Bride Price and Female Education*

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Abstract

Traditional cultural practices can play an important role in development, but can also inspire condemnation. The custom of bride price, prevalent throughout sub-Saharan Africa and in parts of Asia as a payment of the groom to the family of the bride, is one example. In this paper, we show a surprising economic consequence of this practice. We revisit one of the best-studied historical development projects, the INPRES school construction program in Indonesia, and show that previously found small effects on female enrollment mask heterogeneity by bride price tradition. Ethnic groups that traditionally engage in bride price payments at marriage increased female enrollment in response to the program. Within these ethnic groups, higher female education at marriage is associated with a higher bride price payment received, providing a greater incentive for parents to invest in girls' education and take advantage of the increased supply of schools. For those girls belonging to ethnic groups that do not practice bride price, we see no increase in education following school construction. We replicate these same findings in Zambia, where we exploit a similar school expansion program that took place in the early 2000s. While there may be significant downsides to a bride price tradition, our results suggest that any change to this cultural custom should likely be considered alongside additional policies to promote female education.

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1 Introduction

It has become increasingly recognized that culture plays an important role in economic development. However, we have a much less clear understanding of what traditional cultural practices imply for development policy and whether the efficacy of development policies depends on the cultural traits of societies. Development policies generally have not been tailored to the particular cultural characteristics of a society. Increasingly, there has been recognition that this one-size-fits-all strategy may not always work (World Bank, 2015).

Our analysis looks at a particular cultural practice typically referred to as bride price (or also as bride wealth). A bride price is a transfer at the time of marriage from the groom and/or his family to the bride's family. The payment is typically significant in size, often greater than a year's income, and takes the form of money, animals, or commodities. This cultural practice was (and is) widely practiced in many parts of the world, including Asia and sub-Saharan Africa (Anderson, 2007a). Recently, the custom has come under attack, receiving condemnation as a repugnant and harmful practice, and leading to calls for its abolishment (see e.g., Wendo, 2004; Mujuzi, 2010).

In this paper, we examine how the cultural practice of making bride price payments at marriage impacts the efficacy of policies aimed at increasing education. We document that for two countries with large school construction programs – Indonesia in the 1970s and Zambia in the 2000s – the cultural practice of bride price was a crucial determinant of whether the increased availability of schools resulted in increased enrollment rates for women. In areas where the practice existed, school construction had a large and statistically significant impact on educational attainment for girls. However, in areas where the practice was absent, school construction did not have a detectable impact on female education.

We begin our analysis by revisiting one of the best studied historical development projects, the *Sekolah Dasar* INPRES school building program of the 1970s in Indonesia, where 61,807 primary schools were constructed between 1974 and 1980. The seminal paper looking at the impacts of this project only examines a sample of males, which is in line with its objective of estimating the effect of education on wages (Duflo, 2001). In contrast, we examine the impacts of the program on girls' schooling. We first confirm that there appears to be no effect on female education, consistent with the small effects found in Breierova and Duflo (2002). We then show that this average effect masks important heterogeneity that depends on a group's marriage customs. We only observe a positive impact of the program on female education among girls from ethnic groups that traditionally engage in monetary bride price payments at the time of marriage. Our empirical analysis shows that these findings are not driven by other important cultural factors that may be correlated with bride price, such as women's role in agricultural production and matrilineality.

We verify the findings by studying another school expansion program that took place in Zambia in the late 1990s and early 2000s, exploiting newly-collected data from the Zambian Ministry of Education. Zambia, like Indonesia, has societies that engage in bride price payments and others that do not. Although the school construction experiment in Zambia is not as clean from an empirical point of view, a benefit of working in Zambia is that we have collected detailed, fine-grained data that help us to better understand the mechanisms underlying our basic finding. We discuss this in more detail below. Looking at the school building policy in Zambia, we observe the same patterns in the data. The school expansion had a substantially larger impact on female education among ethnic groups that engage in bride price payments at marriage.

Having documented this pattern in two countries, we then turn towards the goal of better understanding the exact reasons behind this finding. Motivated by first-hand accounts of education

being an important determinant – actually, the most important determinant – of the bride price received at marriage, we put forth and test the following explanation. Groups that engaged in bride price payments at marriage were more likely to take advantage of the increased supply of schools by sending their girls to school because the returns to doing so were higher. Where bride price was practiced, increased investments in education by parents led to an increase in the amount of bride price received by parents at the time of marriage. For societies that do not pay a bride price at marriage, or societies that pay a symbolic (or "token") bride price, this additional return to parents' investments in their daughters' education did not exist.[1]

A second, and closely related, reason why the bride price would influence parental investments in daughters is through its ability to function, like other prices in the economy, as an aggregator and transmitter of information that guides economic decisions – in this case, investments in human capital (Hayek, 1945).[2] If parents are uncertain about the returns to education for women, the existence of a bride price, which provides information on the elasticity of bride price with respect to education may serve as valuable information about the returns to education. This is particularly likely in rural areas, where traditional marriage payments are common, but information about urban or formal-sector wages is difficult to observe.

Ultimately, both mechanisms serve to increase parents' incentives to invest in their daughter's education and to take advantage of the increased opportunities for schooling brought on by the school expansion policies considered here. We formalize this logic by developing a model that outlines the incomplete contracting mechanism, and the assumptions needed to explain our results. In the model, the presence of the bride price provides an additional rewards to parental investment in a daughter's education. For this reason, girls from ethnic groups that engage in bride price payments are more likely to be educated. We then show that as long as enrollment rates are sufficiently low and the returns to education are single-peaked, then ethnic groups that practice bride price will have have higher responsiveness to a school construction program that reduces the cost of education. Interestingly, a number of additional hypotheses arise from the model. In particular, ethnic groups that practice bride price should have higher levels of average education overall. Despite higher ex ante levels of education, we still expect to see greater responsiveness of this group to the policy compared to ethnicities that do not practice bride price. In addition, because there is more education of women belonging to bride price groups, the average inherent ability of bride price students will be lower than for non-bride price groups.

Guided by the structure of the model, we then turn to auxiliary analyses to verify the assump-

[1]This mechanism is particularly important if daughters cannot credibly commit to paying back their parents *ex post* for educational investments made *ex ante*. The bride price provides a shorter-term and more certain monetary benefit to educating daughters, which helps overcome the challenge of incomplete contracting (Gale and Scholz, 1994). The problem is summarized by Gary Becker's words in his Nobel lecture: "Both the children and parents would be better off if the parents agreed to invest more in the children in return for a commitment by the children to care for them when they need help. But how can such a commitment be enforced? Economists and lawyers usually recommend a written contract to ensure commitment, but it is absurd to contemplate that a society will enforce contracts between adults and ten-year-olds or teenagers" (Becker, 1993).

[2]As is well-known, for price to function as an aggregator, it requires very little information to be known by each individual: "The most significant fact about this system is the economy of knowledge with which it operates, or how little the individual participants need to know in order to be able to take the right action. In abbreviated form, by a kind of symbol, only the most essential information is passed on and passed on only to those concerned. It is more than a metaphor to describe the price system as a kind of machinery for registering change, or a system of telecommunications which enables individual producers to watch merely the movement of a few pointers, as an engineer might watch the hands of a few dials, in order to adjust their activities to changes of which they may never know more than is reflected in the price movement." (Hayek, 1945, p. 526).

tions that are necessary in the model and to test the predictions that arise from the model. First of all, we show that, in Indonesia and Zambia, bride price is widely practiced and that the value of the bride price is quantitatively important. We then show that the value of the bride price increases significantly with the level of education of the bride. In Indonesia, completing primary school is associated with a 66% increase in the bride price payment, completing junior secondary is associated with a further 64% increase, and completing college with another 84% increase. This relationships are very robust and remain strong even when conditioning on a large set of observable characteristics, including the groom's education. In Zambia, we find comparable magnitudes. Using a survey implemented in that country, we ask individuals why they believe that bride price increases with a woman's education. Responses provide no evidence that the association between bride price and education is spurious. Instead, the most common explanation was that the higher bride price was due to a moral obligation on the part of the groom's family to compensate the bride's family for the educational investments that they made in their daughter.[3]

We then test two additional predictions that emerge from the model, namely that the average level of education of women belonging to bride price cultures should be higher than for women that belong to culture that do not have bride price, and that the average ability of enrolled students from bride price cultures should be lower than the average ability of enrolled students from cultures that do not have bride price. We find that the first prediction holds in both Indonesia and Zambia. Looking at the cross-section, primary school completion rates are higher among bride price ethnic groups than non-bride price groups. We test the second prediction within Indonesia by examining student test scores. We find that, consistent with the model, the average test score among students belonging to bride price ethnicities is lower than among students belonging to ethnic groups that do not have bride price.

Lastly, we also test a number of plausible alternative mechanisms that could also explain the differential response of cultures with different marriage customs to the school construction programs. In particular, we test whether there is evidence that families with a tradition of bride price are wealthier and therefore, have a greater ability to send their daughters to school in response to the government programs. We also test whether women from bride price ethnicities have higher returns to education, which could in turn generate the higher responsiveness to the programs. We find no evidence for either of these mechanisms. Bride price ethnic groups are not wealthier, and they do not appear to have higher returns to female education in the labor market.

Our findings build on and advances the literature that examines the impacts of gender-related cultural norms (e.g. Fernandez, 2007; Fernandez and Fogli, 2009; Fernandez, 2011). We show that important large-scale development policies can have very different effects on groups depending on the cultural institution of bride price.

Our findings also contribute to a better understanding of the economics of marriage payments. While dowries have received a considerable amount of attention in the economics literature (Botticini, 1999; Botticini and Siow, 2003; Anderson, 2003, 2007b), bride price payments have been the subject of fewer studies, despite the fact that the practice is relatively widespread (Anderson, 2007a). By exploring the link between bride price and parental investment in daughters in both Indonesia and Zambia, this paper also adds to the literature on the relationship between marriage practices (in particular, virilocality and polygny) and investments in daughters in South-East Asia (Levine and Kevane, 2003) and in Sub-Saharan Africa (Jacoby, 1995; Tertilt, 2005, 2006; Gaspart and Platteau, 2010).

[3]See Dalton (1966); Moore (2016).

While there may be significant downsides to the cultural practice of bride price, particularly if it justifies abuse or lowers the status of women within marriage (Bishai and Grossbard, 2010), our results on the benefits of bride price payments suggest that abolishing or discouraging these payments should likely be considered alongside additional policies to promote female education.

The paper is structured as follows. We begin in section 2 by providing context and an overview of the custom of bride price, focusing particularly on the specifics of Indonesia and Zambia. In section 3, we then turn to Indonesia's school construction program. We show that although at first-glance the program appears to have had little effect on female education, this masks significant heterogeneity. For women from bride price cultures, school construction is estimated to have had a large positive impact on education, while for women from cultures that do not practice bride price, there is no evidence of any increase in education. We then turn to Zambia and in section 4, document that one observes the same pattern there. In an attempt to propose a clear mechanism behind this result, in section 5 we present a simple model that shows how the presence of a bride price (that is increasing in the bride's education) affects parent's investments in their daughter's education and their response to an increase in the supply of schools. The model is particularly useful in highlighting the assumptions that are necessary to obtain the comparative static that we see in the data, as well as deriving additional predictions that are not *ex ante* obvious. Therefore, in section 6, we use data from a variety of sources to verify the assumptions of the model and to test its auxiliary predictions. Lastly, in section 7, we provide concluding thoughts.

2 Context and Overview of Bride Price

The practice of paying a bride price at the time of marriage is a custom that is widespread throughout sub-Saharan Africa and many parts of Asia. Vroklage (1952) writes in detail on the practice of bride price in Indonesia, describing it as "a compensation for the expense, the care and trouble spent on the bride's upbringing... It is compensation for the complete loss of a worker as a bride withdraws from her own kindred and henceforth belongs to her husband's." He adds that the bride price is also a compensation payment for the bride's future children, who will no longer belong to her parents' family.[4] The bride price in Indonesia is paid to the bride's parents and is linked to *adat* (traditional culture which predates conversion to Islam) rather than religion. Thus, while in Indonesia both bride price and Islam are common, Indonesian bride price customs do not stem from Islamic bride price customs. In fact, in the nineteenth century, the *Ulama* (Islamic religious scholars) worked with the British colonial government to try reduce the value of bride price (Boomgaard, 2003, p. 201).

As in much of sub-Saharan Africa, in Zambia bride price is referred to as *lobola*, and is widely practiced among some ethnic groups. In data collected during the Zambia Fertility Preferences

[4]In his qualitative research, the idea that bride price is equivalent to purchasing a woman is roundly rejected. Interviewees told him, "a bride is not a buffalo" and "a bride is not an animal." Thus, he suggests that what he calls "patriarchy" (likely referring to patrilineality, the practice of the bride and her children joining the husband's kinship group) is naturally associated with bride price. While he does mention that there are groups that practice what he calls "matriarchy," he observes that the bride price customs likely originated in "patriarchal" societies and were then imitated by "matriarchal" societies. In using the term "matriarchy," Vroklage is likely referring to either (or both) matrilineality and matrilocality. These two practices often go hand-in-hand. Matrilineality means that the children join the kinship group of the bride, while matrilocality means that the bride and her husband live with her parents after marriage. Matrilocality may also incentivize parents to invest in daughters by increasing the proportion of the returns on their investments they expect to capture. Consistent with this hypothesis, Bau (2014) finds that matrilocality is associated with greater educational investment in daughters relative to sons.

Survey (ZFPS) in peri-urban Lusaka (we discuss this source in more detail below), bride price was paid in 86 percent of marriages. In Zambia, bride price also functions as a legal proof of marriage, and some churches do not consider a couple married until bride price is paid in full. Therefore, bride price is also important for inheritance and determining the lineage of any children of the marriage since, if a husband dies, it allows a wife to prove in court that they were officially married. Chondoka (1988) writes that traditionally, "marriages were all legalized on delivery of the 'main' payments" (p. 158).

Traditionally, many groups, e.g., the Tonga people, negotiated bride price in terms of cows and continue to negotiate in terms of cows to this day. Since cows have grown greatly in value, it is believed that this explains why Tonga bride prices are relatively high today. In his book *Traditional Marriages in Zambia: A Cultural History*, Chondoka (1988) writes that in areas where cattle were traditionally kept, marriage payments were negotiated in cattle, while in other areas they were negotiated in terms of small valuable items such as iron tools, beads, grain, bark, cloth, animal skins, and money.

A lively public debate has ensued over the past decades, particularly in Africa, on the negative consequences of the bride price custom. The objections arise due to the perceived commodification of women through a transaction, potentially leading to ill-treatment.[5] Parents may have an incentive to "sell" their daughters early for bride price, and women may feel that they cannot leave a marriage because it would mean their parents would have to return the bride price. In Indonesia, where discussion of the negative consequences of bride price is less prevalent than in parts of Africa, concerns have been raised about women continually needing to "earn" their bride price through obedience to their husbands (Sitompul, 2009).

This issue appears in much starker terms within policy debates on Africa: women's rights group Mifumi in Uganda reports cases where men say "I am beating my cows" when they hit their wives, or women are denied ownership of property, and it is noted that women may be expected to be sexually available to their husbands at any time and without protection (Eryenyu, 2014). One housewife in Tanzania described what often happens when bride price is paid, saying, "Unfortunately, this is overdone by some people who end up regarding a woman as mere property" (News, ed, 2006). Citing such stories, many activists have called for the abolishment of bride price. This abolition is perceived to be critical to promoting greater educational investment in young girls, whose parents may otherwise be tempted to marry their daughters off early (Mutebi, 2014).

Instead of banning bride price, some governments have attempted to legislate particular aspects of the practice, such as banning refunds upon divorce or putting limits on the amount that can be paid for bride price. For example, Kenya's most recent set of marriage laws stipulates that a token bride price must be counted as sufficient to meet the needs of the custom (Dudley, 2014).[6] The Zambian government has similarly spoken out to discourage families from requesting exorbitant amounts for their daughters, but this is not written into law and neither country defines what may

[5]The custom fits several core reasons why monetizing transactions involving human beings is seen as repugnant. Roth (2007) categorizes concerns about monetization into three classes: (1) concerns that putting a price on things moves them into a category of impersonal objects; (2) concerns that offering substantial monetary payments might cause individuals to engage in transactions they would not engage in otherwise, leaving them open to exploitation; and (3) concerns that monetizing certain transactions, while not themselves morally repugnant, could lead to a slippery slope of more repugnant transactions. The first two categories are particularly well-represented in the debate on bride prices (Hague et al., 2011; Mangena and Ndlovu, 2013).

[6]To combat the potential of early marriage due to bride price, the local government in Laikipia County, Kenya has also instituted a program to give cows to parents whose daughters graduate from high school.

be counted as token or exorbitant (Voice, ed, 2014).

At the same time, many have argued that bride price is a positive tradition of appreciation for women (Mugisha, 2008) that actually creates incentives to educate girls. From the same policy debate in Uganda are the voices of fathers who share their experiences of bride price negotiations, arguing that "education of the girl child should be emphasized in order to improve the family's bargaining power in so far as bride price is concerned" (Muthegheki et al., 2012, p. 12).

Extensive focus groups conducted by our research team in Lusaka (Zambia) also suggest that the amount of bride price a bride's family receives increases in the parents' educational expenditures on the daughter: one respondent told us that when a parent negotiates *lobola*, he or she calculates how much was spent on education. Parents perceive bride price as a future income stream arising from investment in the girl-child, and view it as a substitute for old age support. For example, one of our respondents told us, "A girl child is business and we all need money" and "For girl children you benefit from charging while with boys support comes from them when you are old." Bride-price negotiators know what factors increase price amounts. As one described in a focus group: "*lobola* is up with level of education because the family knows that the husband and his household will be beneficiaries." The positive relationship between education and bride price in Indonesia is also popularly discussed, including in media articles that encourage future brides to know how much their individual bride-price increases with their education (Tang, 2014).

Our empirical strategy measures differences in the traditional marriage customs of ethnic groups using the *Ethnographic Atlas* (Murdock, 1957). The Atlas provides information on the transfers made at marriage. In the Atlas, groups are categorized as belonging to one of the following categories (Murdock, 1981, pp. 92–93):

1. **Bride price:** Also known as bride wealth. A transfer of a substantial consideration in the form of goods, livestock, or money from the groom or his relatives to the kinsmen of the bride.

2. **Token bride price:** A small or symbolic payment only.

3. **Bride service:** A substantive material consideration in which the principal element consists of labor or other services rendered by the groom to the bride's kinsmen.

4. **Gift exchange:** Reciprocal exchange of gifts of substantial value between the relatives of the bride and groom, or a continuing exchange of goods and services in approximately equal amounts between the groom or his kinsmen and the brides' relatives.

5. **Exchange:** Transfer of a sister or other female relative of the groom in exchange for the bride.

6. **Dowry:** Transfer of a substantial amount of property from the bride's relatives to the bride, the groom, or the kinsmen of the latter.

7. **No significant consideration:** Absence of any significant consideration, or giving of bridal gifts only.

Looking at traditional marriage customs globally using the *Ethnographic Atlas*, we finds that bride price is the most commonly practiced tradition, occurring in approximately 52% of the societies in the *Ethnographic Atlas*. The next most common outcome is for there to be no dominant practice, which is the case for about 22% of societies. At the aggregate level, dowry is uncommon,

occurring in less than 3% of societies. The full distribution of marriage customs across all categories is reported in appendix table A1.

The practice of the bride price is ancient dating at least as far back as 3000BCE, being used by the Ancient Egyptians, Mesopotamians, Hebrews, Aztecs, and the Incas. By contrast, the practice of dowry is much more recent, having likely been first practiced in ancient Greece and Rome (Anderson, 2007a, pp. 152-153). Historically and today, the bride price, like the dowry, is typically significant. Anderson (2007a) summarizes existing evidence on the magnitude of bride price payments (table 4). Although there is significant heterogeneity, it it not uncommon for bride price transfers to be in excess of a year's income and sometimes as large as seven or eight times annual income. Our evidence from modern Indonesia and Zambia is consistent with these numbers. As we discuss in more detail in section 6.1, in both countries bride price payments are very large, often in excess of a year's income.

The Javanese are an example of an Indonesian ethnic group that does not pay bride price. Instead, there is no common universal practice, although it is customary for the man to give a present to the bride at the time of engagement and again another present at the time of marriage. The size of the present could be expensive or cheap, depending on the specific customs of the different social group, with wealthier groups giving more expensive presents (Geertz, 1961, p. 62–65). In the *Ethnographic Atlas*, the Javanese are categorizes as having an "no significant consideration," although "token bride price" is also listed as an alternate custom.

It is well known that bride price societies also tend to be societies that are patrilineal (e.g., the wife joins the husband's kinship group following marriage).

In fact there is a strong negative relationship between both matrilineality and matrilocality and the practice of the bride price at marriage looking across societies within the *Ethnographic Atlas* (see appendix table 2). One also observes that bride price societies are also more likely to practice polygyny.

Relative to bride price, the dowry has received much more attention in the modern economic development literature. This is likely due to the fact that this is the dominant marriage payment in South Asia (Anderson, 2007a) and has historically been prevalent in Europe. One might be tempted to apply our analysis to countries with variation in whether dowry is practiced or not. While we feel this is a fruitful line of inquiry, one should not simply view the dowry as the flip-side of the bride price and vice versa. As Goody and Tambiah (1973) put it: "Bridewealth and dowry then are very far from being mirror opposites" (p. 6). There are important differences between the two practices beside the direction of the payment. With bride price, the payment is made from the groom's parents to the bride's parents. However, with dowry, the payment is made from the bride's family to the bride. Thus, the transfer is given to the new couple and not to the bride's parents (Anderson, 2007a). This has led many scholars to view the dowry as having an important pre-mortem bequest motive (e.g., Goody and Tambiah, 1973; Botticini and Siow, 2003). However, this is not true for the bride price. In addition, evidence does not indicate that the amount that the bride's parents pay as a dowry decreases in the education of their daughter (e.g., Rao, 1993).

In bride price cultures, an interesting dynamic emerges, that has potentially important implications for female education. Typically, bride price payments are sizeable and go to the father of the bride (or male kinsmen), who then decide which males of the family can use the bride price for payment of their marriage. Thus, the bride price has a number of effects. It serves to increase the authority of the father (he effectively decides who marries when); it emphasize a brother's tie with his sister; and it generates a system whereby all males in the family have aligned incentives and

want to receive the largest bride price possible from their sister's marriage (Goody and Tambiah, 1973, p. 5). Note that these effects will be particularly strong when the currency that is used is used solely for bride price. This is in fact the practice in many parts of Africa where the bride price (i.e., lobola) is paid using livestock. An example is the Lovedu of Southern Africa who only buy and sell cows as part of marriage. Otherwise, families do not keep stock of cattle. Krig (1964) write that "cattle coming in as bride-price are not supposed to be used for any other purpose than marriage... most Lobedu families do not possess cattle except for short periods of time" (p. 160).

The use of cattle in much of Africa in general, and Zambia in particular, can be contrasted with Indonesia, where bride price typically takes the form of goods, money and resources that have value and use outside of the circular sphere of marriage payments.

3 Evidence from Indonesia

We begin our empirical analysis by examining data from Indonesia, where bride price is commonly practiced. As we document in full detail in section 6.1, within Indonesia, the practice of bride price at marriage is common and the value of the transfer made is significant. For example, in 2000, 87 percent of marriages that were recorded in the IFLS reported that a bride price was paid. In the 2007 IFLS, this figure was 85 percent. Among those ethnicities that traditionally practice bride price, the median value of the bride price transfer is 9 percent of average annual per capita GDP and the mean value of the transfer is 82 percent of average annual per capita GDP.

To examine whether education-oriented development policies have differential effects based on this cultural practice, we exploit the same quasi-experimental variation in number of schools built by birth district in Indonesia as in Duflo (2001). We use the 1995 Indonesia Intercensal Survey, and study the differential effect of school construction policy on schooling by bride price custom.

We link individuals in the Intercensal Survey to their traditional marriage customs using their self-reported language (i.e., mother tongue). In total, 174 different languages spoken are recorded as being spoken in the Intercensal Survey, which we manually match to ethnic groups in the *Ethnographic Atlas*. In the end, the 174 language groups are matched to 28 distinct ethnic groups from the *Ethnographic Atlas*.[7] Table 1 presents the distribution of cultural practices for the 28 ethnic groups. Of these groups, at the time of marriage, 13 practice bride price, 2 practice bride service, 2 practice token bride price, 3 practice gift exchange, 4 practice sister or relative exchange, and 4 have no common practice. It is important to note that none of the ethnic groups within Indonesia engage in the practice of dowry transfer at the time of marriage. Thus, our estimates of differences between bride price cultures and non-bride price cultures do not reflect the effects of whether a group practices dowry or not. As we will see, this is also true for the sample from Zambia.

The education intervention policy we examine is Indonesia's school construction program of the 1970s. In 1973, the Indonesian government launched a large-scale school construction program called the Sekolah Dasar INPRES program. Over the course of the next five years, 61,800 primary schools were constructed, leading to an increase in enrollment rates of children aged 7 to 12 – from 69 percent in 1973 to 83 percent in 1978 (Duflo, 2001). This was equivalent to adding an average of 2 schools per 1,000 children enrolled in 1971. Duflo (2001) shows that the program causally

[7] All but 11 of the 174 language groups in the Indonesia Intercensal survey could be matched to an ethnicity in the *Ethnographic Atlas*. These comprise 0.43 percent of the observations with non-missing language data.

increased years of schooling completed by male students by 0.27 years and that controlling for a concurrent program which improved sanitation and water allocation only strengthened this result.

We start with the baseline estimating equation from Duflo (2001):

$$y_{idk} = \alpha_k + \alpha_d + \beta_1 I_k^{Post} \times Intensity_d + \sum_j \mathbf{X'}_d \mathbf{I}_k^j \mathbf{\Gamma}_j + \varepsilon_{idk} \tag{1}$$

where i indexes individuals, d district of birth, and k year of birth. y_{idk} is the dependent variable of interest, an indicator variable that equals 1 if individual i finished primary schooling. α_k and α_d denote cohort (i.e., birth-year) fixed effects and district fixed effects. I_k^{Post} is an indicator variable equal to 1 if an individual belongs to a cohort born between 1968 and 1972 (so that they would have fully experienced the intervention). The untreated cohort is born between 1950 and 1962 (and were already out of school by the time of the intervention). As in the baseline specification of Duflo (2001), partial treatment cohorts are dropped from the analysis. $Intensity_d$ is the number of schools (per 1,000 school-age children) built in birth district d during the school construction program. I_k^j is an indicator variable that equals 1 if individual i's year of birth is equal to j and 0 otherwise, and $\sum_j \mathbf{X'}_d \mathbf{I}_k^j \mathbf{\Gamma}_j$ denotes cohort fixed effects interacted with the following district-level covariates: the number of school-aged children in the district in 1971 before the school building program took place, the enrollment rate of the district in 1971, and the exposure of the district to the second largest INPRES program, a water and sanitation program.

Panel A of table 3 presents summary statistics from the sample.

Estimates of equation (1) are reported in table 4. The dependent variable is an indicator variable that equals one if the individual completed primary school, and zero otherwise.[8] Column 1 reports estimates for the males only, which is the sample used by Duflo (2001). Column 2 reports estimates for the sample of females only. As shown, while one estimates strong effects of the treatment for the sample of males, the estimated effects are much weaker, and not different from zero, when examining the female sample.

We next show that these modest impacts mask significant heterogeneity. To do this, we estimate an extension of equation (1) that allows for a differential impact of the school construction program depending on whether an ethnic group practices the tradition of bride price payments:

$$\begin{aligned} y_{iedk} \quad = \quad & \beta_1 I_k^{Post} \times Intensity_d \times I_e^{NoBridePrice} + \beta_2 I_k^{Post} \times Intensity_d \times I_e^{BridePrice} \\ & + \alpha_k I_e^{NoBridePrice} + \alpha_k I_e^{BridePrice} + \alpha_e + \alpha_e I_k^{Post} + \alpha_e Intensity_d + \alpha_d I_e^{NoBridePrice} \\ & + \alpha_d I_e^{BridePrice} + I_e^{NoBridePrice} \sum_j \mathbf{X'}_d \mathbf{I}_k^j \mathbf{\Gamma}_j + I_e^{BridePrice} \sum_j \mathbf{X'}_d \mathbf{I}_k^j \mathbf{\Upsilon}_j + \varepsilon_{iedk}, \end{aligned} \tag{2}$$

where all indices and variables are defined as before. Additionally, e indexes the ethnicity of individual i and $I_e^{BridePrice}$ is an indicator variable equal to 1 if ethnic group e traditionally makes non-token bride price payments at the time of marriage, and $I_e^{NoBridePrice}$ is an indicator that equals one if the group does not. The inclusion of $I_k^{Post} \times Intensity_d \times I_e^{NoBridePrice}$ and $I_k^{Post} \times Intensity_d \times I_e^{BridePrice}$ allows us to estimate the impact of school construction separately for ethnic groups that undertake bride price payments at marriage and those that do not. Thus, β_1 and β_2 are our coefficients of interest.

[8] Because the school construction program built elementary schools, we focus our analysis on the elementary school completion rates. Examining years of schooling, we find similar but less precise results.

The specification includes district fixed effects, but now allows the district fixed effects to vary depending on bride price customs of the ethnic group: $\alpha_d I_e^{NoBridePrice}$ and $\alpha_d I_e^{BridePrice}$ as well. These absorb the double interaction components, $Intensity_d \times I_e^{NoBridePrice}$ and $Intensity_d \times I_e^{BridePrice}$, of the triple interaction specification. We also interact the ethnicity fixed effects with the post-treatment indicator variable, $\alpha_e I_k^{Post}$. These absorb the double interaction terms $I_k^{Post} \times I_e^{NoBridePrice}$ and $I_k^{Post} \times I_e^{BridePrice}$. Lastly, we allow the impacts of our baseline set of district-level covariates interacted with cohort fixed effects to vary depending on whether ethnicity e practices bride price. We therefore control for the following interactions: $I_e^{NoBridePrice} \sum_j \mathbf{X'}_d \mathbf{I}_k^j \mathbf{\Gamma}_j$ and $I_e^{BridePrice} \sum_j \mathbf{X'}_d \mathbf{I}_k^j \mathbf{\Gamma}_j$.

The estimates of equation (2) are reported in column 3 of table 4. As shown, we find a significant, positive effect of the school construction program on elementary school completion rates for bride price females but not non-bride price females. The point estimates suggest that an increase of 1 school per 1,000 school-aged children in a district increases the likelihood that a female from a bride price ethnicity will complete primary school by 2.4 percentage points. We confirm this finding by estimating equation (2) separately for girls belonging to ethnic groups with bride price (column 4) and for ethnic groups without bride price (column 5).

Given that the practice of bride price is potentially correlated with other cultural characteristics that may themselves be related to gender outcomes, we investigate the robustness of our estimates to accounting for heterogeneity in the impacts of the school construction program due to other cultural characteristics. The first cultural characteristic we consider is the role women traditionally played in agriculture. Boserup (1970) argues that female participation is strongly associated with the practice of bride price. Giuliano (2014) confirms this empirically, showing a correlation between bride price and female participation in agriculture across all ethnicities in the *Ethnographic Atlas*. Thus, we also account for traditional female participation in agriculture using variable v54 (*Sex Differences: Agriculture*) from the *Ethnographic Atlas*. The measure classifies ethnicities as being in one of eight categories: no information available, males only, males appreciably more, differentiated but equal participation, equal participation, females appreciably more, females only, agriculture is absent or unimportant. Using this coding, we create an indicator variable that equals one if the ethnicity is coded as having 'females appreciably more' or 'females only' traditionally engaged in agriculture.

Anthropologists commonly view bride price, or bridewealth, as being a transfer the husband makes to the wife's family to compensate them for the loss of their daughter (see, for instance, Dalton (1966)). Thus, we would expect bride price to be more widely practiced among ethnic groups that are patrilineal (i.e., the bride joins the kinship group of the groom and his family at the time of marriage). In addition, Bau (2014) provides evidence that matrilocality, which is strongly related to matrilineality, is associated with greater parental investment in daughters relative to sons. Therefore, using information from variable v43 of the *Ethnographic Atlas*, we create an indicator variable that equals one if the ethnicity is coded as being matrilineal.

For female agriculture, some ethnic groups are coded as having no information available. Thus, we also create an indicator variable that equals one if we do not have information to categorize the ethnicity in question. Using these constructed covariates, we test for heterogeneity in the effects of school construction by traditional female participation in agriculture and by traditional matrilineality. This is done by including the analogous interactions as for bride price, namely the newly constructed variables are interacted with $Intensity_d \times I_k^{post}$ with all of the appropriate double interactions also included.

The estimates are reported in table 5. The coefficients on the bride price and non-bride price interactions are virtually unchanged. Column 1 reports the baseline estimates for comparison, column 2 includes the matrilocality interactions, column 3 includes the female agricultural interactions, and column 4 includes both sets simultaneously. The estimated differential effect by bride price remains robust to the inclusion of these additional covariates. The coefficients of the controls are also of interest.

An alternative data source to the 1995 Indonesian Intercensal Survey is the 2010 Indonesian Census, which also reports elementary school completion. A benefit of the 2010 data over the 1995 data is a sample size that is much larger. The estimates, which are reported in appendix table A3, show results that are qualitatively similar to the estimates using the 1995 data.

As a placebo test, one can estimate equations (1) and (2), but assigning children aged 12–17 at the time of the school construction to be the placebo treated cohort and children aged 18–24 at the time to be the placebo untreated cohort. The estimates show no statistically significant effects effects of placebo treatment on males, female, bride price females, and non-bride price females. See appendix table A4 for the estimates.

As in Duflo (2001), we can also allow the effect of the school construction to vary by cohort, but restrict the effect of the construction to be zero for those that were older than 12 in 1974 and therefore would be too old to attend primary school in 1974. Doing this, we find that the effect of school construction for bride price females is generally positive, and the coefficients on the interactions between the cohort indicator variables and the intensity of treatment are jointly significant (F-stat = 7.58, $p < .01$). In contrast, the coefficients for non-bride price females are typically small and negative. The estimates are reported in appendix table A5.

In table A6, we test whether our Indonesia results are driven by Muslim bride price traditions. Muslim bride price, called *mehr* differs from the bride price we study, which is paid to the parents of the bride at the time of marriage. *Mehr* serves as divorce insurance, and is paid to the bride if a marriage ends in divorce. Ambrus et al. (2010), who study the interaction of *mehr* and dowries in Bangladesh, provide a more complete discussion of mehr. In appendix table A4, we allow the effects of school construction to differ by whether an individual reports being a Muslim, as well as the traditional bride price practices of their ethnic group. We find that the effect of bride price status is larger and more significant among non-Muslims, suggesting that neither an Islam effect nor the practice of *mehr* is driving our results.

4 Replicating the finding in Zambia

Having identified heterogeneous impacts of the 1970s Indonesian school construction project on female education, we now show that this finding is also found in a very different context: Zambia in the late-1990s and early-2000s.

There are a number of reasons why Zambia provides a very good setting to replicate the Indonesia finding. Like Indonesia, Zambia features a range of ethnic groups that practice bride price payments at marriage and a range of groups that do not. Also like Indonesia, Zambia had a large school construction program in the late 1990s and early 2000s. Although the school construction occurred over a longer timespan and the process of choosing the location and timing of school construction was more opaque than in Indonesia, the episode provides large-scale variation in school construction like that in Indonesia. As in Indonesia, data on bride price payments and

their determinants are available in Zambia.[9]

Table 6 reports the distribution of marriage payments across the ethnic groups from the Zambian Demographic and Health Surveys (DHS), which we use for our Zambian analyses. As reported, ethnic groups either practice bride price payments, token bride price, or bride service. The Zambian DHS reports 52 distinct ethnic groups for the respondents. Of the 52 ethnicities, we are able to match 48 of them to 20 related and representative groups in the *Ethnographic Atlas*. The remaining four groups are very small, and they comprise less than 0.01 percent of the DHS sample.

To determine whether bride price is related to other cultural traits that may influence female education in Zambia, we examine the relationship between the presence of a bride price norm and other gender-related traits in table 7. Many cultural traits that we expect to be related to gender preferences are homogeneous across Zambian ethnic groups. The plough is not aboriginal for *any* Zambian groups, and *all* groups historically practice some form of polygamy. In contrast, matrilocality is strongly negatively correlated with the practice of bride price ($\rho = -0.694$, $p < 0.01$), as is matrilineality ($\rho = -0.394$, $p < .1$) , consistent with the idea that matrilineality/matrilocality and bride price are substitutes. Within Zambia, there is no significant relationship between female dominance in agriculture and bride price ($\rho = -.083$), although data on gender differences in agriculture are only available for 16 of the 20 ethnic groups from Zambia the *Ethnographic Atlas*.

Since the female agriculture variable in the *Ethnographic Atlas* contains additional information about relative female involvement in agriculture, we also run an ordered logit of this variable on bride price, excluding ethnicities that are not involved in agriculture. The coefficient from this ordered logit is very close to zero and not statistically different from zero. In fact, there is little variation in female agricultural involvement in Zambia. In 12 of the 16 ethnicities for which we have data, females were traditionally "more involved" in agriculture than males.

Table 8 provides additional summary statistics for the two subsamples of the pooled 1996, 2001, and 2007 rounds of the Zambian DHS that we use to analyze the effects of bride price and its interaction with the school construction program on enrollment.

To examine the effect of a large school expansion program on enrollment by bride price customs, we combine the pooled Zambia 1996, 2001, and 2007 DHS data with data provided by the Zambian Ministry of Education. Figure 6 graphs the number of schools built by year in Zambia between 1940 and 2013. Figure 7 reports the number of schools constructed by province. The data indicate that there was a large school construction boom between the mid-1990s and the early-2000s; a total of 5,649 schools were built between 1994 and 2007.

In replicating our findings from Indonesia in the Zambian context, we maintain specifications that are as similar as possible, given data availability, to the specifications we have used for Indonesia. We begin by estimating a variant of equation (2) using a sample of children aged 5 to 12 available from the three rounds of the DHS that include ethnicity data. The earliest round is from 1996, a time period at the beginning of the school construction episode. The second round is from 2001, during the middle of the episode, and the third is from 2007, near the end of the episode.

Unlike in the Indonesian setting, examined by Duflo (2001), construction in Zambia occurred

[9]Within Africa, there are a number of other school expansion episodes that could potentially be used to examine the impacts of the increased provision of schooling on female education. These are available for Zimbabwe (Agüero and Bharadwaj, 2014), Sierra Leone (Cannonier and Mocan, 2012), and Nigeria (Osili and Long, 2008). However, for Sierra Leone and Nigeria, there is not sufficient variation in the practice of bride price payments across ethnic groups to undertake the necessary analysis. In both countries, the majority of people belong to an ethnic group that practices bride price payments at marriage. In Zimbabwe, sufficiently fine-grained data on individuals' ethnicities are not available from the existing data sources that could be used for the analysis.

over a longer period of time and the strategy for building the schools was less clear. Therefore, rather than examining variation arising from the interaction between pre-treatment and post-treatment cohorts with the spatial variation in treatment intensity, we estimate the relationship between the stock of schools in a district during a time period and the average enrollment of children aged 5 to 12 in the same district and time period in our panel setting. As before, we examine differences in the impact of the program on boys versus girls, and for girls, we examine differences in the impact for ethnic groups that practice bride price and those that do not.

Our estimating equation is:

$$\begin{aligned} y_{iedkt} &= \beta_1 Schools_{dt}/Area_d \times I_e^{NoBridePrice} + \beta_2 Schools_{dt}/Area_d \times I_e^{BridePrice} \\ &\quad + \alpha_{kt} I_e^{NoBridePrice} + \alpha_{kt} I_e^{BridePrice} + \alpha_{et} + \alpha_{ed} + \varepsilon_{iedkt}, \end{aligned} \tag{3}$$

where i indexes children, e ethnic groups, d districts, k age of child at the time of the survey, and t the year of the survey (1996, 2001 or 2007). Our outcome of interest is an indicator variable that equals 1 if child i is enrolled in school at the time of the survey (year t): y_{iedkt}. Our measure of school construction is given by $Schools_{dt}/Area_d$, which is the number of schools in district d and year t. As before, $I_e^{BridePrice}$ is an indicator variable that equals 1 if ethnic group e practices bride price payments at marriage, while $I_e^{NoBridePrice}$ is an indicator variable that equals 1 if the ethnic group does not.

The specification also includes age by survey year fixed effects interacted with the bride price indicator variables, $\alpha_{kt} I_e^{NoBridePrice}$ and $\alpha_{kt} I_e^{BridePrice}$. These are the equivalent of the cohort fixed effects interacted with the bride price indicator variables in equation (2). We also include ethnicity-time period fixed effects, α_{et}, and ethnicity-district fixed effects, α_{ed}, which are the equivalent of the ethnicity fixed effects interacted with the post-treatment indicator variable, and the district fixed effects interacted with the bride price indicator variables in equation (2).

Estimates of equation (3) are reported in table 9. Columns 1–3 report estimates of a variant of equation (3) that does not allow for a differential effect depending on an ethnic group's marriage customs. We see that in Zambia a similar pattern emerges as in Indonesia. Among boys and girls, there is some weak evidence that school construction increases enrollment (column 1). This effect is concentrated among boys (column 2), and the estimated impact for girls is very close to zero (column 3).

Column 4 reports estimates of equation (3). As in Indonesia and consistent with proposition 3, the positive impacts of school construction are concentrated among girls from ethnic groups that traditionally practice bride price payments at the time of marriage. Columns 5 and 6 confirm this finding by estimating equation (3) separately for the two sets of ethnic groups.

Table 10 tests whether the results in table 9 can be explained by pre-trends in districts that received more schools. Table 10 duplicates the regressions in table 9, but it includes the forward lag for the treatment, $Schools_{d,t+1}/Area_d$ and its interactions with $I_e^{BridePrice}$ and $I_e^{NoBridePrice}$. None of the forward lags positively predict enrollment. In fact, the negative coefficients for the forward lags suggest that schools may have been allocated to poorly performing districts.

Since bride price is likely to be related to other characteristics, we study whether our results are sensitive to controlling for the interaction between female agriculture and matrilineality and the school construction program, as we did for Indonesia. There are only 21 ethnicities in the *Ethnographic Atlas* for Zambia and female agriculture is only non-missing for 16. As a result, the coefficients are identified by little variation. Appendix table A9 reports the results of the Zambia

school construction regressions including interactions between the treatment $Schools_{d,t+1}/Area_d$ and an indicator variable for whether agriculture is female-dominated and whether matrilineality is practiced, as well as its interaction with an indicator variable for whether data on female participation in agricultural is missing. When female agriculture controls are included, both β_1 and β_2 become larger, and the effect of the school building program becomes positive and significant for non-bride price ethnicites as well. Nonetheless, a F-test for the final column of appendix table A9 shows that β_2 is significantly larger than β_1 ($F = 6.22, p < .05$).

5 Model

Having provided evidence that school construction policies in both Indonesia and Zambia exhibit different impacts on girls' education depending on whether the ethnic group practices bride price or not, we now turn towards gaining a better theoretical understanding of what in our opinion is the most natural explanation for this pattern: the returns to parents of education daughters are higher in bride price ethnicities.

We present a simple model of parental education decisions that intends to show the impact that bride price customs can have on parents' decisions to invest in their daughters and how this changes with government policies that increase access to school. In this basic framework, bride price payments, as long as they are increasing in the bride's education, reward parental investments in their daughters' human capital. When parents are altruistic, they may invest in the education of their daughter as long as she receives a return from it. However, if the daughter cannot commit to repaying them for the sunk investment, parents do not undertake as much investment as the daughter would choose to make if she could pay for it. Bride price helps to overcome this intergenerational incomplete contracting problem by ensuring a medium-term monetary return to the parents.

There are two simple but important predictions from this model. The first is that even a small amount of bride price can lead to higher education rates as long as there are households on the margin of making that educational investment. The second prediction is that, without strong assumptions about the nature of the preferences or of the savings technology, bride price has an ambiguous impact on the effects of education policy. However, we show that under mild assumptions on the distribution of the returns to education, we expect that reducing the cost of schooling would have a larger effect on the enrollment rates of ethnicities that engage in bride price payments when enrollment rates are low, as we might expect in a developing country.

5.1 Setup

Parents live for two periods and receive utility from consumption c_t and through the well-being of their daughter V^d via an altruism parameter $\gamma \in (0, 1)$. Daughters are characterized by ability a_i, which is distributed according to a probability density function $f(\ )$ and a cumulative distribution function $F(\ )$.

The utility of the daughter $V^d(S, a_i)$ depends on her her educational attainment S and ability a_i. Define $\Delta V(a_i) = V^d(S = 1, a_i) - V^d(S = 0, a_i)$ to be the returns to education for a daughter of ability a_i. $\Delta V(\ )$ is a strictly increasing function. These returns are distributed with a probability density function $g(\ )$, which is a monotone transformation of $f(\ )$, and cumulative distribution function $G(\ )$. The returns do not depend on the bride price custom and are meant to capture

both labor market and marriage market returns that are enjoyed by a woman of ability a_i if she is educated.

In the first period, parents decide how much to consume (c_1) and whether or not to educate their daughter ($S \in \{0,1\}$) at the cost f_S. In the second period, they only decide how much to consume (c_2).

The variable $BridePrice_e \in \{0,1\}$ denotes whether the household belongs to an ethnic group that engages in bride price payments or not. If it does, parents receive a bride price payment in period 2. We assume that in the absence of this custom, the bride price amount will be part of the transfer to the daughter from her husband, and hence that the payment is incident on her. Bride price amounts depend on a woman's ability and on her educational attainment:

$$BP(BridePrice_e, S, a_i) = BridePrice_e \left[\pi S + h(a_i)\right].$$

Assumption 1. *Bride price amounts are increasing in a woman's educational attainment:* $\pi > 0$.

Household i solves the following problem:

$$\begin{aligned} max_{S\in\{0,1\},c\geq 0} \quad & c_1 + \beta c_2 + \gamma[V^d(S, a_i) - \beta \cdot BP(BridePrice_e, S, a_i)] \\ s.t. \quad & c_1 + f_S \cdot S \leq y_1 \\ & c_2 \leq y_2 + BP(BridePrice_e, S, a_i) \end{aligned} \tag{4}$$

Note that there is no borrowing nor saving. We assume that $y_1 > f_S$, i.e. that the household does not need to borrow to finance the education of the daughter.

5.2 Bride price and the education decision

Substituting the budget constraints into the objective function, we have that a household educates the daughter ($S_i = 1$) whenever

$$-f_S + BridePrice_e \beta(1-\gamma)\pi + \gamma \Delta V(a_i) \geq 0.$$

The household that is on the margin between making the educational investment or not, depending on the bride price custom BP and on the cost of education f_S, has returns to education for the daughter equal to

$$\Delta V^*(BridePrice_e, f_S) = \frac{f_S}{\gamma} - BridePrice_e \frac{\beta(1-\gamma)\pi}{\gamma}.$$

Define as $a^*(BridePrice_e, f_S)$ the corresponding ability level obtained by inverting function $\Delta V(\,)$: $\Delta V^*(BridePrice_e, f_S) = \Delta V(a^*(BridePrice_e, f_S))$.

Household i makes the educational investment as long as the returns for the daughter are higher than the ones of the marginal household ($\Delta V(a_i) \geq \Delta V^*(BridePrice_e, f_S)$). Hence, the probability that household i educates the daughter is:

$$P(S_i = 1 | BridePrice_e, f_S) = P(\Delta V(a_i) \geq \Delta V^*(BridePrice_e, f_S)) = 1 - G(\Delta V^*(BridePrice_e, f_S)).$$

Proposition 1. *The probability of education* $P(S_i = 1)$ *is:*
(i) decreasing in the cost of education;

(ii) higher among ethnicities that engage in bride price payments.

Proof. See Appendix A. □

Proposition 1 simply tells us that we should observe higher rates of enrollment among ethnicities that practice bride price. This result is intuitive: bride price provides an additional incentive for parents to educate their daughter, in addition to altruism. Higher enrollment rates among bride price ethnicities imply, in this setting, that girls of relatively lower ability would get educated in bride price ethnicities because the bride price premium justifies the education investment of the parents.

Proposition 2. *The average ability of educated girls is higher among ethnicities that do not engage in bride price payments relative to ethnicities that do.*

Proof. See Appendix A. □

It is worth noting that, as long as both the returns to education $\Delta V(a_i)$ and bride price payments $\pi S + h(a_i)$ are increasing in ability a_i, bride price amounts are higher for educated women whether or not $\pi > 0$. If more able women are more likely to be educated and to receive high bride price, hedonic regressions of bride price payments do not have a causal interpretation, as mincerian regressions cannot typically identify the labor market returns to education when educational attainment is endogenous (Griliches, 1977; Card, 1994; Heckman et al., 2006).

5.3 Bride price and response to education policies

We now examine how a change in the cost of education f_S affects the probability of education depending on the bride price custom, making two additional assumptions, which provide simple sufficient (but not necessary) conditions. The first is that the distribution of daughters' returns to education is single peaked. The second is that, because of the low rates of female enrollment in developing countries, the marginal girl that gets educated in both Indonesia and Zambia has ability above the mode.[10] Under these assumptions, it is straightforward to interpret the above empirical results.[11]

Proposition 3. *A drop in the cost of education increases the probability of education more in ethnicities that engage in bride price payments compared to other ethnicities.*

Proof. See Appendix A. □

Figure 1 provides a simple intuition for this result: when the density of the returns to education is decreasing, a decline in the cost of schooling affects the group with higher schooling rates (bride price ethnicities, in our case) more because this group has higher density on the margin of the educational investment.

Intuitively, in a society where few women are educated, the ones who are must have very high returns from education. The unimodal assumption guarantees, loosely, that there are only a few women with such high returns, relative to the number of women with modal returns. A marginal

[10] If the distribution of returns is skewed to the right, this case applies when education rates are above 50%.

[11] This argument is related to one put forth by Fabinger and Weyl (2013), who show that a unimodal distribution of consumer valuations leads to S-shaped demand functions. Then, the elasticity of demand with respect to a price change depends on whether such a change occurs in a part of the demand curve that is concave or convex.

decrease in the cost of education leads women whose returns to education were previously marginally below the cost of education to become educated. If women in bride price ethnicities need slightly lower returns in order to get educated relative to women in non-bride-price ethnicities, there will be more women on the margin of responding to the policy change in bride price ethnicities since their returns are closer to the modal returns. Becker et al. (2010) use a related argument to explain why women's education rates have overtaken those of men in developed countries.

6 Additional Evidence

In this section, we examine the main assumption and implications to our model and bring additional datasets to show consistent evidence from both Indonesia and Zambia in support of our interpretation that the bride price custom can explain the heterogeneous effects of school expansion that we have documented across ethnic groups.

6.1 Are bride price transfers large enough to affect parent's decisions?

An important implication of the model is that, in order for there to be an effect of the bride price custom on parental decisions regarding their daughters' education, the bride price payment does not have to be particularly large. Whether or not an ethnic group traditionally engages in bride price payments will contribute to determining which households are on the margin of educating their daughter or not. Thus, even if the amount of the bride price is small, it can still affect those on the margins. However, the larger the bride price and the more strongly it increases with education, the larger we expect the effects to be. Thus, here we document that bride price transfers are sizeable in both Indonesia and Zambia.

Bride price payments are important in contemporary Indonesia. Figure 3 graphs the distribution of bride price payments for ethnicities that traditionally make payments at marriage using rounds 3 and 4 of the Indonesia Family Life Survey, while figure 4 graphs the distribution for all non-zero bride price payments (including ethnicities that pay token bride price). In 2000, 87 percent of marriages reported to the IFLS had a bride price and in 2007, 85 percent of marriages included a bride price.[12] Appendix table A8 reports summary statistics for bride price marriages for rounds 3 and 4 of the Indonesia Family Life Survey.

We find that across all marriages (i.e., in the full IFLS sample), the median bride price is 4 percent of GDP per capita and the mean bride price is 45 percent of GDP per capita. Moreover, if we restrict the sample to ethnicities that we identify as having a bride price custom, the median bride price is 9 percent of GDP per capita and the mean is 82 percent.[13] Therefore, bride price payments are significant, particularly compared to a family's annual income.

In Zambia, bride price(*lobola*) is widespread. In the data from the Zambia Fertility Study (ZFPS - see the data appendix for a description of the data) in peri-urban Lusaka, a bride price transfer was made in 85.5% of all marriages and in 87.5% of marriage in which the wife belong to

[12]The IFLS asks about dowry and bride price together and does not distinguish between the two. However, according to the IFLS documentation the marriage custom is typically bride price except for marriages among the matrilocal Minangkabau, who we omit from the analysis (RAND, 1999).

[13]We see little evidence of bride price inflation or deflation over time. Marriage year is negatively correlated with bride price, but this correlation is entirely driven by marriages that are reported to have occurred before 1980 (which make up 7 percent of the bride price ethnicity data), and these respondents had to recall bride prices from at least 20 years ago when they responded to the survey.

an ethnic group that traditionally engages in bride price. In the overall sample, the mean payment corresponds to 122% of the per capita GDP in the year of marriage, the median to 58%. Among ethnic groups that traditionally engage in bride price, the mean payment was 182%of the per capita GDP in the year of marriage, the median was 72%

6.2 Are bride price transfers increasing with the bride's education?

A crucial assumption in the mechanism of the model is that bride price transfers are increasing in the educational attainment of the bride. This was Assumption 1 of the model. We now verify that there is a positive correlation between a woman's educational attainment and the bride price payment in both Indonesia and Zambia.

Evidence from Indonesia

In Indonesia, we examine this relationship using the Indonesia Family Life Survey (2000 and 2007). The survey reports information about the value of bride price transfers at marriage. We link individuals to their traditional marriage practices using their self-reported ethnicity. The 2007 IFLS contains information on 28 ethnicities that were matched manually to the ethnic groups listed in the *Ethnographic Atlas*.[14]

We begin by estimating the following hedonic regression:

$$\begin{aligned} \ln(BP)_{iekt} &= \alpha_t + \phi_k + \beta_1 I(PrimarySchool)_i + \beta_2 I(JuniorSecondary)_i \\ &\quad + \beta_3 I(College)_i + \mathbf{X}_i \mathbf{\Gamma} + \varepsilon_{iekt} \end{aligned} \tag{5}$$

where i indexes a marriage, e the ethnicity of the bride, k the year of the marriage, and t the survey year (2000 or 2007). $BridePrice_{iekt}$ is the reported amount of the bride price paid at the time of marriage. $I(PrimarySchool)_i$ is an indicator variable that equals one if individual i has completed primary school and attended junior secondary school, $I(JuniorSecondary)_i$ is an indicator variable equal to 1 if an individual has completed junior secondary school and attended upper secondary school, and $I(College)_i$ is an indicator for having attended college. α_t is a survey-year fixed effect and ϕ_k is a marriage-year fixed effect. $\mathbf{X}_i$ varies across specifications, but always includes controls for the bride's age and her age squared at the time of marriage. Depending on the specification, it also includes either ethnicity effects or an indicator variable for belonging to a bride price ethnicity, as well as controls for the husband's education, and the husband's age at marriage.

Estimates of equation (5) are reported in table 11.[15] Column 1 reports the returns to different education levels controlling for only survey-year and marriage year fixed effects. Column 2 adds marriage age controls and column 3 includes a control for belonging to a bride price ethnicity. In column 4, we include ethnicity fixed effects to capture any correlation between belonging to an ethnicity that practices higher bride price and receiving more education. The results are very similar.

The estimates show that more educational attainment by the bride is strongly associated with a higher bride price transfer at marriage. According to the estimates reported in column 4, completion

[14]Of the ethnic groups listed in the IFLS, six cannoln(BP)t be matched to the *Ethnographic Atlas*. This comprises 5.6 percent of the sample of recently married couples who were asked questions about their bride price payments and had a recorded ethnicity.

[15]Summary statistics for rounds 3 and 4 of the Indonesia Family Life Survey (IFLS) are reported in appendix table A8.

of primary school is associated with a 54% increase in the value of the bride price (relative to no schooling), completion of junior secondary school is associated with an additional 62% increase in the bride price, and completion of upper secondary schooling and attendance of college is associated with an additional 89% increase. According to the estimates, parents of women who attended college, on average, receive bride price payments that are 205% higher than payments to parents of women who did not complete primary education.

The remaining columns in table 11 report estimates that include husband's education, as well as husband's age (and age squared) at the time of marriage. Although the estimates in table 11 must be taken with the caveat that the additional covariates are potentially endogenous to our variables of interest, the estimated effects of a bride's educational attainment are consistent with the estimates from the first four columns of the table. The potentially-endogenous variables absorb part of the effect of education on bride price amount, but the relationship between a bride's educational attainment and bride price remains large, positive, and statistically significant.

Overall, the estimates reported in table 11, while not causal, are consistent with the hypothesis that a bride's education has a very large impact on the amount of bride price that the bride's parents receive at the time of marriage.

While the correlations report in table 11 cannot be interpreted as causal, we can alternatively follow Duflo (2001) and instrument for primary school completion among females belonging to bride price ethnicities using the number of schools built in a female's birth district in rounds 3 and 4 of the IFLS.[16] In line with Duflo (2001), we allow the effect of school construction to vary by a child's age in 1974, restricting the effect to 0 if a child was older than 12 in 1974. Following Duflo (2001), we also restrict the sample to those born between 1950 and 1972. Unfortunately, the resulting sample of couples from bride price ethnicities who were asked questions about bride price is quite small (258). This results in the first stage estimating equation:

$$I(Completed\,Primary)_{idkt} = \alpha_d + \alpha_k + \alpha_t + \sum_{a=2}^{12} \beta_a\, Intensity_d \times I(age_{1974} = a)_i + \sum_j \mathbf{X'}_d \mathbf{I}_k^j \mathbf{\Gamma}_j + \epsilon_{idkt}, \quad (6)$$

where d denotes the district, i denotes the individual, t denotes the survey year, and k denotes the cohort. α_d denotes district fixed effects, α_k cohort fixed effect, and α_t survey-round fixed effects. $\sum_j \mathbf{X'}_d \mathbf{I}_k^j \mathbf{\Gamma}_j$ are the cohort-specific controls for the INPRES sanitation program, the enrollment rate in 1971, and the total number of school-aged children in 1971.

The second-stage equation is given by:

$$y_{idkt} = \alpha_d + \alpha_k + \alpha_t + \gamma I(CompletedPrimary)_i + \sum_j \mathbf{X'}_d \mathbf{I}_k^j \mathbf{\Gamma}_j + \mu_{idkt}, \quad (7)$$

where the outcome variable y_{idk} is either the value of the bride price paid or the natural log of the bride price.

Appendix table A7 reports the results of these regressions. Column 1 shows that the instruments jointly significantly predict primary school completion among bride price females in the IFLS (F-

[16] As we have shown in table 4, the school construction does not strongly effect primary completion for females who do not belong to ethnicities that practice bride price.

statistic of 5.99). Columns 2 and 3 of the table, which report the effect of primary schooling on bride price and log bride price values, are imprecisely estimated but appear to corroborate the results in the hedonic regressions: completing elementary school increases bride price payments by 180 percent ($p < .10$). However, self-reported bride prices in the IFLS are likely to be in nominal terms. Therefore, in columns 4-6, we duplicate the regressions in columns 1-3 including marriage year fixed effects. The new first stage is quite weak, with an F-statistic of 1.72. The effect of primary school completion on bride price values in column 5 is large and significant at the 5 percent level. Column 6 indicates that primary completion leads to an 80 percent increase in bride price payments, but this effect size is imprecise and statistically insignificant. In general, given the weak first stage, these results should be interpreted with caution.

Evidence from Zambia

We investigate the relationship between the amount of bride price paid at the time of marriage and the bride's characteristics and, in particular, her education, as postulated in assumption 1. To do so, we included a dedicated module in the first wave of the Zambia Fertility Preferences Survey (Fall 2014), in which 728 households from a poor suburb of peri-urban Lusaka were interviewed. Each spouse was asked a series of questions on the practice of *lobola*, leading to a total of 1,456 observations.[17]

Appendix table A11 reports summary statistics for the key variables. 94 percent of wives have completed primary education, 50 percent have completed junior secondary education, and 27 percent have completed secondary education. Educational attainment is slightly higher among husbands, with 99 percent completing primary school, 73 percent completing junior secondary school and 47 percent secondary education. Almost no person interviewed had attended college.

To assess the empirical relationship between bride price payments and educational attainment, we estimate the following hedonic regressions for wife i, belonging to ethnic group e and married in year t:

$$\begin{aligned} \ln(BP)_{iet} &= \alpha_t + \beta_1 I(Primary)_i + \beta_2 I(JuniorSecondary)_i + \beta_3 I(Secondary)_i \\ &\quad + \mathbf{X}_{ie}\mathbf{\Gamma} + \varepsilon_{iet}, \end{aligned} \tag{8}$$

where the dependent variable, $\ln(BP)_{iet}$, is the natural logarithm of the amount paid at marriage. We measure education using an indicator variable $I(Primary)_i$ that equals 1 if the bride has completed primary education (and 0 otherwise) and an indicator variable $I(JuniorSecondary)_i$ that equals 1 if the woman has completed junior secondary education and $I(Secondary)_i$ that equals 1 if the woman has completed secondary education or above. The excluded category is no education. The control vector $\mathbf{X}_{ie}$ includes a quadratic in the wife's age, an indicator variable that equals one if an ethnicity traditionally practices bride price, a marriage-year fixed effect, and the husband's characteristics.

Estimates of equation (8) are reported in table 12, columns 1–4. As in Indonesia, bride price payments increase with the education of the bride. Completing primary school is associated with a 50 percentage point increase in the bride price payment, completing junior secondary school is associated with another 27 percentage point increase, and completing secondary school with another 40 percentage point increase.

[17] See Appendix A for further details of the sample.

We next include a vector of covariates related to the husband's characteristics. These include an indicator of whether the husband has completed primary school or junior secondary school and the husband's age at marriage and age at marriage squared. The estimates are reported in columns 5–8 of table 12. The coefficients for the education completion variables remain stable, although the coefficient for primary school completion, β_1, become less precisely estimated.

These results are consistent with qualitative evidence from focus groups. From these discussions, it is clear that bride price transfers increase with the education of the bride and that this is well known. For example, one respondent told us that when a parent negotiates *lobola*, he or she calculates how much was spent on education. Parents are well aware of bride price as a future income stream and view it as a substitute for old age support. For example, one respondent explained to us that "a girl child is business and we all need money" and "for girl children you benefit from charging [lobola], while with boys support comes from them when you old."

We also used the ZFPS survey to try and gain a better understanding of why bride price is increasing with the education of women (or at least why it is perceived to increase). Thus, we asked respondents to indicate the reason why, in their view, bride price for more educated brides is higher. Respondents, again unprompted, indicated several reasons that were categorized and are reported in column 1 of table 13. The most common answer given was that parents should be compensated for the educational investments made in their daughter. This is consistent with the common anthropological interpretation of the bride price as compensation for the parents' investments made in the bride (e.g., Vroklage, 1952). Other common explanations attributed the higher bride price to increased productivity of the bride, either in relation to earnings in the labor market, improved skills within the household, increased ability to maintain the health and education of her children.

An important point is that these results, in general suggest a causal interpretation of the positive relationship between education and bride price. Either due to a culture-based moral obligation, or due to a perceived increase in the productivity of the bride, her increased education causes her to receive a higher bride price. An alternative set of explanations are that the estimated relationship is driven by omitted factors, the most obvious being that more educated brides tend to have richer parents, and if the bride's parents are wealthier, then they will demand a higher bride price. We were particularly careful to look for explanations of this nature. Though some respondents did provide an explanation along these lines, it was only chosen by less than 8% of the sample, making it one of the least popular explanations.

After allowing respondents to answer unprompted, they were then prompted and asked directly about each potential explanation listed in table 13. Due to the well-known acquiescent response bias, we must interpret the prompted responses with caution and we expect respondents' agreement frequencies to be upward biased and their disagreement frequencies to be downward biased. However, the relative differences are likely still informative. The responses to the prompted questions, reported in columns 2 and 3, show that most people believe that the increase in bride price from education is due to the belief that parents should be compensated for their investments in their daughter. When asked about this explanation, only 12% said that they felt this was not a reason. By contrast, 56% said that education being associated with a bride's parents being wealthy was not a reason.

6.3 Do bride price cultures have higher levels of female educational attainment?

We next turn to an examination of the relationship between an ethnic group's bride price practices and the level of female schooling. We do this by examining variation in schooling enrollment across ethnic groups (first in Indonesia and then in Zambia) and asking whether girls are more likely to be enrolled in school in ethnic groups that engage in bride price payments at marriage, as predicted by proposition 1.

Our estimating equation is:

$$I_{ijedt}^{Enrolled} = \alpha_{dt} + \beta_1 I_e^{BridePrice} + \mathbf{X}_i\mathbf{\Gamma} + \mathbf{X}_j\mathbf{\Omega} + \mathbf{X}_e\mathbf{\Pi} + \varepsilon_{ijedt}, \quad (9)$$

where i indexes girls aged 5–22, j indexes households, e indexes ethnic groups, and t the year of the survey. For Indonesia, we examine all girls from the 1995 Indonesia Intercensal Survey. For Zambia, we examine all girls from the pooled 1996, 2001, and 2007 Zambian DHS.

The dependent variable $I_{ije}^{Enrolled}$ is an indicator variable that equals 1 if individual i from household j and ethnicity e is enrolled in school. As before, $I_e^{BridePrice}$ is an indicator variable that equals 1 if ethnicity e traditionally engages in the practice of bride price payments at marriage. α_{dt} denotes district fixed effects interacted with survey-year fixed effects. For Indonesia, we have only one survey-year so these are simply district fixed effects. The vector $\mathbf{X}_i$ consists of the age of the girl as well as her age squared. The vector $\mathbf{X}_e$ also includes our set of ethnicity-level controls. This is the same set as included in tables 5 and appendix table A9: an indicator that equals one if ethnicity e traditionally was matrilineal and a measure of the traditional participation of women in agriculture. We cluster standard errors at the ethnicity level. Since there are as few as 16 ethnicities in our sample, we also report confidence intervals from a wild bootstrap procedure (Cameron and Miller, 2015).

Estimates of equation (9) are reported in table 14. Columns 1 and 2 report estimates for Indonesia, while columns 3 and 4 report estimates for Zambia. The even numbered columns include the ethnographic covariates, while the odd numbered columns do not. In all four specifications, we estimate a positive and significant relationship between bride price and the probability that a girl is enrolled in school. The point estimates are large. Bride price is associated with between a 3.4 to 6.8 percentage point increase in the probability of school enrollment. These correlations are consistent with proposition 1 of the model.

6.4 Do bride price cultures have lower test scores?

One of the predictions to emerge from the model states that bride price females should have lower academic ability on average conditional on attending school (proposition 2). We use self-reported test score data in rounds 3 and 4 of the IFLS to test whether this is the case for primary school students in Indonesia. We first restrict the data set to test-takers who took state exams between 1980 and 2001 during the Ebtanas exam system.[18] This sample includes 77 percent of primary-school test-takers. After normalizing total test scores to have a mean of 0 and a standard deviation of 1, we run the following regression for bride price females who reported primary school test scores:

$$TestScore_{iekpst} = \alpha_{kt} + \delta_{ps} + age_{it} + \beta_1 I_e^{BridePrice} + \beta_2 I_e^{NoBridePrice} + \mathbf{X}_e\mathbf{\Pi} + \epsilon_{iekpst}. \quad (10)$$

[18] Ebtanas was instituted in 1980, and it was replaced by UNAS in 2001.

where i denotes a female primary school student, e an ethnicity, k is the year of birth, p a province, s the year the test was taken, and t denotes the IFLS survey year. The variable α_{kt} is a year-of-birth by survey-year fixed effect and δ_{ps} is a province by test year fixed effect. We include δ_{ps} since the Ebtanas exam system was standardized at the province-level each year. The vector $\mathbf{X}_e$ includes our set of ethnicity-level controls. This is again the same set as included in table 5 and appendix table A9: an indicator that equals one if ethnicity e traditionally was matrilineal and a measure of the traditional participation of women in agriculture. We cluster standard errors at the ethnicity level. Since there are only 13 ethnicities with test score data in the IFLS, we also report confidence intervals from a wild bootstrap procedure (Cameron and Miller, 2015).

Table 15 reports the estimates of equation (10). Column 1 reports estimates without the ethnographic controls and column 2 reports estimates including the controls. Consistent with proposition 2, bride price females' test scores are estimated to be 0.08–0.09 standard deviations lower than those of non-bride price females.

6.5 Qualitative survey evidence from Zambia

The institution of bride price can only influence educational investment to the extent that parents believe that bride price increases with education. To understand whether families perceive the association between education and bride price as causal, we included a dedicated module in the first wave of the Zambia Fertility Preferences Survey (Fall 2014), in which 728 households were interviewed. Each spouse was asked a series of questions on the practice of *lobola*, leading to a total of 1,456 observations.

In the first set of questions, respondents were unprompted and asked to indicate the factors that affect bride price in their community today. The responses are summarized in table 16. The majority of respondents (37%) listed education as the primary determinant of the value of the bride price at marriage. The next most commonly listed first determinant was family values (15%) and good morals (13%). Overall, 63% of respondents listed education as one of the three most important factors affecting bride price.

Respondents were then asked to list all factors that lower bride price amounts. We coded these qualitative answers to identify those indicating that low education is a negative determinant of bride price.[19] Overall, 17% of respondents report lack of education as a negative determinant of bride price, with similar percentages among male and female respondents.

6.6 Testing other explanations for the differential schooling response by bride price cultures

Below, we examine two categories of potential alternative explanations for our findings, which involve possible differences in economic behavior across ethnic groups that are systematically correlated with the bride price custom. Overall, we find no evidence that such systematic differences exist.

[19] Examples of these qualitative answers are "Lack of education," "Not going to school," "The woman is uneducated," "Education level of the girl," "If a woman hasn't been to school."

Higher returns to education for bride price cultures

One potential explanation for our findings is that the the labor market returns to education are higher for females from bride price cultures and this is why parents are more likely to educated their daughters in response to the school-building programs. We test whether the data are consistent with this alternative explanation. Using the 1995 Indonesia Intercensal data, we check whether the relationship between a women's level of education and either her employment status or her income is stronger for women from bride price cultures than women that are not.

In practice, we estimate the following equation:

$$\begin{aligned} y_{iked} &= \alpha_d + \alpha_k + \beta_1 I(PrimarySchool)_i + \beta_2 I(PrimarySchool)_i \times I_e^{BridePrice} \\ &\quad + \beta_3 I(Junior\,Secondary)_i + \beta_4 I(Junior\,Secondary)_i \times I_e^{BridePrice} \\ &\quad + \beta_5 I(College)_i + \beta_6 I(College)_i \times I_e^{BridePrice} + \varepsilon_{kied} \end{aligned} \tag{11}$$

where i indexes a woman between the ages of 25 and 45, e her ethnicity, d her district, and k her age. y_{iked} is either an indicator variable that equals one if the individual is employed, the natural log of the wage among women employed in the formal sector[20], or the wealth index of a woman's household.[21] $I(PrimarySchool)_i$ is an indicator variable that equals one if individual i has completed primary school and attended junior secondary school, $I(Junior\,Secondary)_i$ is an indicator variable equal to 1 if an individual has completed junior secondary school and attended upper secondary school, and $I(College)_i$ is an indicator for having attended college. α_d denotes district fixed effects, which are intended to capture district-level differences in the labor market, and α_k denotes age fixed effects.

The estimates are reported in table 17. Unsurprisingly, we find that more education is associated with more employment, higher wages, and greater household wealth. However, we find no evidence that the relationship between education and employment or wages is stronger for women from bride price cultures. In fact, in agreement with our prediction that educated women in bride price ethnic groups have worse unobserved quality, we find somewhat lower coefficients in terms of marital wealth associated with education for these women. Thus, it is unlikely that the differential policy response we document can be explained by higher returns to education for women from bride price cultures.

Evidence from Zambia confirms our findings for Indonesia. We estimate a variant of equation (11) using the three available rounds of the Zambian DHS. As in Indonesia, we examine female employment and a wealth index[22]. These estimates are reported in columns 1 and 2 of table 18. As in Indonesia, we find no evidence of a differential return to education for women belonging to bride price cultures.

Because the DHS does not include information on wages and therefore we are unable to examine the wages of employed women, we instead use alternative measures of well-being that are available from the DHS and likely correlated with female income (and household income). Specifically, we also examine an indicator variable that equal one if a woman's child is categorized as being stunted (having a height that is below three standard deviations below the mean of the growth

[20]The Indonesia Intercensal data only reports wages for formal sector employees.

[21]The wealth index is constructed by a principal components analysis of indicator variables for owing an automobile, tv, radio, stove, buffet, bicycle boat, and motorboat. The wealth index is the first component of this analysis.

[22]The Zambia wealth index is constructed by the Demographic and Health Surveys based on answers to a large number of questions about asset ownership and housing characteristics.

distribution for health children based on a study of six baseline countries chosen by the WHO – Brazil, India,Oman, Ghana, Norway and the USA) and an indicator that equals one if a woman's child is categorized as being malnourished (having a weight that is below three standard deviations below the mean). We estimate equation (11), looking at children aged 0-5 in the sample. The estimates are reported in columns 3 and 4 of table 18. Again, we see no evidence of a differential return to education for women belonging to bride price cultures.

Higher ability to pay for schooling for bride price cultures

An alternative explanation for our finding is that cultures that engage in bride price payments at the time of marriage have higher incomes and therefore are better able to send their daughters to school in response to the large school construction programs. We test for this by estimating the determinants of the wealth index in Indonesia and Zambia. In particular, we are interested in whether households that belong to bride price ethnic groups (defined as the ethnicity of the household head) have greater wealth. The specification also includes district fixed effects and survey year fixed effects (for Zambia).

Estimates are reported in columns 1 and 3 of table 19. We find no significant difference in the wealth of bride price and non-bride price households in either Indonesia and Zambia. Thus, it is unlikely that differences in wealth levels explain our findings.

Even if household wealth is the same between bride price and non-bride price groups, it is still possible that bride price societies have less children and thus are more easily able to send their children to school, including their daughters. For example, in Indonesia, it has been hypothesized that historically the bride price has led to delayed marriage (and to many women not marrying) and therefore to lower rates of fertility (Boomgaard, 2003).

To test for this, we look at a cross-section of women, aged 25–45, in both Indonesia and Zambia, and examine the correlates of the number of living children the women has at the time of the survey. In addition to a bride price indicator variable, the specification also includes age fixed effects, district fixed effects, and survey-year fixed effects (for Zambia).

The estimates are reported in columns 2 and 4 of table 19. We find no evidence that bride price families have fewer children, and thus are more easily able to send daughters to school. In Zambia, we find that there is no statistically significant difference between bride price and non-bride price groups. In Indonesia, we do see a significant difference, but we find that bride price families actually have more children than non-bride price families, not less. Thus, it is unlikely that differences in fertility rates explain our findings.

7 Conclusions

Our analysis has documented a (perhaps surprising) economic consequence of the traditional practice of bride price payments, which is prevalent in many parts of the world including most of sub-Saharan Africa and many parts of Asia.

Revisiting one of the best-studied historical development projects – the Sekolah Dasar INPRES school construction program in Indonesia – we have shown that the impacts of the school-building project on female education depended critically on this cultural practice. For ethnic groups that traditionally make bride price payments at marriage, the increased supply of schools resulted in a significant increase in female education. However, for those without this custom, the increase in

the number of schools had no impact on female education.

To better understand the mechanisms behind this differential effect, we documented that for groups practicing bride price payments, higher female education at marriage is associated with a significantly higher bride price payment received. Thus, the bride price provides a greater incentive for parents to invest in girls' education. Furthermore, it is these parents that are more likely to take advantage of the increased supply of schools by educating their daughters.

We also replicated these same findings in Zambia, where we exploit a similar school expansion program that took place in the early 2000s. We find effects in Zambia to be qualitatively identical to the effects in Indonesia. The impact of the school building program on female education is concentrated among ethnic groups that traditionally make bride price payments at the time of marriage. As in Indonesia, the value of the bride price received at marriage increases with the education of the bride. Household survey data from Zambia reveals that parents believe that bride price increases with education, which they attribute mainly to providing compensation for parental investment in girl children.

We believe that our finding provides a number of important lessons. First, while there may be significant downsides to a bride price tradition, our results suggest that any change to this cultural custom should likely be considered alongside additional policies to promote female education. Second, our findings also highlight the importance of the culture of a society, and how this can be critical in determining the success of large-scale development policies.

8 Tables

Table 1: Distribution of Customs Practiced in Indonesia

	Number of ethnic groups	Percent of non-missing observations
Marriage Customs		
Bride Price	13	0.464
Bride Service	2	0.071
Token Bride Price	2	0.071
Gift Exchange	3	0.107
Sister Exchange	4	0.143
No Custom	4	0.143
Dowry	0	0.000
Other Customs		
Matrilineal	4	0.143
Matrilocal	5	0.185
Plow	9	0.321
Female Agriculture	4	0.174
Polygamy	19	0.679

Notes: This table counts the number of ethnicities that practice different traditional customs in the *Ethnographic Atlas*, which contains 28 ethnicities that are matched to Indonesian data.

Table 2: Correlations Between Bride Price and Other Customs in Indonesia

	Indicator variable for bride price practice				
Matrilineal	-0.250				
	(0.248)				
Matrilocal		-0.100			
		(0.253)			
Plow			-0.029		
			(0.209)		
Female Agriculture				-0.276	
				(0.256)	
Polygamy					0.029
					(0.209)
Constant	0.500***	0.500***	0.474***	0.526***	0.444***
	(0.106)	(0.111)	(0.119)	(0.120)	(0.172)
Number of observations	28	27	28	23	28
Adjusted R^2	-0.007	-0.034	-0.038	-0.002	-0.038

Notes: This table regresses an indicator variable for whether an ethnicity practices non-token bride price on indicator variables for practicing matrilineality, matrilocality, and female agriculture.

Table 3: Summary Statistics by Bride Price Status for the 1995 Indonesia Intercensal Data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Bride Price		Non-Bride Price		Pooled Sample			
					Without Controls		With Controls	
	Mean	SD	Mean	SD	Difference	SE	Difference	SE
					Panel A. School Construction Sample			
Age	12.750	4.930	13.234	4.990	-0.484***	0.029	0.186	0.145
Female Primary Completion	0.639	0.480	0.605	0.489	0.034***	0.005	0.048*	0.027
Male Primary Completion	0.745	0.436	0.722	0.448	0.023***	0.005	0.032	0.020
Schools per 1000 School-Aged Children	2.220	1.089	1.991	0.790	0.229***	0.006	–	–
Matrilineal	0.123	0.329	0.109	0.312	0.014**	0.002	-0.156**	0.050
Female Agriculture	0.036	0.185	0.034	0.182	0.001	0.001	-0.074**	0.034
Age	34.451	7.041	34.414	7.131	0.036	0.055	0.036	0.052
					Panel B. School Enrollment Sample (Ages 5-22)			
Female Enrollment	0.610	0.488	0.577	0.494	0.033***	0.004	0.006	0.015
Male Enrollment	0.635	0.481	0.619	0.486	0.016***	0.004	-0.009	0.011
Matrilineal	0.107	0.310	0.126	0.332	-0.019***	0.002	-0.136**	0.048
Female Agriculture	0.035	0.184	0.045	0.208	-0.010***	0.001	-0.054*	0.029

Notes: This table presents summary statistics for the 1995 Indonesia Intercensal data. Columns 1 and 2 present means and standard deviations for ethnicities that traditionally practice bride price. Columns 3 and 4 present summary statistics for non-bride price ethnicities. Column 5 presents the difference in means and column 6 presents the standard error of the difference. Column 7 presents the coefficient on bride price in a regression of the row-name variables on bride price status, district of birth fixed effects, and in the case of the school construction sample, treated or non-treated cohort fixed effects. Column 8 presents the standard error of the bride price coefficient, clustered at the district level.

Table 4: Bride Price Status and the INPRES School Expansion in the 1995 Indonesia Intercensal Data

	(1)	(2)	(3)	(4)	(5)
	Indicator variable for completion of primary school				
	Males	Females	Females	B.P. Females	Non B.P. Females
$I_k^{Post} \times Intensity_d$	0.012*	-0.002		0.023**	-0.001
	(0.006)	(0.007)		(0.012)	(0.010)
$I_k^{Post} \times Intensity_d \times I_e^{BridePrice}$			0.024**		
			(0.012)		
$I_k^{Post} \times Intensity_d \times I_e^{NoBridePrice}$			-0.001		
			(0.010)		
Ethnicity FEs $\times I_k^{Post}$	N	N	Y	Y	Y
Ethnicity FEs	N	N	Y	Y	Y
Ethnicity FEs $\times Intensity_d$	N	N	Y	Y	Y
District FEs $\times I_e^{BridePrice}$	N	N	Y	N	N
Duflo Controls $\times I_e^{BridePrice}$	N	N	Y	N	N
Duflo Controls	Y	Y	Y	Y	Y
District FEs	Y	Y	Y	Y	Y
Cohort FEs $\times I_e^{BridePrice}$	N	N	Y	N	N
Cohort FEs	Y	Y	Y	Y	Y
Number of observations	75,286	76,959	64,426	9,707	55,696
Number of clusters	258	255	240	155	217
Adjusted R^2	0.124	0.179	0.185	0.174	0.185

Notes: Education attainment data are taken from the 1995 Indonesia Intercensal Survey and merged with ethnicity level norm data from Murdock's (1967) *Ethnographic Atlas*. I_k^{Post} refers to the treated cohort, born between 1968 and 1972. The untreated cohort is born between 1950 and 1962. $Intensity_d$ is the number of schools built in a district per 1,000 people in the school-aged population. All regressions include district-of-birth fixed effects, cohort fixed effects, and the interaction of cohort fixed effects with number of school-aged children in the district in 1971, with the enrollment rate in 1971 and with the regency level implementation of a water and sanitation program under INPRES. The subscript d indexes districts, i individuals, k cohorts, and e ethnic groups. Standard errors are clustered at the birth-district level.

Table 5: Indonesia School Construction Regressions, Accounting for other Cultural Traits

	(1)	(2)	(3)	(4)
	Indicator variable for the completion of primary school			
	Baseline Regression	Matrilineal	Female Agriculture	Both
$I_k^{Post} \times Intensity_d \times I_e^{BridePrice}$	0.024**	0.024**	0.024**	0.024**
	(0.012)	(0.012)	(0.012)	(0.012)
$I_k^{Post} \times Intensity_d \times I_e^{NoBridePrice}$	-0.001	0.000	-0.001	0.000
	(0.010)	(0.010)	(0.010)	(0.010)
Ethnicity FEs $\times I_k^{Post}$	Y	Y	Y	Y
Ethnicity FEs $\times Intensity_d$	Y	Y	Y	Y
District FEs $\times I_e^{BridePrice}$	Y	Y	Y	Y
Duflo Controls $\times I_e^{BridePrice}$	Y	Y	Y	Y
Duflo Controls	Y	Y	Y	Y
District FEs	Y	Y	Y	Y
Cohort FEs	Y	Y	Y	Y
Number of observations	65,403	65,403	65,403	65,403
Clusters	240	240	240	240
Adjusted R^2	0.184	0.184	0.184	0.184

Notes: The table re-estimates the pooled Indonesia school construction regressions for females including controls for triple interactions of ethnic norms, $Intensity_d$ and I_k^{Post}. We also include triple interactions with indicator variables for missing ethnic norm data. Standard errors are clustered at the district of birth level.

Table 6: Distribution of Customs in Zambia

	Number of ethnic groups	Percent of non-missing observations
Marriage Customs		
Bride Price	8	0.381
Bride Service	6	0.286
Token Bride Price	7	0.333
Gift Exchange	0	0.000
Sister Exchange	0	0.000
No Custom	0	0.000
Dowry	0	0.000
Other Customs		
Matrilineal	13	0.619
Matrilocal	12	0.571
Plow	0	0.000
Female Agriculture	12	0.750
Polygamy	21	1.000

Notes: This table counts the number of ethnicities that practice different traditional customs in the *Ethnographic Atlas*, which lists traditional customs for 21 societies.

Table 7: Correlations between Bride Price and Other Customs in Zambia

	Indicator variable for bride price practice		
Matrilineal	-0.394*		
	(0.218)		
Matrilocal		-0.694***	
		(0.168)	
Female Agriculture			-0.083
			(0.308)
Constant	0.625***	0.778***	0.500*
	(0.180)	(0.146)	(0.267)
Number of observations	21	21	16
Adjusted R^2	0.111	0.475	-0.066

Notes: This table regresses an indicator variable for whether an ethnicity practices non-token bride price on indicator variables for practicing matrilineality, matrilocality, traditional plow use, female dominated agriculture, and polygamy, controlling for region of the world fixed effects.

Table 8: Summary Statistics from the 1996, 2001, and 2007 Zambia Demographic and Health Surveys

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Bride Price		Non-Bride Price			Full Sample		
	Mean	SD	Mean	SD	Difference	Se	Coefficient	Se
					School Enrollment Sample (Ages 5 to 22)			
Female Enrollment	0.507	0.500	0.489	0.500	0.018**	0.004	0.013*	0.007
Male Enrollment	0.560	0.496	0.576	0.494	-0.016	0.004	0.004	0.007
Age	12.550	5.100	12.472	5.054	0.078	0.116	0.004	0.122
Schools/Area	0.086	0.217	0.087	0.222	-0.001	0.002	-0.007	0.006
Matrilineal	0.012	0.109	0.834	0.372	-0.822***	0.002	-0.725***	0.040
Female Agriculture	0.902	0.298	0.918	0.274	-0.016***	0.002	-0.037	0.022
Wealth Index	3.099	1.410	3.139	1.383	-0.041***	0.017	-0.004	0.098
					School Construction Sample (Ages 5 to 12)			
Female Enrollment	0.578	0.494	0.558	0.497	0.021**	0.004	0.013*	0.007
Male Enrollment	0.555	0.497	0.556	0.497	-0.001	0.004	0.004	0.007
Age	8.369	2.273	8.382	2.279	-0.014	0.116	0.004	0.122
Schools/Area	0.084	0.215	0.083	0.215	0.001	0.002	-0.007	0.006
Matrilineal	0.013	0.112	0.839	0.367	-0.827***	0.002	-0.725***	0.040
Female Agriculture	0.904	0.295	0.914	0.280	-0.011***	0.002	-0.037	0.022
Wealth Index	2.947	1.408	2.983	1.364	-0.036***	0.017	-0.004	0.098
Female Employment Rate (All Adults 25-45)	0.613	0.487	0.672	0.469	-0.059***	0.007	-0.014	0.013

Notes: This table presents summary statistics by bride price status in the pooled 1996, 2001, and 2007 rounds of the Zambia DHS. The first panel of the table presents summary statistics for the sample of children aged 5-22 used in the enrollment analysis and the second panel presents summary statistics for the sample of children aged 5-12 used in the school construction analysis. Columns 1 and 2 present means and standard errors for the bride price group, and columns 3 and 4 present means and standard errors for the non-bride price group. Column 5 presents the difference in the means and column 6 gives the standard error of the difference. Column 7 is the coefficient on bride price status in a regression of the row-name variable on bride price status and district and year fixed effects. Column 8 is the standard error of this coefficient clustered at the district level.

Table 9: School Construction and Primary School Enrollment in the Pooled Zambia DHS (1996, 2001, and 2007)

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: School enrollment indicator					
	All	Males	Females	Females	B.P. Females	Non B.P. Females
$Schools_{dt}/Area_d$	0.024	0.030	0.010		0.071**	-0.016
	(0.020)	(0.020)	(0.026)		(0.033)	(0.035)
$Schools_{dt}/Area_d \times I_e^{BridePrice}$				0.071**		
				(0.035)		
$Schools_{dt}/Area_d \times I_e^{NoBridePrice}$				-0.016		
				(0.035)		
Age by Bride Price FE	Y	Y	Y	Y	Y	Y
Ethnicity by Round FE	Y	Y	Y	Y	Y	Y
Ethnicity by District FE	Y	Y	Y	Y	Y	Y
Number of observations	24,273	11,996	12,277	12,277	3,514	8,763
Number of clusters	70	70	70	70	64	69
Adjusted R^2	0.400	0.405	0.394	0.394	0.434	0.378

Notes: This table examines the differential impact of school building in Zambia on bride price and non-bride price females. The sample consists of children aged 5–12 at the time of the survey in the 1996, 2001, and 2007 rounds of the DHS. The treatment variable, $Schools_{dt}$ is the number of schools built in a district d by year t (the survey round of the DHS). This is normalized by the area of the district, calculated using ArcGIS, $Area_d$. Standard errors are clustered at the district level.

Table 10: Placebo Test of School Construction and Primary School Enrollment by Bride Price Status in the Pooled Zambia DHS (1996, 2001, and 2007)

	(1)	(2)	(3)	(4)	(5)	(6)
			Dep var: School enrollment indicator			
	All	Male	Females	Females	B.P. Females	Non B.P. Females
$Schools_{d,t+1}/Area_d$	-0.009	0.030	-0.093		-0.215*	-0.050
	(0.054)	(0.061)	(0.077)		(0.122)	(0.100)
$Schools_{d,t+1}/Area_d \times I_e^{BridePrice}$				-0.217*		
				(0.123)		
$Schools_{d,t+1}/Area_d \times I_e^{NoBridePrice}$				-0.046		
				(0.105)		
$Schools_{d,t}/Area_d$	0.032	0.002	0.098		0.278**	0.031
	(0.055)	(0.066)	(0.076)		(0.121)	(0.102)
$Schools_{d,t}/Area_d \times I_e^{BridePrice}$				0.277**		
				(0.120)		
$Schools_{d,t}/Area_d \times I_e^{NoBridePrice}$				0.021		
				(0.107)		
Number of observations	24,273	11,996	12,277	12,277	3,514	8,763
Adjusted R^2	0.400	0.404	0.394	0.393	0.434	0.378
Clusters	70	70	70	70	64	69

Notes: This table examines the differential impact of present and future school building in Zambia on bride price and non-bride price females. The sample consists of children aged 5–12 at the time of the survey in the 1996, 2001, and 2007 rounds of the DHS. The treatment variable, $Schools_{dt}$ is the number of schools built in a district d by year t (the survey round of the DHS). This is normalized by the area of the district, calculated using ArcGIS, $Area_d$. $Schools_{d,t+1}$ is the number of schools built by 2001 in 1996, the number of schools built by 2007 in 2001, and the number of schools built by 2012 in 2007. Standard errors are clustered at the district level.

Table 11: Determinants of Bride Price in the IFLS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent Variable: Log Bride Price Amount							
$I(Completed\ Primary)_i$	0.656***	0.621***	0.592***	0.544***	0.436***	0.470***	0.458***	0.414***
	(0.073)	(0.077)	(0.079)	(0.073)	(0.079)	(0.079)	(0.081)	(0.074)
$I(Completed\ Junior\ Secondary)_i$	0.644***	0.653***	0.617***	0.620***	0.451***	0.488***	0.473***	0.461***
	(0.073)	(0.077)	(0.079)	(0.072)	(0.078)	(0.077)	(0.079)	(0.072)
$I(College)_i$	0.837***	0.826***	0.824***	0.887***	0.400***	0.371***	0.389***	0.476***
	(0.081)	(0.083)	(0.087)	(0.080)	(0.094)	(0.094)	(0.098)	(0.090)
$MarriageAge_i$		0.014	0.016	0.006	0.002	-0.001	0.007	-0.008
		(0.014)	(0.014)	(0.013)	(0.014)	(0.014)	(0.013)	(0.014)
$MarriageAge_i^2$		-0.000	-0.000	-0.000	-0.000	0.000	-0.000	0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$I(BridePrice)_e$			0.730***				0.652***	
			(0.067)				(0.066)	
$I(Husband\ Completed\ Primary)_i$					0.297***	0.234***	0.245***	0.194**
					(0.090)	(0.088)	(0.090)	(0.082)
$I(Husband\ Completed\ Junior\ Secondary)_i$					0.339***	0.330***	0.294***	0.354***
					(0.081)	(0.080)	(0.082)	(0.075)
$I(Husband\ College)_i$					0.655***	0.638***	0.624***	0.560***
					(0.094)	(0.093)	(0.097)	(0.090)
$HusbandMarriageAge_i$						0.009	-0.013	0.014
						(0.015)	(0.015)	(0.014)
$HusbandMarriageAge_i^2$						-0.000	0.000	-0.000
						(0.000)	(0.000)	(0.000)
Year of Marriage f.e.	Y	Y	Y	Y	Y	Y	Y	Y
Ethnicity f.e.	N	N	N	Y	N	N	N	Y
Survey Round f.e.	Y	Y	Y	Y	Y	Y	Y	Y
Observations	5,403	5,076	4,647	5,076	5,064	4,934	4,520	4,934
Adjusted R-Squared	0.426	0.426	0.450	0.490	0.441	0.418	0.435	0.485

Notes: Columns regress the natural log of bride price payments at the time of marriage on various covariates. The measures are taken from rounds 3 and 4 of the Indonesia Family Life Survey. Robust standard errors are reported in parentheses.

Table 12: Determinants of Bride Price in Zambia

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Log Bride Price Amount							
$I(Primary)_i$	0.497*	0.525*	0.536*	0.489	0.474	0.473	0.473	0.420
	(0.295)	(0.303)	(0.297)	(0.316)	(0.297)	(0.323)	(0.317)	(0.335)
$I(JuniorSecondary)_i$	0.279**	0.270**	0.271**	0.262**	0.273**	0.264**	0.265**	0.267**
	(0.123)	(0.124)	(0.123)	(0.127)	(0.123)	(0.126)	(0.125)	(0.130)
$I(Secondary)_i$	0.409***	0.454***	0.404***	0.402***	0.431***	0.479***	0.438***	0.446***
	(0.117)	(0.124)	(0.125)	(0.130)	(0.125)	(0.136)	(0.135)	(0.143)
$I(MarriageAge)_i$		-0.0336	-0.0245	-0.0287		-0.0702	-0.0633	-0.0626
		(0.120)	(0.122)	(0.130)		(0.122)	(0.122)	(0.128)
$I(MarriageAge)_i^2$		0.000	-0.000	-0.000		0.001	0.001	0.001
		(0.00251)	(0.003)	(0.003)		(0.003)	(0.003)	(0.003)
$I(BridePrice)_e$			0.303***				0.315***	
			(0.0975)				(0.101)	
$I(HusbandPrimary)_i$					0.932***	0.847***	0.924***	1.135***
					(0.303)	(0.317)	(0.284)	(0.278)
$I(HusbandJuniorSecondary)_i$					-0.180	-0.144	-0.146	-0.199
					(0.156)	(0.158)	(0.156)	(0.166)
$I(HusbandSecondary)_i$					0.088	0.084	0.054	0.074
					(0.120)	(0.121)	(0.121)	(0.128)
$I(HusbandMarriageAge)_i$						-0.001	-0.001	-0.001
						(0.001)	(0.001)	(0.001)
$I(HusbandMarriageAge)_i^2$						0.000	0.000	0.000
						(0.000)	(0.000)	(0.000)
Year of marriage f.e.	Y	Y	Y	Y	Y	Y	Y	Y
Ethnicity f.e.	N	N	N	Y	N	N	N	Y
Observations	442	442	439	439	442	430	427	427
R-squared	0.351	0.360	0.368	0.391	0.360	0.372	0.382	0.406

Notes: Columns regress the natural log of bride price payments at the time of marriage on various covariates. The measures are taken from the ZFPS. Robust standard errors are reported in parentheses.

Table 13: Reasons why Bride Price Increases with Education in Zambia

Reasons why bride price increases with education		(1) Unprompted reason	(2) Prompted reason	(3) Not a reason
Improves the bride's skills in the house	obs.	217	485	728
		15.17%	33.92%	50.91%
Improves the bride's knowledge and skills as a mother	obs.	177	613	631
		12.46%	43.14%	44.41%
Improves the woman's earning potential	obs.	213	720	481
		15.06%	50.92%	34.02%
Improves the literacy of children	obs.	89	740	580
		6.32%	52.52%	41.16%
Bride's parents should to be compensated for investments	obs.	793	461	178
		55.38%	32.19%	12.43%
Is associated with her parents being rich	obs.	110	521	789
		7.75%	36.69%	55.56%
Other reasons	obs.	27	-	-
		3.96%	-	-

Notes: Data from the first wave of ZFPS (Fall 2014).

Table 14: Relationship between Bride Price and Enrollment for Females in Indonesia and Zambia

	(1)	(2)	(3)	(4)
	Indicator variable equal to 1 if enrolled			
	Indonesia		Zambia	
$I_e^{BridePrice}$	0.042***	0.068***	0.037***	0.034***
	(0.013)	(0.014)	(0.013)	(0.014)
	[0.016, 0.067]	[0.049,0.093]	[0.013, 0.060]	[0.010, 0.067]
Age Controls	Y	Y	Y	Y
District by Survey Year FE	N	N	Y	Y
Ethnicity Controls	N	Y	N	Y
Number of observations	103,067	101,241	23,734	20,000
Adjusted R^2	0.412	0.413	0.350	0.355
Clusters	26	22	21	16

The table regresses an indicator variable for whether a child between the ages of 5 and 22 is enrolled in school on an indicator variable for whether the child is a member of an ethnicity with non-token bride price norms. The Indonesia regressions use the 1995 Indonesia Intercensal data, and the Zambia regressions use the pooled 1996, 2001, and 2007 Zambia DHS data. Age controls consist of age and age squared, and cultural norm controls consist of indicator variables for belonging to a matrilineal ethnicity and belonging to an ethnicity with a tradition of female agriculture. Standard errors, which are reported in parentheses, are clustered at the ethnicity level. Wild boot-strapped 95 percent confidence intervals are reported in square brackets.

Table 15: The Relationship between Bride Price Status and Test-Scores for Primary-School Females in Indonesia

	(1)	(2)
	Total Test Score	
$I_e^{BridePrice}$	-0.089**	-0.079**
	(0.036)	(0.033)
	[-0.143,-0.0272]	[-0.130, -0.030]
Cultural Norms Controls	N	Y
Age by Survey Year FE	Y	Y
Province by Year-Tested FE	Y	Y
Number of observations	2,923	2,901
Clusters	13	11
Adjusted R^2	0.092	0.092

Notes: This table tests whether belonging to a bride price ethnicity predicts lower test scores for females. The table uses self-reported data on test scores from the IFLS rounds 3 and 4 and restricts the sample to test-takers who took the Ebtanas (the testing regime prior to 2001). Since the Ebtanas was standardized at the province level, the table includes province by year-tested fixed effects. The outcome variable is the respondent's self-reported total test score, normalized to have a mean of 0 and a standard deviation of 1. Standard errors, in parentheses, are clustered at the ethnicity level. Cultural norm controls consist of indicator variables for female-dominated agriculture and matrilineality. Confidence intervals obtained using the wild bootstrap proceedure with 100 draws appear in square brackets.

Table 16: Determinant of bride price in qualitative survey answers to ZFPS (2014)

Think about the factors that affect bride price today: what is the ... most important factor?					
		first	*second*	*third*	*not listed*
Education	obs	543	223	152	538
		37.29%	15.32%	10.44%	36.95%
Good morals	obs	191	283	216	766
		13.12%	19.44%	14.84%	52.61%
Family values	obs	214	272	206	764
		14.70%	18.68%	14.15%	52.47%
Virginity	obs	137	186	179	954
		9.41%	12.77%	12.29%	65.52%
Age	obs	41	94	141	1180
		2.82%	6.46%	9.68%	81.04%
Tribe	obs	104	117	190	1045
		7.14%	8.04%	13.05%	71.77%
Other	obs	144	118	85	1109
		9.89%	8.10%	5.84%	76.17%

Notes: Data from the first wave of ZFPS (Fall 2014).

Table 17: The Relationship between Education and Wages for Bride Price and Non-Bride Price Females in Indonesia

	(1) Employed	(2) ln (Wage)	(3) Wealth Index
$I_e^{BridePrice}$	-0.031	0.011	0.001
	(0.030)	(0.032)	(0.092)
	[-0.079,0.018]	[-0.045, 0.058]	[-0.165, 0.165]
$I(PrimarySchool)_i$	-0.059***	0.281***	0.738***
	(0.004)	(0.015)	(0.013)
	[-0.067, -0.052]	[0.256, 0.305]	[0.715,0.764]
$I(PrimarySchool)_i \times I_e^{BridePrice}$	0.002	0.083	-0.120**
	(0.018)	(0.058)	(0.052)
	[-0.026, 0.033]	[-0.026 , 0.177]	[-0.204, -0.039]
$I(Junior\ Secondary)_i$	0.092***	0.827***	0.991***
	(0.010)	(0.021)	(0.031)
	[0.076, 0.108]	[0.792, 0.863]	[0.941,1.045]
$I(Junior\ Secondary)_i \times I_e^{BridePrice}$	0.045	-0.106	-0.137**
	(0.031)	(0.071)	(0.061)
	[-0.006, 0.097]	[-0.220,0.020]	[-0.235, -0.016]
$I(College)_i$	0.179***	0.184***	0.315***
	(0.007)	(0.016)	(0.060)
	[0.164, 0.190]	[0.156, 0.213]	[0.214, 0.413]
$I(College)_i \times I_e^{BridePrice}$	-0.036	-0.032	-0.196
	(0.050)	(0.045)	(0.130)
	[-0.119, 0.046]	[-0.129, 0.055]	[-0.427, 0.066]
District FE	Y	Y	Y
Number of observations	84,501	12,423	84,491
Clusters	26	23	26
Adjusted R^2	0.108	0.503	0.375

Notes: This table regresses employment status, formal sector wages, and an index of household assets from the 1995 Indonesia Intercensual data on educational attainment, allowing the returns to education to differ for bride price and non-bride price females. Wage or salary was only reported for formal sector employees. The standard errors are clustered at the ethnicity level. The sample consists of women between the ages of 25 and 45.

Table 18: The Relationship between Education and Wages for Bride Price and Non-Bride Price Females in Zambia

	(1) Employment	(2) Wealth Index	(3) Child Stunting	(4) Child Malnutrition
$I(Primary)_i$	0.044***	0.274***	-0.022*	-0.002
	(0.014)	(0.024)	(0.012)	(0.002)
	[0.010, 0.069]	[0.223, 0.319]	[-0.042, 0.001]	[-0.005, 0.001]
$I(Primary)_i \times I_e^{BridePrice}$	-0.024	-0.058	0.035	-0.006
	(0.036)	(0.131)	(0.025)	(0.008)
	[-0.090, 0.041]	[-0.302, 0.193]	[-0.019, 0.083]	[-0.023, 0.008]
$I(Secondary)_i$	0.049**	0.873***	-0.068***	-0.005**
	(0.016)	(0.050)	(0.007)	(0.002)
	[0.022, 0.077]	[0.772, 0.966]	[-0.079, -0.055]	[-0.009, -0.004]
$I(Secondary)_i \times I_e^{BridePrice}$	0.025	-0.070	0.006	0.001
	(0.019)	(0.051)	(0.028)	(0.004)
	[-0.009, 0.061]	[-0.155, 0.035]	[-0.038, 0.057]	[-0.004, 0.007]
$I(SecondaryPlus)_i$	0.238***	0.517***	-0.076***	-0.005
	(0.012)	(0.085)	(0.014)	(0.007)
	[0.216, 0.258]	[0.391, 0.671]	[-0.097, -0.054]	[-0.018, 0.007]
$I(SecondaryPlus)_i \times I_e^{BridePrice}$	0.009	0.080	-0.036*	0.005
	(0.027)	(0.196)	(0.020)	(0.020)
	[-0.040, 0.060]	[-0.322, 0.512]	[-0.068, -0.006]	[-0.032, 0.041]
$I_e^{BridePrice}$	-0.025	-0.000	-0.036*	0.010
	(0.045)	(0.101)	(0.019)	(0.007)
	[-0.100, 0.050]	[-0.180, 0.174]	[-0.066, -0.003]	[-0.003, 0.025]
District × Year FE	Y	Y	Y	Y
Age FE	Y	Y	Y	Y
F-test of Bride Price Interact Coefficients	1.29	0.80	1.95	0.35
Number of observations	11,056	3,934	16,862	16,862
Clusters	21	21	21	21
Adjusted R^2	0.171	0.522	0.075	0.010

Notes: This table regresses whether a female works, the household wealth index, child stunting (having a height 3 standard deviations below the average for a healthy child according to a study in six baseline countries chosen by the WHO) and child malnutrition (having a height 3 standard deviations below the healthy-child average in six baseline countries chosen by the WHO) on a female's education, allow the effects of education to differ for bride price and non-bride price females. An observation in columns 1 and 2 is a women over 25 years of age and less than or equal to 45. An observation in columns 2 and 3 is a child aged 0 to 5. The table uses data from the 1996, 2001, and 2007 rounds of the Zambia DHS. The standard errors are clustered at the ethnicity level. Wild bootstrapped 95 percent confidence intervals appear below in brackets.

Table 19: Tests for Alternative Drivers of the Bride Price Effect in Zambia and Indonesia

	(1)	(2)	(3)	(4)
	Indonesia		**Zambia**	
	Wealth Index	Number of Children Born	Wealth Index	Number of Children Born
$I_e^{BridePrice}$	-0.006	0.223***	-0.004	-0.007
	(0.059)	(0.065)	(0.126)	(0.072)
	[-0.110, 0.093]	[0.108, 0.357]	[-0.228, 0.248]	[-0.149, 0.140]
Age FE	N	Y	N	Y
District FE	Y	Y	Y	Y
Survey Year FE	N	N	Y	Y
Number of observations	132,511	79,140	32,669	11,076
Clusters	26	26	21	21
Adjusted R^2	0.224	0.283	0.401	0.356

This table uses data from the Indonesia 1995 Intercensal survey and the pooled 1996, 2001, and 2007 Demographic and Health Surveys to investigate the relationship between bride price norms and other household or individual characteristics. In Indonesia, we construct the wealth index as the first factor of a principal components analysis of indicator variables for owning a tv, radio, stove, buffet, bicycle boat, and motor boat. In Zambia, the wealth index is constructed by the DHS using a variety of asset ownership data in each survey year. In columns 1 and 3, an observation is a household. Columns 2 and 4 include all women aged 25-45. Standard errors are clustered at the ethnicity level. Wild bootstrapped 95 percent confidence intervals appear in brackets.

9 Figures

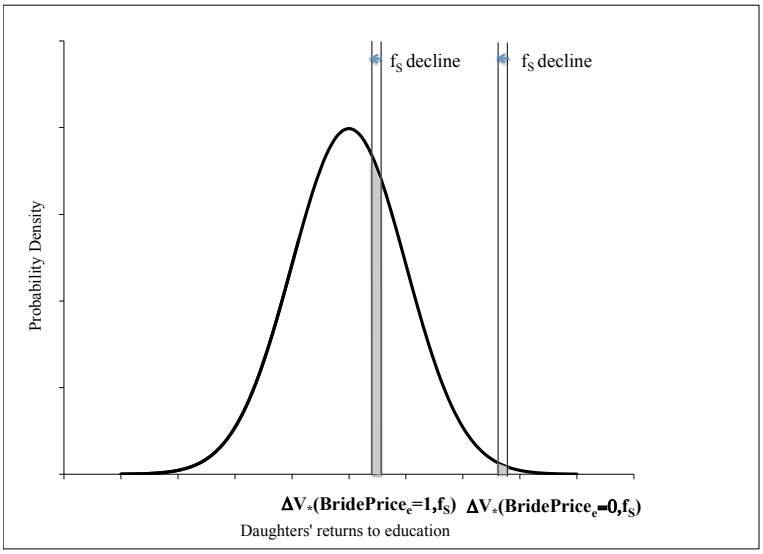

Figure 1: Distribution of girls' returns to education and declines in the cost of education

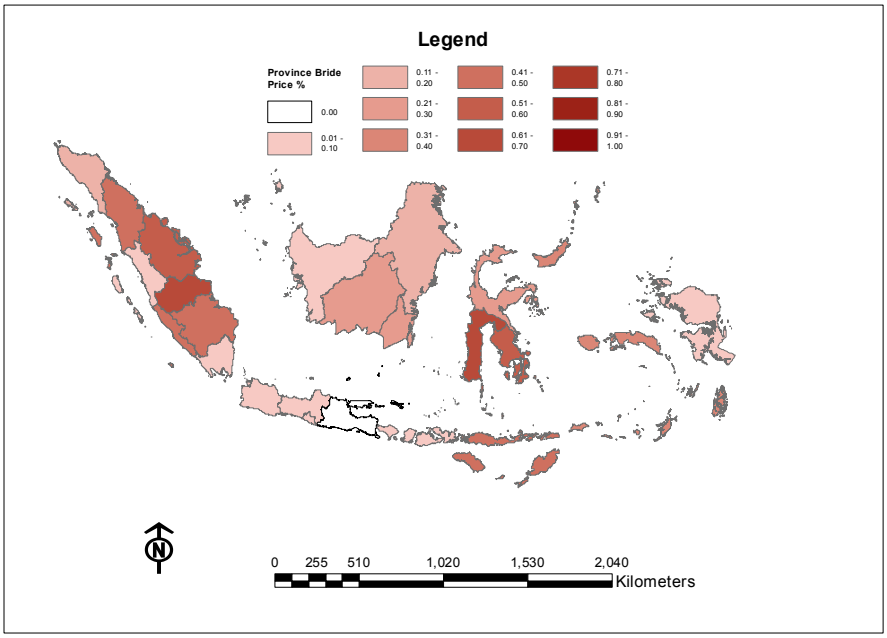

Figure 2: Geographic distribution of bride price customs in Indonesia

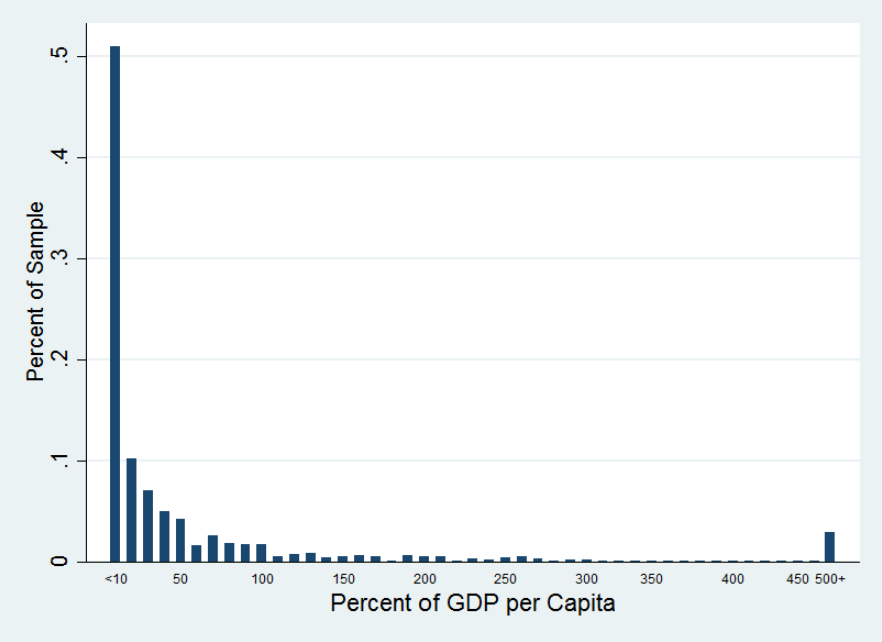

Figure 3: The distribution of bride price payments as percent of GDP per capita for bride price ethnicities in the 2000 and 2007 rounds of the Indonesia Family Life Survey.

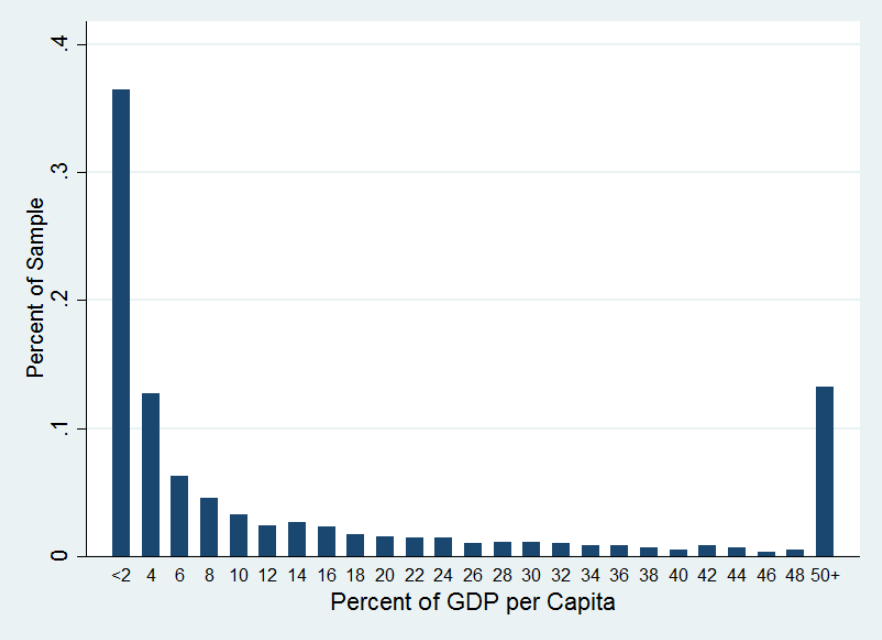

Figure 4: The distribution of bride price payments as percent of GDP per capita for all couples in the 2000 and 2007 rounds of the Indonesia Family Life Survey.

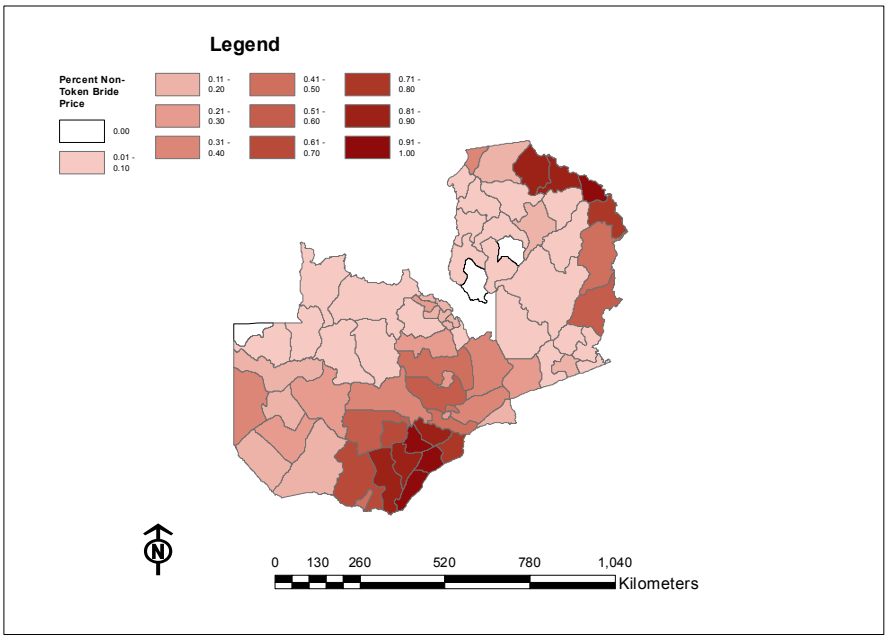

Figure 5: Geographic distribution of bride price customs in Zambia

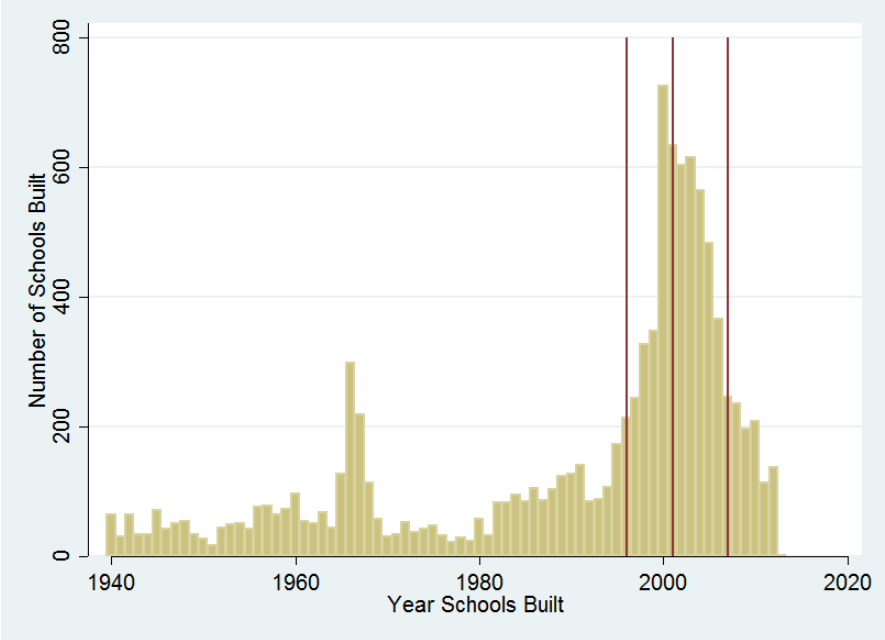

Figure 6: Number of schools constructed each year in Zambia (Ministry of Education, Government of Zambia).

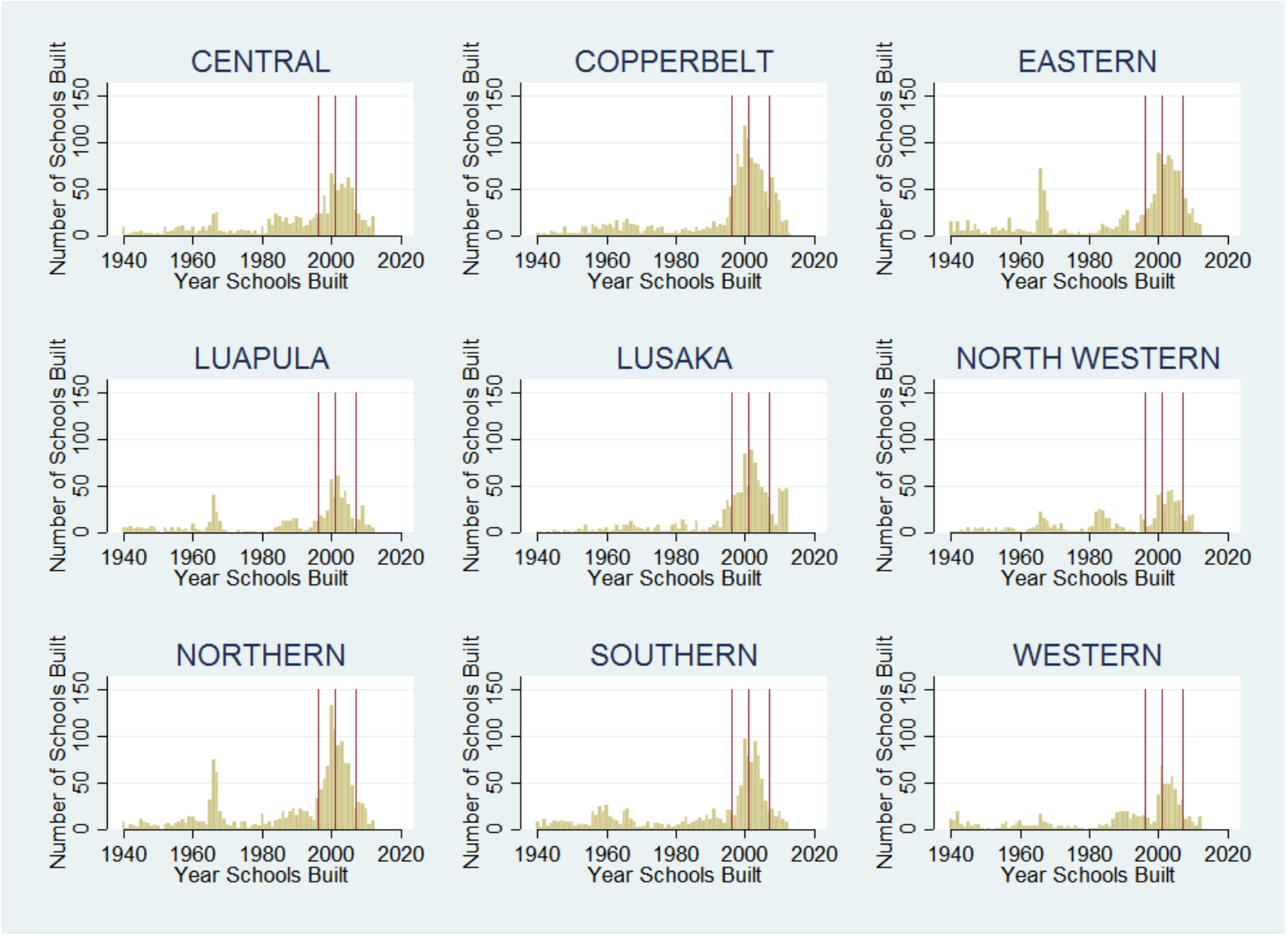

Figure 7: Number of schools constructed each year for each province in Zambia (Ministry of Education, Government of Zambia).

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