is 12 years old.[11] This measure of bride price is assumed to be a proxy for the exposure of subsequent cohorts of women to traditional cultural norms implying the payment of an amount of money to the family of the bride. Map 2 illustrates the variation in cultural norms related to marriage across provinces. In the Western provinces of Izmir and Mugla, the practice of bride price is virtually non-existent. By contrast, in the Eastern province of Van, 88.4% of women married before 1981 and interviewed either in 1993 or in 1998 declare that a bride price was paid to their family at the occasion of their marriage. However, the heterogeneity of the practice of bride price is not limited to a basic opposition between West and East. While the practice of bride price is obviously widespread in the Eastern part of Turkey, the custom is also common in some provinces in the West, such as Afyon, or in the Black Sea region, as in Sinop. Since our measure

Figure 2: Distribution of bride money payment practice in 1993 and 1998 among women married before 1981, by province (deciles)
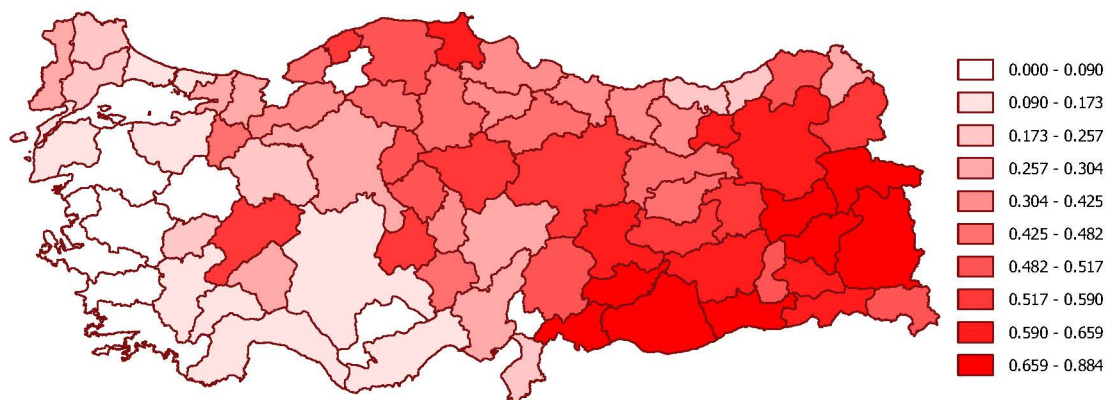
Source : TDHS 1993 and 1998. Legend: weighted share of women married before 1981 with an exchange of bride price (deciles)

is constructed at the province level using data collected among women married before the oldest women in our regression sample were 12, we are quite confident that it is not endogenous. Indeed, weather shocks experienced during adolescence may have an impact

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[11]We drop from the sample the province of Iğdir, for which we can use 4 observations only to construct our measure for the historical prevalence of bride price. Our results are robust to additionally excluding the 10 other provinces for which less than 20 individual observations were available to compute the value of the bride price share (results available upon request). On average, the calculation of the province-level prevalence of bride price is based on 113 individual values.

on the type of unions formed, and in particular on the payment of a bride price. However, we rely here on a province level variable measured before unions under study were formed to capture exposure to norms, rather than directly use individual statements on bride price payments.

In the following analysis, we define a binary indicator equal to one for provinces with a high prevalence of bride price, ie provinces where our indicator of bride price is above the national median (equal to 42.5%). Descriptive statistics of the main demographic indicators used in this article depending on the province-level historical prevalence of bride price norms are shown in Appendix Table 4.

3.3   Weather data and agricultural production

We merge TDHS data with gridded weather data converted at the province level, to construct measures of weather shocks. Rainfall data come from the CHIRPS project, and are available from 1981 onwards.[12] In addition, we use agricultural data on crop production at the province level, obtained from the Turkish Statistical Institute.

In order to validate our use of rainfall shocks as relevant proxies for income shocks, we estimate the following equation:

$$Y_{p,t} = a + b_0 DSevereShock_{p,t} + b_1 DModerateShock_{p,t} + D_p + \epsilon_p \qquad (1)$$

where $Y_{p,t}$ represents the production (in thousand tonnes) for different categories of crops or yields (for wheat only) in year t, measured at the province level (p). $DSevereShock_{p,t}$ is a dummy equal to one if the rainfall z-score measured over the 9 months of the growing season (January to September) in year t[13] and province p is below -1.64, which corre-

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[12]The Climate Hazards Group InfraRed Precipitation with Station (CHIRPS) data archive is a quasi-global (50S-50N), gridded 0.05 degree resolution, 1981 to near-real time precipitation time series. The terrestrial precipitation estimates, are available in daily to annual time intervals. CHIRPS was created in collaboration with scientists at the U.S. Geological Survey (USGS) Earth Resources Observation and Science (EROS) Center to deliver reliable, up-to-date, and more complete datasets for a number of early warning objectives (such as trend analysis and seasonal drought monitoring) using satellite data and precipitation grids produced from station data. They can be downloaded at this address: http://chg.geog.ucsb.edu/data/chirps/ (Funk et al., 2014).

[13]The z-score is computed as the difference between observed precipitations in province p and average precipitations in p for the same 9 months over the 1981-2018 period divided by the standard deviation

sponds to the 5th percentile of the normal distribution. $DModerateShock_{p,t}$ is a dummy equal to one if the z-score is between -1.64 and -1.28, that is, between the 5th and the 10th percentile of the normal distribution. Those two indicators capture extreme and moderate droughts by comparing observed rainfall to average rainfall for the same province and period of the year, once the natural variability of rainfall is accounted for. There is no consensus in the literature on the definition of rainfall shocks. While several articles use continuous measures of normalized precipitations (Maccini and Yang, 2009; Yang and Choi, 2007), Corno et al. (2020) choose in their main analysis to characterize shocks by rainfall below the 15th percentile, and Shah and Steinberg (2017) use the 20th percentile as a cutoff. Our specification allows us to investigate simultaneously the impact of severe and moderate shocks. Figure 3 (in Appendix), illustrates the distribution of shocks over the period under study. There is variation in our indicators over time, in spite of a major drought in 1989, which affected almost all provinces. However, the majority of the shocks observed over our period of interest occurred in the 1980s and 1990s. The potential issues raised by the temporal distribution of rainfall shocks are further discussed in Sections 4.2 and Section 5.4.

Estimation results for equation 1 are shown in Table 5 in Appendix. We find that negative rainfall shocks have a large and significant effect on agricultural output. Column 1 shows for example that when a severe rainfall shock is observed, the production of cereals decreases by 335 thousand tonnes, whereas the average production of cereals over the period is 1114 thousand tonnes, which represents a 30% drop in cereal production. In total, column (5) shows that a severe drought causes a 25% decrease (424 thousand tonnes) in our aggregate measure of agricultural production constructed as the total of cereals, fruit and vegetables productions. Moderate drought episodes are found to cause a less dramatic reduction (17%) in total production. We additionally use yield data available for wheat and find that a severe drought decreases wheat yields by 1103 kg per hectare, while the average yield for the period is 4879 kg per hectare (22% decrease). Moderate droughts are found to have a much lower impact on wheat yields (6.5% decline).

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of precipitations in province p over 1981-2018.

4 Empirical model

4.1 Impact of weather shocks on marital and educational outcomes

In order to assess the impact of income shocks and bride money practice on early marriage we estimate the following generic equation:

$$
\begin{aligned}
Y_{i,p,y} =\ & \beta_0 + \beta_1 DSevereShock_{\tau_{i,p,y}} + \beta_2 DSevereShock_{\tau_{i,p,y}} \times BridePrice_p \\
& + \beta_3 DModerateShock_{\tau_{i,p,y}} + \beta_4 DModerateShock_{\tau_{i,p,y}} \times BridePrice_p \\
& + D_p + D_y + D_w + \varepsilon_{i,p,y}
\end{aligned}
\tag{2}
$$

where $Y_{i,p,y}$ represents different definitions or proxies of early marriage, for woman i, born in province p and year y. $Y_{i,p,y}$ includes several proxies for early marriage: binary variables for being married before the age of 15 and 18[14], age at marriage, age at first birth, and the time span between religious and civil ceremonies. Equation 2 is first estimated on the sample of married women, for whom we have detailed information about their first union, and then on a larger sample of all women over 15, whatever their marital status, for a reduced set of outcomes: marriage before 15, before 18, and the number of years of education. $DSevereShock\_\tau_{i,p,y}$ is a binary variable equal to one if at least one severe negative rainfall shock (z-score ≤ -1.64) is observed in province p when woman i was in age range τ. Similarly, $DModerateShock\_\tau_{i,p,y}$ is a dummy equal to one if at least one moderate droughts ($-1.64 <$ z-score ≤ -1.28) is observed. The considered age range is 12 to 17 for all outcomes except marriage before the age of 15, and education, for which the relevant age range is 12 to 14. The lower bound, 12, corresponds to a commonly admitted age for puberty, and higher bounds were chosen with respect to the 15 and 18 age cut-offs to define child marriage and early marriage that are used in the literature.

The rainfall shock variables are interacted with the binary variable $BridePrice_p$ equal

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[14]We followed the literature in setting the age cut-offs at 15 and 18. Note however that we find consistent results with an age cut-off at 16.

to one if woman i lived during her childhood in a province where the average prevalence of the practice of bride price is above the national median. We also test another specification in which we interact the shock variable with binary variables for the different quartiles of the distribution of bride price prevalence (see Online Appendix Table B2). The construction of the average prevalence of bride price is detailed in Section 3.2 above.

D_p, D_y, and D_w are province of origin, year-of-birth, and survey wave fixed-effects. Note that province-level fixed effects D_p capture all time-invariant province level characteristics, including the historical prevalence of bride price measured by $BridePrice_p$. Standard errors are clustered at the province level. All individual observations are weighted using adjusted TDHS weights to avoid over-representing cohorts that are surveyed in multiple waves Crespin-Boucaud (2020).

Last, we estimate Equation 2 on the sample of married women on various characteristics of their first union. Our list of dependent variables includes dummy variables for endogamous union for arranged union and consent of the bride, age and education of the groom, and age and education difference between spouses.

4.2   Threats to identification and potential biases

A potential threat to identification comes from the fact that provinces where the practice of bride price is the most widespread are also likely to differ on a number of characteristics from provinces where the practice is nearly extinct. Our specifications include province fixed-effects that capture time-invariant differences across provinces. The practice of bride price is nonetheless likely correlated with traditional norms and practices, which could challenge the interpretation of our results. However, rather than focusing on the impact of bride price per se, we are interested in the interaction between negative income shocks and the prevalence of bride price norms. It is true that other norms may coexist with bride price and urge parents to marry their daughters early, but it is less clear which of those norms, other than bride price, would imply earlier marriages in bad times. The financial incentive provided by bride price to marry daughters earlier when faced with a negative income shocks is the most likely explanation. However, other marital norms that

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may be correlated with the practice of bride price, such as within-kin-group marriages, may also provide informal insurance and obey to financial incentives, as has been found in other contexts (Hotte and Marazyan, 2020). If traditional marital norms are positively correlated and correspond to insurance mechanisms, then the effect that we intend to measure would be biased towards zero. We address the role of other confounding norms and discuss the role of rural versus urban environments in Section 5.4.

It could also be argued that the geographical distribution of rainfall shocks may be correlated with marital payment practices. Indeed, long-term rainfall patterns, and in particular a more frequent occurrence of shocks, could explain the persistence of bride price, as a form of insurance against negative income shocks. However, as reported in Table 6 in Appendix, the average standard deviation of rainfall is larger in provinces with a low practice of bride price over our period of interest, and there is no significant difference between provinces with a high and low practice of bride price over the long term.[15]

A final challenge for interpretation is linked to the distribution of rainfall shocks during the period of interest, characterized by a major global shock in 1989 and a greater number of shocks in the 1980s and 1990s, as shown in Appendix Table 3. First, in 1989, Turkey was affected by a generalized drought episode, that hit a large majority of provinces. We cannot exclude that part of the effect that we intend to measure is driven by this exceptional shock. This issue is further explored in Section 5.4 by including a triple interaction in our model with a binary variable equal to one for cohorts that were too young to be affected by this severe drought. Second, with the exception of a drought episode in 2008 that affected a small proportion of provinces, all rainfall shocks occurred between 1984 and 1995. This feature may bias our results towards zero if selective mortality affects women who were married at a young age as a consequence of rainfall shocks.

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[15]To compute long-term standard deviation of rainfall we use the geo-referenced datasets provided by the University of Delaware which are less precise than the CHIRPS products but cover a wider time range.

5   Results

5.1   Rainfall shocks, bride money prevalence, and marriage

Table 1 shows estimation results of equation 2 on the sub-sample of ever married women. As discussed above, since declared age at marriage, at least for part of our sample, could be biased by the legal framework, which restricted in 2002 the possibility of civil marriage before the age of 18, we use a bundle of measures to proxy for early marriage. In particular, the second part of the table shows the effect of rainfall shocks on the type and timing of wedding ceremonies.

We find that exposure to a severe drought - characterized by rainfall below the 5th percentile of the normal distribution - during adolescence significantly increases the probability to be married under 15 only for girls born in provinces with a high prevalence of the practice of bride price (column 2). After a severe shock, girls living in those provinces experience a 2.5 percentage point (ie 23% of the sample mean) increase in the probability to be married before 15 compared to girls faced with the same shock in provinces with a low prevalence of bride price. Those girls marry on average 4 months earlier, with a civil ceremony delayed by about 4 and a half month for those who married religiously first. By contrast, in provinces where bride price norms are less pervasive severe droughts tend to increase age at marriage and reduce the time between the religious and civil ceremony. Moderate droughts have no significant impact on early marriage, regardless of bride price norms, but they tend to reduce the probability of early childbirth and the time between the religious and civil ceremonies only in provinces with a high prevalence of bride price.

Taken together, these results suggest that in the absence of a financial transfer directed to the bride's parents, there are no financial incentives for parent to marry their daughter early when faced with a severe adverse income shock. In this situation, parents may choose to delay the marriage of a daughter because they are unable to support the cost of the ceremony, traditionally borne by the bride's family. This cost is most probably more than compensated by the bride price in regions where marital payments are exchanged.

In regions where bride price is infrequent, as well as when the shock is not too large, it is also possible that parents focus their attention on other ways to cope with the shock (bank loan, help from relatives), making the marriage of a child less a priority at this time. It may also be easier to find help to cope with a shock when this shock is not too large and the amount of help needed limited. However testing these hypotheses would require information on households' coping strategies that is not available in the TDHS.

Table 1: Rainfall shocks and early marriage - sample of ever married women - 1998 to 2018

	(1)	(2)	(3)	(4)	(5)	(6)
	Married under 15		Married under 18		Age at marriage	
Rainfall 12-14 < 5th pctile	0.001	-0.009				
	(0.012)	(0.012)				
Rainfall 12-14 5th to 10th pctile	-0.011	-0.009				
	(0.008)	(0.009)				
Rainfall 12-14 < 5th pctile X bride price		0.025**				
		(0.010)				
Rainfall 12-14 5th to 10th pctile X bride price		-0.007				
		(0.014)				
Rainfall 12-17 < 5th pctile			-0.025	-0.035	0.266	0.412**
			(0.025)	(0.028)	(0.160)	(0.178)
Rainfall 12-17 5th to 10th pctile			-0.020	-0.016	0.165	0.119
			(0.014)	(0.013)	(0.121)	(0.113)
Rainfall 12-17 < 5th pctile X bride price				0.023		-0.333**
				(0.020)		(0.145)
Rainfall 12-17 5th to 10th pctile X bride price				-0.012		0.141
				(0.029)		(0.210)
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year of birth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	0.11	0.11	0.41	0.41	19.80	19.80
N	22929	22929	22929	22929	22929	22929

	(7)	(8)	(9)	(10)	(11)	(12)
	Childbirth before 18		Religious first		Time between 2 ceremonies if religious first	
Rainfall 12-17 < 5th pctile	-0.007	-0.014	0.037**	0.037	-3.807***	-5.759***
	(0.016)	(0.018)	(0.019)	(0.023)	(1.309)	(1.671)
Rainfall 12-17 5th to 10th pctile	-0.008	0.011	0.008	0.006	-2.543*	0.370
	(0.013)	(0.014)	(0.014)	(0.019)	(1.379)	(1.396)
Rainfall 12-17 < 5th pctile X bride price		0.021		-0.000		4.554***
		(0.017)		(0.021)		(1.419)
Rainfall 12-17 5th to 10th pctile X bride price		-0.048**		0.007		-5.894***
		(0.021)		(0.027)		(1.918)
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year of birth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	0.23	0.23	0.56	0.56	14.76	14.76
N	22786	22786	20985	20985	11770	11770

Standard errors in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.
Controls not shown: survey year dummies
Data source: Turkey DHS 1998 to 2018

5.2 Sample selection issues and educational outcomes

Our main results are estimated over the sample of married women, for whom we have the most complete set of information. However, this sample is selected over our outcome of interest, marriage, which may be a source of concern. Yet, partial information is available in the DHS for women who are not married yet and thus not included in the main survey module. We use such information to first corroborate our main results, and second, to provide additional results on education. We thus re-estimate equation 2 on an enlarged sample of over 37,500 observations including all women aged 15 and over, for whom we have information on both marital status and educational attainment. Results are shown in Table 2. On this unselected sample, we find that girls who were exposed to a severe drought when aged 12 to 14 and were living in a province with a high practice of bride price are 3.6 percentage point (ie 51% compared to sample mean) more likely to be married before the age of 15 than those living in provinces where the practice is less widespread. As noted above, this finding is consistent with the bride price providing a financial incentive for parents to marry their daughter early when faced with a major shock, whereas in the absence of bride price, the cost of the ceremony may exceed what may be perceived as the costs of keeping in the household an extra-mouth to feed in times of hardship. Results reported in column (4) for being married before the age of 18 are not significant.

Consistent with the extensive literature linking early marriage to school dropout and with our findings on early marriage, results reported in column (6) show that severe droughts have a negative effect on educational attainment for girls living in provinces with a high historical practice of bride price. While shocks may in theory have a direct impact on educational attainment and school dropout, we do not find any negative impact of shocks on the number of years of education for girls living in provinces with a low prevalence of bride price. This finding suggests that the lower educational attainment - corresponding to 0.7 year or 8 months on average - of girls hit by a severe drought is partly due to early marriage. These findings confirm that negative income shocks are

particularly detrimental to girls in regions where the practice of bride price is common, and point to the role played by marital norms and institutions.

Table 2: Rainfall shocks and early marriage 1998-2018 - all women born post 1969

	(1)	(2)	(3)	(4)	(5)	(6)
	Married under 15		Married under 18		Nb years of education	
Rainfall 12-14 < 5th pctile	-0.003	-0.018**			0.053	0.341
	(0.009)	(0.009)			(0.171)	(0.231)
Rainfall 12-14 5th to 10th pctile	-0.008*	-0.009*			-0.037	-0.031
	(0.005)	(0.005)			(0.098)	(0.119)
Rainfall 12-14 < 5th pctile X bride price		0.036***				-0.685***
		(0.009)				(0.210)
Rainfall 12-14 5th to 10th pctile X bride price		0.001				0.008
		(0.009)				(0.240)
Rainfall 12-17 < 5th pctile			-0.024	-0.029		
			(0.022)	(0.026)		
Rainfall 12-17 5th to 10th pctile			-0.021*	-0.016		
			(0.011)	(0.011)		
Rainfall 12-17 < 5th pctile X bride price				0.014		
				(0.019)		
Rainfall 12-17 5th to 10th pctile X bride price				-0.016		
				(0.024)		
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year of birth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	0.07	0.07	0.30	0.30	7.27	7.27
N	37252	37252	30037	30037	37961	37961

Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.
Controls not shown: survey year dummies
In columns (3) and (4), the sample is restricted to women aged 18 and over.
Data source: Turkey DHS 1998 to 2013

5.3   Marriage characteristics

We exploit in this section the richness of information contained in the TDHS Turkey to document the effect of shocks on characteristics of unions, depending on the prevalence of bride price norms. Results reported in Table 3 first show that severe droughts do not affect endogamy, in contrast to moderate droughts. Moderate shocks tend to increase the probability of a within-kin-group marriage, especially with a close relative of the mother, in provinces with a low prevalence of bride price, and decrease the probability of endogamous marriage in provinces with a high prevalence of bride price. These findings suggest that the cost of the ceremony may be lower in the case of within-kin-group marriages. However this perceived benefit may be outbalanced by an expected higher bride price in the case of a non-endogamous union in provinces where the practice of such marital payments is widespread. As discussed in Section 4.2, and consistent with Hotte and Marazyan (2020), endogamous marriage and bride price may be perceived as informal

insurance mechanisms against shocks, but our findings suggest that they are substitutes rather than complements. Second, severe shocks increase the probability of arranged marriage, in particular without the bride's consent, in provinces with a high prevalence of bride price. This finding is consistent with our result on the higher probability of marriage under 15, as child marriages are most probably arranged by the parents. Last, we find that severe shocks in provinces with a widespread practice of bride price are associated with a younger age at marriage and a lower educational attainment for the groom. This finding is associated with a reduced age and education gap (though significant only for education) between spouses.

5.4   Bride price norms and confounding factors

As discussed in Section 4.2, our interpretation based upon the role of the prevalence of bride price norms may be challenged by the fact that our historical measure of bride price may also capture other traditional norms or customs.

Descriptive statistics shown in Appendix Table 6 provide a first picture of potential differences between provinces with high and low prevalence of bride price. We combine in this table variables computed from the TDHS (early marriage variables) to indicators from the 1985 census[16] (sex-ratio and rural dummy[17]). The sex-ratio, which is likely to influence marital norms, is not significantly different in the two types of provinces. By contrast, and as expected, provinces with a high practice of bride price are more likely to be rural. They are also characterized by an ex-ante greater prevalence of child marriage.

Tradition, rurality, and ethnic minorities

In order to try to separate the effect of bride price to that of other traditional norms, we test additional specifications in which we include interactions between our shock variables and the province level prevalence of marriage before the age of 15 for women born before 1969. We use this measure as a proxy for all other norms that could be correlated with

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[16]10% extraction available at https://international.ipums.org/international/

[17]We use information on the sector of activity of household heads from the 1985 census and define a province as being agricultural if more than 52% - the national median - of active household heads work in the agricultural sector.

Table 3: Rainfall shocks and marriage characterictics - sample of ever married women born post 1969 - 1998 to 2018

| | (1) | (2) | (3) | (4) | (5) | (6) |
	Endogamous		Endogamous close maternal		Endogamous close paternal	
Rainfall 12-17 < 5th pctile	0.008	0.010	0.005	0.006	-0.010	-0.014
	(0.015)	(0.016)	(0.009)	(0.010)	(0.008)	(0.009)
Rainfall 12-17 5th to 10th pctile	0.026**	0.042***	-0.001	0.010*	0.005	0.008
	(0.012)	(0.011)	(0.005)	(0.006)	(0.007)	(0.008)
Rainfall 12-17 < 5th pctile X bride price		-0.000		0.001		0.008
		(0.014)		(0.008)		(0.009)
Rainfall 12-17 5th to 10th pctile X bride price		-0.040**		-0.026**		-0.007
		(0.019)		(0.012)		(0.013)
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year of birth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	0.25	0.25	0.06	0.06	0.08	0.08
N	22929	22929	22929	22929	22929	22929

| | (7) | (8) | (9) | (10) | (11) | (12) |
	Arranged		Without girl consent		Groom age	
Rainfall 12-17 < 5th pctile	-0.032	-0.053**	-0.019	-0.038***	-0.015	0.231
	(0.020)	(0.022)	(0.013)	(0.013)	(0.171)	(0.186)
Rainfall 12-17 5th to 10th pctile	0.013	0.016	-0.008	-0.012*	0.230	0.309*
	(0.014)	(0.015)	(0.007)	(0.007)	(0.143)	(0.178)
Rainfall 12-17 < 5th pctile X bride price		0.046**		0.039***		-0.513**
		(0.021)		(0.011)		(0.209)
Rainfall 12-17 5th to 10th pctile X bride price		-0.009		0.007		-0.151
		(0.023)		(0.012)		(0.241)
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year of birth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	0.48	0.48	0.07	0.07	24.45	24.45
N	22929	22929	18644	18644	22697	22697

| | (13) | (14) | (15) | (16) | (17) | (18) |
	Age gap		Groom education		Education gap	
Rainfall 12-17 < 5th pctile	-0.272*	-0.167	0.252*	0.476***	0.125	0.348*
	(0.156)	(0.173)	(0.128)	(0.138)	(0.146)	(0.177)
Rainfall 12-17 5th to 10th pctile	0.065	0.178	0.052	0.095	0.134	0.327***
	(0.120)	(0.147)	(0.105)	(0.159)	(0.092)	(0.111)
Rainfall 12-17 < 5th pctile X bride price		-0.194		-0.476***		-0.427***
		(0.184)		(0.126)		(0.128)
Rainfall 12-17 5th to 10th pctile X bride price		-0.261		-0.065		-0.438**
		(0.239)		(0.194)		(0.170)
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year of birth fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	4.64	4.64	8.03	8.03	1.66	1.66
N	22697	22697	22733	22733	22730	22730

Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.
Controls not shown: survey year dummies
Sum coeff. reports the sum of the coefficients on the shock variable and its interaction with the bride price indicator.
P-value reports the p-value of the test of Sum coeff. against zero.
Data source: Turkey DHS 1998 to 2013

bride price and result from the historical exposure to shocks. Results are reported in Online Appendix Table B3. The coefficient on the interaction between severe shocks and the bride price dummy remains positive and significant for marriage under 15 (column 2). This finding suggests that although part of our results can be due to past exposure to shocks and attributed to the co-existence of other traditional norms, bride price remains a significant driver of early marriage.

Second, as shown in Appendix Table 6, provinces with a historical prevalence of bride price above the median are significantly more rural than other provinces. The coefficients on the interaction between shocks and the bride price dummy may thus in part capture the effect of a greater vulnerability to weather shocks in more rural and/or agricultural areas. In Online Appendix Table B4, we test whether our results are driven by rural areas: we re-estimate equation 2, controlling for the interaction between shock variables and the dummy for agricultural provinces. The coefficient on the interaction between severe droughts and the bride price dummy remains positive and significant for marriage under 15. Although part of our findings can be explained by a greater vulnerability to shocks in rural provinces, this is not the only driver of our results.

Further confirmation of the fact that our bride price variable is not capturing only a greater vulnerability linked to rural livelihoods is provided in Online Appendix Tables B5 and B6. We use information available in the TDHS about the self-declared type of area of origin. We know whether women lived during their childhood in the province capital city or in the main city of one of the several districts composing each province, which we defined as urban settings, for lack of more information on the urban or rural nature of the place. Other categories, ie sub-district main city, or village, are defined as rural. We then replicate our main regression table separately on the rural and urban sub-samples. The coefficient on the interaction between the severe shock and bride price dummies remains significant for being married before 15 on both sub-samples. These findings suggest that households living in urban settings in a context such as Turkey in the 1980s, 1990s or early 2000s are not immune to weather shocks affecting agricultural production. This is especially likely if food markets are mostly local since, in that case, droughts or other adverse weather shocks that negatively affect agricultural production also impact households located in urban areas through their impact on urban food prices. This mechanism has been documented in other contexts (Cohen and Garrett, 2010; Baez et al., 2017). Although there is little academic work on this issue in Turkey, Brosig et al. (2011), who focus on the wheat market, incidentally show evidence of a great heterogeneity in market integration and transaction costs across Turkish provinces at the

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expense of the most peripheral ones, resulting in large local price variations in wheat prices.

Last, we explore the role of the Kurdish minority which is the largest ethnic minority in Turkey. Indeed, Kurds are predominant in the South-Eastern part of the country, which is also characterized by a high prevalence of bride price. We estimate our model on separate samples - Kurdish and non-Kurdish. Ethnic status is defined based on the mother tongue that is declared by surveyed women in the TDHS. On both subsamples, the coefficient on the interaction between severe shocks and bride price is positive and significant for marriage under 15 suggesting that our results are not driven by the Kurdish group. Estimation results are reported in Tables B7 and B8 in the Online Appendix.

Heterogeneity across cohorts: the 1989 global drought

As mentioned in Section 4.2, a significant proportion of shocked observations are caused by the (quasi) global drought that affected Turkey in 1989. Our results could be driven by the fact that we compare different cohorts, born before and after 1978, the former one being more likely to be affected by a shock, while the latter are less exposed. Nonetheless, as discussed in Section 3.3, Appendix Figure 3 shows that there is some variation in our shock dummy both before and after 1989. To test the potential differences in estimated effects for the oldest and youngest cohorts, we interact both the shock variables and their interaction with the bride price dummy with a binary variable equal to one for women born after 1978. Results are shown in Table B9 in the Online Appendix. The coefficient on the triple interaction term with severe droughts is not significant, except for the religious ceremony coming first and the lapse of time between the religious and civil ceremonies. These findings suggest that for most outcomes, and in particular for the probability to be married before 15, the effect of shocks interacted with the bride price dummy is not significantly different for women born before and after 1978.

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6 Conclusion

While the relationship between negative income shocks and child marriage has been extensively investigated for low income countries, where the pervasiveness of credit and insurance market imperfections may lead parents to marry their daughters at a young age as a means to cope with the negative effect of economic shocks, the extent to which such a strategy may still persist in fast integrating or growing economies remained to be investigated. We study in this paper the effect of negative agricultural income shocks on early marriage and union characteristics in Turkey exploiting retrospective information on marriage for a sample of women born from 1969 to 2003. We use rainfall during the growing season to constructs two measures of shocks at the province level capturing different drought intensities.

We find that severe droughts significantly increase the probability for girls exposed during their adolescence to be married before the age of 15 in provinces where the historical prevalence of bride money payment is high, compared to those where it is low. We find a negative and significant impact of large shocks on education in provinces with a high prevalence of bride price only. This finding suggests that the negative impact of income shocks on education, in the Turkish context, may be mediated by early marriage. We explore the impact of shocks on union characteristics and find that severe droughts in provinces with a high prevalence of bride price are associated with more arranged and forced unions, to younger grooms, with less education. Moderate shocks only affect the probability of endogamous marriage, with a different sign depending on the practice of bride price, suggesting that within kin-group marriage may be a substitute informal insurance mechanism in the absence of bride price. Our results suggest that despite the development of insurance and credit markets, reliance on child marriage is persisting in some specific areas as norms may adapt at a lower pace, with detrimental consequences on married girls. We ensure that this difference in response to a shock is robust to accounting for rural/urban differences between provinces and initial prevalence of early marriage norms. Moreover, our results are not driven by the Kurdish minority.

Turkey is a middle-income country, and there are obviously possibilities of at least partial insurance against some risks that are more developed than in many Sub-Saharan African countries for example. This may explain why we find no significant impact of moderate droughts on early marriage. However, our results suggest that all the strategies of households aimed at diversifying their income and limiting their exposure to risk is insufficient in case of major negative shocks. Indeed, we find that severe droughts increase the probability of child marriage in provinces with a high prevalence of bride price norms. This finding suggests that improved access to insurance markets, saving tools, technologies that alleviate populations' vulnerability to rainfall shocks, and public social safety nets could reduce the practice of child marriage by lowering the economic significance of bride price. Prohibiting bride prices or limiting their amount has been shown to be ineffective in different countries (Boye et al., 1991; Vléï-Yoroba, 1997; Ordioni, 2005) due for a part to difficulties in the implementation of the measure: it would also not resolve the original issue of unpredictability of incomes and prices. Moreover, as suggested by our results on the time interval between religious and civil ceremony, it may lead to more unions involving child brides outside the legal framework, thus creating even more insecurity. Since droughts are expected to become more frequent and severe in Turkey (Sen et al., 2012), designing adequate policies that would help households to cope with adverse agricultural shocks seems a relevant option in this context. The extension in 2021 of the government sponsored national insurance program (TARSIM) to cover drought events may be a major step, provided that it is adopted by the most vulnerable populations. However, our results suggest that only large shocks increase child marriage, and classic insurance schemes, even in developed countries, have difficulties compensating for extreme events. Given that Turkey is also exposed to a high seismic risk, a disaster fund that would cover all natural events similar to the Mexican fund Fonden, would help identifying and targetting vulnerable communities. In addition, following evidence reviewed by Bergstrom and Özler (2023), a combination of conditional cash transfers to households affected by major disasters and scholarships for adolescent girls in provinces with a high prevalence of bride price norms may also contribute to decrease the prevalence

of child marriage in Turkey.

Appendix

Table 4: Characteristics of married women and their first union depending on historical practice of bride price in the province of origin (weighted)

	Bride price below median	Bride price above median	Diff.
	mean	mean	
Married before 15	0.07	0.13	0.06***
			(0.00)
Married before 18	0.34	0.47	0.13***
			(0.00)
Age at marriage	20.45	19.30	-1.15***
			(0.00)
Childbirth before 18	0.18	0.27	0.10***
			(0.00)
Religious marriage is first	0.45	0.67	0.22***
			(0.00)
Time between two ceremonies (in months)	3.75	11.70	7.95***
			(0.00)
Endogamous	0.17	0.34	0.17***
			(0.00)
Endogamous (groom is a mother's close relative)	0.04	0.08	0.04***
			(0.00)
Endogamous (groom is a father's close relative)	0.04	0.11	0.07***
			(0.00)
Arranged	0.34	0.55	0.21***
			(0.00)
Without bride consent	0.03	0.09	0.06***
			(0.00)
Groom age at marriage	25.00	24.08	-0.92***
			(0.00)
Age gap at first marriage (in years)	4.54	4.76	0.22***
			(0.00)
Groom Education (in years)	8.87	7.65	-1.22***
			(0.00)
Education gap (in years)	0.81	2.07	1.26***
			(0.00)
Number of individuals	12,077	10,872	22,929

Source: DHS 1998, 2003, 2008, 2013 and 2018. The computation of the historical measure of bride price additionally uses information contained in the DHS 1993 and 1998 waves.
Individuals observations are weighted using survey weights.
The number of observations computed in the last row corresponds to the maximum number of observations in each group. P-values in parentheses.
* $p<0.10$, ** $p<0.05$, *** $p<0.01$.

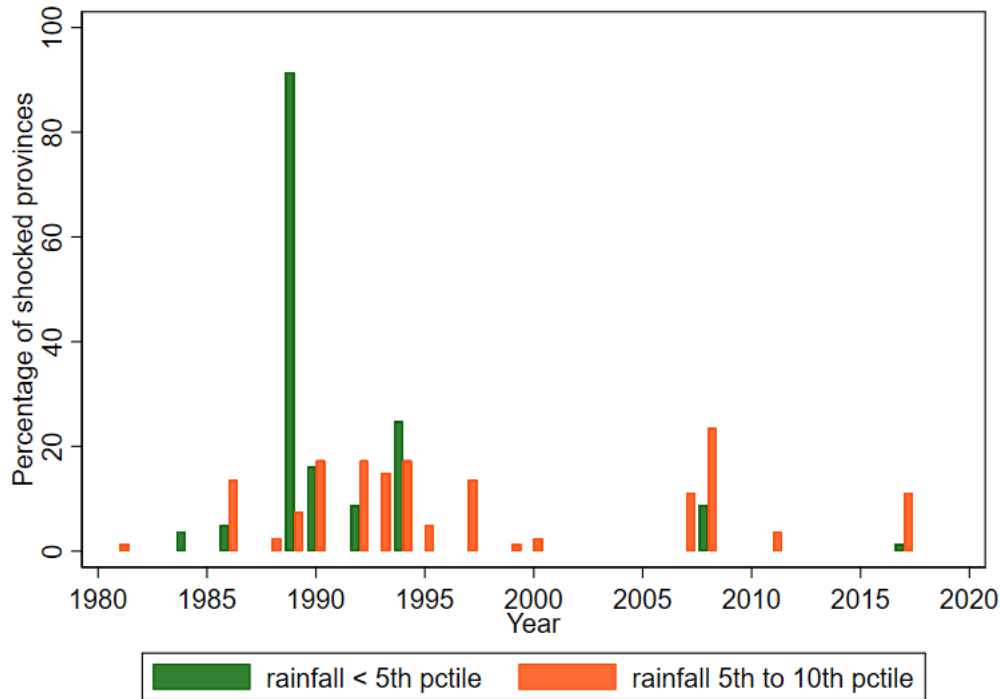Figure 3: Percentage of provinces with medium to severe rainfall shocks, by year

Table 5: Rainfall shocks (from January t to Sept t), production (thousand tonnes) and yields (kg per hectare)

	(1) Cereal Production	(2) Wheat Production	(3) Fruit Production	(4) Vegetable Production	(5) Total Production	(6) Wheat Yields
Rainfall < 5th pctile	-335.436**	-63.239***	-49.504*	-38.592	-423.532**	-1102.961***
	(151.006)	(15.534)	(28.393)	(52.394)	(178.894)	(327.438)
Rainfall 5th to 10th pctile	-256.950***	-29.065***	-27.400**	-2.801	-287.151***	-316.899*
	(68.267)	(7.934)	(12.836)	(23.686)	(80.875)	(170.394)
Constant	1114.223***	70.001***	226.398***	333.340***	1673.960***	4879.246***
	(12.091)	(1.427)	(2.273)	(4.195)	(14.324)	(30.715)
N	1215	811	1215	1215	1215	781

Standard errors in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.
Data source: CHIRPS and Turkish Statistical Institute.

Table 6: Province characteristics

	Bride price below median	Bride price above median	Diff. (2) - (1)
	mean	mean	
Standard deviation of rainfall (1981-2017)	8.64	7.53	1.11**
	(0.35)	(0.32)	(0.47)
Standard deviation of historical rainfall (1900-2017)	3.57	3.62	-0.05
	(0.36)	(0.35)	(0.50)
Sex Ratio in 1985 (Nfemale/Nmale)	0.97	0.94	-0.02
	(0.01)	(0.01)	(0.01)
Rural (share of hh head in 1985 > median)	0.39	0.77	0.38***
	(0.08)	(0.07)	(0.10)
Share married before 15 (women born before 1969)	0.18	0.29	0.11***
	(0.02)	(0.02)	(0.03)
Share married before 18 (women born before 1969)	0.54	0.65	0.11***
	(0.02)	(0.02)	(0.03)
Average age at marriage (women born before 1969)	18.73	17.79	- 0.94***
	(0.20)	(0.16)	(0.26)
Observations	39	41	80

Note: The table compares characteristics of provinces with a high and low value of bride price (see Section 3.2). Standard errors are in parentheses and significance levels are denoted as follows:* p<0.10, ** p<0.05, *** p<0.01. The significance levels for coefficients in columns diff.(1) and diff.(2) are reported for t-tests. The significance levels for coefficients in column diff. (1) - (2) are reported for the test of equality between diff.(1) and diff.(2).

References

Adams, B. N. (2010). Themes and threads of family theories: A brief history. *Journal of Comparative Family Studies*, 41(4):499–505.

Anderson, S. and Bidner, C. (2021). Family Institutions. Prepared for the handbook of family economics.

Arif, N. and Fatima, I. (2015). Marital satisfaction in different types of marriage. *Pakistan Journal of Social and Clinical Psychology*, 13(1):36.

Aşık, G., Karakoç, U., and Pamuk, Ş. (2023). Regional inequalities and the west–east divide in turkey since 1913. *The Economic History Review*, 76(4):1305–1332.

Baez, J. E., Lucchetti, L., Genoni, M. E., and Salazar, M. (2017). Gone with the storm: rainfall shocks and household wellbeing in guatemala. *The Journal of Development Studies*, 53(8):1253–1271.

Bau, N. and Fernández, R. (2021). The Family as a Social Institution. CEPR Discussion Papers 16263, C.E.P.R. Discussion Papers.

Bergstrom, K. and Özler, B. (2023). Improving the well-being of adolescent girls in developing countries. *The World Bank Research Observer*, 38(2):179–212.

Boye, A.-e. K., Hill, K., Isaacs, S., and Gordis, D. (1991). Marriage law and practice in the Sahel. *Studies in family planning*, 22(6):343–349.

Brosig, S., Glauben, T., Götz, L., Weitzel, E.-B., and Bayaner, A. (2011). The Turkish wheat market: spatial price transmission and the impact of transaction costs. *Agribusiness*, 27(2):147–161.

Chari, A., Heath, R., Maertens, A., and Fatima, F. (2017). The causal effect of maternal age at marriage on child wellbeing: Evidence from India. *Journal of Development Economics*, 127:42–55.

Cohen, M. J. and Garrett, J. L. (2010). The food price crisis and urban food (in) security. *Environment and Urbanization*, 22(2):467–482.

Corno, L., Hildebrandt, N., and Voena, A. (2020). Age of marriage, weather shocks, and the direction of marriage payments. *Econometrica*, 88(3):879–915.

Corno, L. and Voena, A. (2023). Child marriage as informal insurance: Empirical evidence and policy simulations. *Journal of Development Economics*, 162:103047.

Crespin-Boucaud, J. (2020). Interethnic and interfaith marriages in sub-saharan africa. *World Development*, 125:104668.

Delprato, M., Akyeampong, K., and Dunne, M. (2017). Intergenerational education effects of early marriage in Sub-Saharan Africa. *World Development*, 91:173–192.

Field, E. and Ambrus, A. (2008). Early marriage, age of menarche, and female schooling attainment in Bangladesh. *Journal of political Economy*, 116(5):881–930.

Funk, C. C., Peterson, P. J., Landsfeld, M. F., Pedreros, D. H., Verdin, J. P., Rowland, J. D., Romero, B. E., Husak, G. J., Michaelsen, J. C., Verdin, A. P., et al. (2014). A quasi-global precipitation time series for drought monitoring. *US Geological Survey data series*, 832(4):1–12.

Ghosh, A., Hwang, S. I. M., and Squires, M. (2023). Economic consequences of kinship: Evidence from us bans on cousin marriage. *The Quarterly Journal of Economics*, 138(4):2559–2606.

Goode, W. J. (1963). World revolution and family patterns.

Goody, J. (1983). *The development of the family and marriage in Europe*. Cambridge University Press.

Goody, J. and Tambiah, S. J. (1973). *Bridewealth and dowry*. Number 7. CUP Archive.

Hotte, R. and Lambert, S. (2023). Marriage payments and wives' welfare: All you need is love. *Journal of Development Economics*, page 103141.

Hotte, R. and Marazyan, K. (2020). Demand for insurance and within-kin-group marriages: Evidence from a West-African country. *Journal of Development Economics*, page 102489.

Kaplan, S., Pinar, G., Kaplan, B., Aslantekin, F., Karabulut, E., Ayar, B., and Dilmen, U. (2016). The prevalence of consanguineous marriages and affecting factors in Turkey: a national survey. *Journal of biosocial science*, 48(5):616–630.

Khalifa, S. (2021). The price of silence: Marriage payment and women's attitude toward intimate partner violence.

Khan, S. (2024). Female education and marriage in pakistan: The role of financial shocks and marital customs. *World Development*, 173:106413.

Kumala Dewi, L. P. R. and Dartanto, T. (2019). Natural disasters and girls vulnerability: is child marriage a coping strategy of economic shocks in Indonesia? *Vulnerable children and youth studies*, 14(1):24–35.

Lee-Rife, S., Malhotra, A., Warner, A., and Glinski, A. M. (2012). What works to prevent child marriage: a review of the evidence. *Studies in family planning*, 43(4):287–303.

Lévi-Strauss, C. (1967). *Les structures élémentaires de la parenté*. De Gruyter Mouton.

Maccini, S. and Yang, D. (2009). Under the weather: Health, schooling, and economic consequences of early-life rainfall. *American economic review*, 99(3):1006–1026.

Mete, C., Bossavie, L., Giles, J., and Alderman, H. (2020). Is consanguinity an impediment to child development? *Population studies*, 74(2):139–159.

Mobarak, A. M., Kuhn, R., and Peters, C. (2013). Consanguinity and other marriage market effects of a wealth shock in Bangladesh. *Demography*, 50(5):1845–1871.

Molotsky, A. (2019). Income shocks and partnership formation: Evidence from malawi. *Studies in Family Planning*, 50(3):219–242.

Muller, H.-P., Marti, C., Schiedt, E., and Arpagaus, B. (2010). Atlas vorkolonialer gesellschaften (atlas of pre-colonial societies): Cultural heritage and social structures in african, asian and melanesian states.

OECD., Food, and of the United Nations, A. O. (2021). *Building Agricultural Resilience to Natural Hazard-induced Disasters Insights from Country Case Studies*. OECD Publishing.

Ordioni, N. (2005). Pauvreté et inégalités de droits en Afrique: une perspective "genrée". *Mondes en développement*, (1):93–106.

Palloni, A., Hill, K., and Aguirre, G. P. (1996). Economic swings and demographic changes in the history of Latin America. *Population studies*, 50(1):105–132.

Paul, P. (2018). Maternal age at marriage and adverse pregnancy outcomes: findings from the India human development survey, 2011-2012. *Journal of pediatric and adolescent gynecology*, 31(6):620–624.

Prakash, R., Singh, A., Pathak, P. K., and Parasuraman, S. (2011). Early marriage, poor reproductive health status of mother and child well-being in India. *BMJ Sexual & Reproductive Health*, 37(3):136–145.

Rahman, L. and Rao, V. (2004). The determinants of gender equity in india: examining Dyson and Moore's thesis with new data. *Population and Development Review*, 30(2):239–268.

Raj, A. (2010). When the mother is a child: the impact of child marriage on the health and human rights of girls. *Archives of Disease in Childhood*, 95(11):931–935.

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

Rubio, G. (2014). How love conquered marriage: Theory and evidence on the disappearance of arranged marriages. *Unpublished manuscript). University of California, Merced.*

Santhya, K. (2011). Early marriage and sexual and reproductive health vulnerabilities of young women: a synthesis of recent evidence from developing countries. *Current opinion in obstetrics and gynecology*, 23(5):334–339.

Santhya, K. G., Ram, U., Acharya, R., Jejeebhoy, S. J., Ram, F., and Singh, A. (2010). Associations between early marriage and young women's marital and reproductive health outcomes: evidence from India. *International perspectives on sexual and reproductive health*, pages 132–139.

Sen, B., Topcu, S., Türkeș, M., Sen, B., and Warner, J. (2012). Projecting climate change, drought conditions and crop productivity in Turkey. *Climate Research*, 52.

Shah, M. and Steinberg, B. M. (2017). Drought of opportunities: Contemporaneous and long-term impacts of rainfall shocks on human capital. *Journal of Political Economy*, 125(2):527–561.

Tekgüç, H. (2012). Separability between own food production and consumption in Turkey. *Review of Economics of the Household*, 10(3):423–439.

Tutku, R. (2013). *Violence against women: Turkey and the economics of honor killings.* St. John's University (New York).

Van Eck, C. (2002). *Purified by blood: Honour killings amongst Turks in the Netherlands.* Amsterdam University Press.

Van Leeuwen, M., Salamon, P., Fellmann, T., Koç, A., Bölük, G., Tabeau, A., Esposti, R., Bonfiglio, A., Lobianco, A., and Hanrahan, K. (2011). Potential impacts on agricultural commodity markets of an eu enlargement to Turkey. Technical report, Office for Official Publications of the European Communities.

Vléï-Yoroba, C. (1997). Droit de la famille et réalités familiales: le cas de la côte d'ivoire depuis l'indépendance. *Clio. Femmes, Genre, Histoire*, (6).

Weimer, L. (2019). *Consanguinity and Intimate Partner Violence.* University of California, San Diego.

White, D. R. and Brudner-White, L. A. (1988). The Murdock legacy: the ethnographic atlas and the search for a method. *Behavior Science Research*, 22(1-4):59–81.

Xiaohe, X. and Whyte, M. K. (1990). Love matches and arranged marriages: A Chinese replication. *Journal of Marriage and the Family*, pages 709–722.

Yaman, M. (2020). Child marriage: A survival strategy for syrian refugee families in Turkey? In *Women, Migration and Asylum in Turkey*, pages 213–233. Springer.

Yang, D. and Choi, H. (2007). Are remittances insurance? evidence from rainfall shocks in the philippines. *The World Bank Economic Review*, 21(2):219–248.

Yilmaz, I. (2021). The emergence of islamist official and unofficial laws in the Erdoganist Turkey: The case of child marriages. *Religions*, 12(7):513.

Yüksel-Kaptanoğlu, İ. and Ergöçmen, B. A. (2014). Early marriage: trends in Turkey, 1978-2008. *Journal of Family Issues*, 35(12):1707–1724.