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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 parts of Asia as a payment by the groom to the family of the bride, is one example. In this paper, we show a perhaps 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. However, we see no increase in education following school construction for girls from ethnicities without a bride price tradition. We replicate these 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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A data appendix is available at http://www.nber.org/data-appendix/w22417

1 Introduction

Researchers and policy-makers are increasingly beginning to recognize that culture plays an important role in economic development. However, we continue to have a much more limited understanding of what traditional practices imply for development policy and whether the efficacy of development policies depends on the particular cultural setting in which a policy is enacted. Although development policies generally have not been tailored to specific cultural contexts, there is growing recognition that one-size-fits-all strategies may not be optimal and that there may be benefits to understanding a society's cultural characteristics when designing policies (World Bank, 2015).

Our analysis advances the understanding of the importance of culture for development policy. In particular, we consider a 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). Despite being common and widespread, the practice is not without controversy. In recent years, the custom has come under attack, with critics condemning it as a repugnant and harmful practice and calling for its abolishment (e.g., Wendo, 2004; Mujuzi, 2010).

In this paper, we examine how the cultural practice of bride price influences the efficacy of policies aimed at increasing 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 studying this program, in line with its objective of measuring the effect of education on wages, only examines a sample of males (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 custom. We observe a positive impact of the program on female education only among girls from ethnic groups that traditionally engage in bride price payments at the time of marriage. Our empirical analysis shows that this finding is not driven by other important cultural factors that may be correlated with bride price, such as women's role in agricultural production or matrilineality.

We corroborate these 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 Zambia Ministry of

Education. Zambia, like Indonesia, has ethnic groups that engage in bride price payments and others that do not. Although the school expansion program in Zambia is not as close to quasi-experimental variation, a benefit of working in Zambia is that we have collected detailed, fine-grained survey data that help us to better understand the mechanisms underlying our basic results. In Zambia, we observe the same patterns as in Indonesia. Among ethnic groups that traditionally practice bride price, school construction has a large and statistically significant impact on female education. However, among ethnic groups that traditionally do not practice bride price, school construction does not have a detectable impact on female education.

Having documented the heterogeneous response across bride price ethnicities in two countries, we then seek to develop a better understanding of the mechanism behind this finding. We begin by recognizing that an important consequence of the bride price is that it provides an additional monetary incentive for parents 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. This mechanism is particularly important if daughters cannot credibly commit to paying back their parents *ex post* for educational investments made *ex ante*, and parents are not perfectly altruistic (Gale and Scholz, 1994).[1] The bride price provides a shorter-term and more certain monetary benefit to educating daughters.[2]

We formalize this channel by developing a model that outlines the mechanism and the assumptions needed to explain our results. In the model, the presence of the bride price provides an additional reward to parental investment in a daughter's education, a reward that is absent for non-bride price cultures.[3] For this reason, girls from ethnic groups that engage in bride price payments are systematically more likely to be educated. We then study under what conditions ethnic groups that practice bride price are more responsive to a school construction program. We show that as long as the level of education is low (as is the case in developing countries), then bride price ethnic groups, who have higher education rates at baseline, are more responsive to a school-expansion program.[4]

[1]The problem is summarized by Gary Becker 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, p. 399).

[2]An additional reason why the bride price might influence parental investments in daughters is through its ability to function as an aggregator and transmitter of information – in this case, the returns to investment in human capital (Hayek, 1945). If parents are uncertain about the returns to education for women, the elasticity of bride price with respect to education may serve as valuable information about the returns to education.

[3]The link between bride price and parental investments is mentioned in Becker (1981, p. 129): "Bride price then not only compensates parents for the transfer of their property, but also induces them to invest optimally in daughters if girls with appropriate accumulations of human capital command sufficiently high prices."

[4]In the body of the paper we present the simplest model possible that is able to illustrate our mechanism of interest. In particular, we do not model matching on the marriage market. Instead, we do this in the appendix, where we

Interestingly, a number of additional predictions arise from the model. The first is that, in addition to a greater responsiveness to education policies, the presence of the bride price also results in a higher average level of education (both before and after the program) among girls belonging to bride price groups. The second prediction arises from a complementarity between daughters' ability and education, that is, that parents are more likely to send high ability daughters to school relative to low ability daughters. Therefore, the higher level of schooling among bride price families implies that, on average, lower ability daughters are also being educated, and that the average ability of daughters that attend school is lower.

Guided by the theory, we then turn to auxiliary analyses to verify the necessary assumptions in the model and to test the additional predictions that arise from the model. Turning first to a verification of the necessary assumptions of the model, we show that in both Indonesia and Zambia, the value of bride price payments is quantitatively important and highly correlated with traditional ethnic practices. In Indonesia, average payments among ethnic groups that practice bride price are 51% of per capita GDP, while this figure is 179% in Zambia.[5]

We then turn to the crucial assumption that bride price payments are increasing with the bride's education and that this is known to parents. Within Indonesia, we find that completing primary school is associated with a 66% increase in the bride price payment, completing junior secondary is associated with a further 58% increase, and completing college with another 86% increase. These 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 the same patterns in the data, as well as similar magnitudes. In addition, we collect information on individuals' knowledge of the positive relationship between education and bride price payments and their perceptions of the reason behind this positive relationship – e.g., whether the relationship is causal or spurious. The data collected indicate that the relationship between the bride's education and the amount of bride price received is widely known, and that the positive association between bride price and education is perceived to be causal rather than the result of a spurious correlation driven by other factors. The most common explanation for this relationship was that a higher bride price was due to a moral obligation on the part of the groom's family to compensate

develop an equilibrium matching model in which people sort based on education. The setup allows the bride price custom to affect the returns to education in the marriage market. We show that, in such a frictionless framework, all the assumptions needed for the propositions of our stylized model are met as long as education rates are higher for males than for females both before and after the program. The model also predicts that the bride price custom does not generate heterogeneous responses among males, as we observe in the data.

[5]As we discuss below, the Zambian sample is taken from the suburbs of the capital city Lusaka, and thus not necessarily nationally representative.

the bride's family for the greater educational investments they had made in their daughter.[6]

Another important necessary assumption, that becomes clear from the model, is that the returns to education must be similar for bride price and non-bride price ethnic groups. If there are large differences in these returns, then it is not necessarily the case that bride price groups will be more responsive to education policies.[7] Using data from both Indonesia and Zambia, we check whether there appears to be differential returns to education between the two groups. We find that the relationship between income and education is similar for women from bride price and non-bride price ethnic groups.

Having verified the necessary assumptions of the model, we then turn to testing the two additional predictions that emerge from the model. We first test the prediction that the average level of education is higher for women belonging to bride price ethnic groups. Second, we test the prediction that the average ability of enrolled students from bride price ethnic groups is lower than the average ability of enrolled students from non-bride price ethnic groups. We find that the first prediction holds in both Indonesia and Zambia. Female enrollment rates are 4–6 percentage points higher for bride price groups in Indonesia relative to non-bride price groups and 2 percentage points higher in Zambia. Using Indonesian data, we test the second prediction by examining student test scores. We find that, consistent with the model, the average test score for female students belonging to bride price ethnic groups is about 0.07 standard deviations lower than the average among students belonging to non-bride price ethnic groups.

Having provided direct tests of the hypothesized mechanism underlying our reduced-form finding, we turn to an examination of alternative explanations for the higher responsiveness of bride price families to schooling opportunities for daughters. We test a host of plausible alternative hypotheses, including whether bride price parents are better able to send their daughters to school in response to government programs because they tend to be wealthier, have fewer children, or simply value girls more. Examining each of these alternative explanations for our findings, we find that none are able to explain the larger impact of school construction on female education among bride price ethnic groups. We do not find that bride price families are wealthier, have fewer children, or have more positive attitudes towards females.

Our findings build on and advance the literature examining the impacts of gender-related cultural norms (e.g. Fernandez, 2007; Fernandez and Fogli, 2009; Fernandez, 2011). In particular, we show

[6]This view is fully consistent with anthropological accounts of the perception of the bride price and its role by those engaging in the practice. See, for example, Dalton (1966) and Moore (2016).

[7]Also, from an empirical point of view, if we do see greater responsiveness for bride price groups, this could be due to differential returns to education.

that important large-scale development policies can have very different effects on different ethnic groups depending on the cultural institution of bride price. This finding reinforces the idea that cultural context matters for the design of development policies and that taking these details into account is important for understanding the effects of these policies.

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; Arunachalam and Naidu, 2015; Anderson and Bidner, 2016), bride price has been the subject of fewer studies, despite the fact that the practice is relatively widespread (Anderson, 2007a; Bishai and Grossbard, 2010). 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, such as patrilocal residence and polygny, and investments in daughters in South-East Asia (Levine and Kevane, 2003; Bau, 2016) and in Sub-Saharan Africa (Jacoby, 1995; Tertilt, 2005, 2006; Gaspart and Platteau, 2010).

The paper is structured as follows. We begin in section 2 by providing context and an overview of the custom of bride price, focusing on Indonesia and Zambia in particular. In section 3, we then turn to Indonesia's school construction program and estimate differential effects that depend on the bride price custom. In section 4, we document that one observes the same heterogeneity in Zambia. In section 5, we develop a model that shows how the presence of the custom of bride price (with payments that are increasing in the bride's education) affects parents' investments in their daughter's education, as well as their response to an increase in the supply of schools. In section 6, we use data from a variety of sources to verify the necessary assumptions of the model and to test its additional predictions. In section 7, we test alternative explanations for our findings. Lastly, in section 8, we provide concluding thoughts.

2 The Practice of Bride Price

2.1 Historical Context

The payment of a bride price at the time of marriage is a custom that is widespread throughout sub-Saharan Africa and many parts of Asia. The practice has a long history, dating at least as far back as 3000 BCE and has been used by the Ancient Egyptians, Mesopotamians, Hebrews, Aztecs, and the Incas (Anderson, 2007a, pp. 152–153).[8] Historically and today, the magnitude of the bride

[8]In contrast, the practice of dowry is much more recent, having likely been first practiced in ancient Greece and Rome.

price is typically significant (Anderson, 2007a).[9] Although there is substantial heterogeneity, it is 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 contemporary Indonesia and Zambia, discussed below, is in line with these numbers.

Our analysis requires measures of the traditional marriage customs of different ethnic groups. One of the main data sources that we use is George Peter Murdock's (1967) *Ethnographic Atlas*. The source provides information on transfers made at marriage, categorizing ethnic groups as engaging in one of the following practices (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 bride's 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.

Among the 1,265 ethnic groups in the *Ethnographic Atlas*, bride price is the most commonly practiced marriage custom, occurring in approximately 52% of societies globally. The next most common custom is for there to be no dominant practice, which is the case for about 22% of societies. The distributions of marriage customs for Indonesia and Zambia are reported in columns 1 and 3 of table 1.[10]

[9] See, in particular, Anderson (2007a, table 4) who summarizes the existing evidence on the magnitude of bride price payments.

[10] Ethnic groups were coded as being present in Indonesia or Zambia if they were matched with languages or ethnicities listed in the 1995 Indonesia Intercensal data or the 1996, 2001, 2007, and 2013 Zambia Demographic and Health Surveys (DHS). A detailed list of the names of each ethnic group in the samples as well as whether they practice bride price is reported in appendix tables A18 and A19.

Table 1: Distribution of Marriage Customs

	(1)		(2)		(3)		(4)	
	Indonesia				**Zambia**			
	Ethnographic Atlas only		**Multiple Sources**		**Ethnographic Atlas only**		**Multiple Sources**	
	Number	Share	Number	Share	Number	Share	Number	Share
Bride Price	13	0.46	23	0.52	8	0.38	11	0.37
Bride Service	2	0.07	4	0.09	6	0.29	12	0.40
Token Bride Price	2	0.07	2	0.05	7	0.33	7	0.23
Gift Exchange	3	0.11	4	0.09	0	0.00	0	0.00
Female Relative Exchange	4	0.14	4	0.09	0	0.00	0	0.00
Absence of Consideration	4	0.14	7	0.16	0	0.00	0	0.00
Dowry	0	0.00	0	0.00	0	0.00	0	0.00
Total	28	1.00	44	1.00	21	1.00	30	1.00

Notes: This table reports the number of ethnicities that practice different traditional marriage customs within Indonesia and Zambia. In columns 1 and 3, the data on traditional marriage practices are from the *Ethnographic Atlas* (Murdock, 1967). In column 2, the data are from Murdock (1967) and LeBar (1972). In column 4, the data are from Murdock (1967), Willis (1966), Whiteley and Slaski (1950), and Schapera (1953). Ethnic groups were coded as present in Indonesia or Zambia if they were matched with languages or ethnicities listed in the 1995 Indonesia Intercensal data or the 1996, 2001, 2007, and 2013 Zambia Demographic and Health Surveys.

In constructing our measure of marriage practices, we supplement information from the *Ethnographic Atlas* with country-specific ethnographic sources. For Indonesia, we use LeBar (1972), which is a publication produced as part of the *Human Relations Area Files*, and for Zambia, we draw on three volumes of the *Ethnographic Survey of Africa* (Willis, 1966; Whiteley and Slaski, 1950; Schapera, 1953). The sources provide a finer breakdown of ethnic groups and more coverage than is possible using only the *Ethnographic Atlas*.[11] The distribution of marriage customs using these combined sources is reported in columns 2 and 4 of table 1. This is the variation that we use in our analysis.[12]

Figures 1 and 2 provide an overview of the geographic distribution of the practice of bride price in Indonesia and Zambia. The figures are constructed by combining survey data (from the 1995 Indonesia Intercensal Survey and the pooled 1996, 2001, 2007, and 2013 Zambia Demographic and Health Surveys) that report both the location and the language or ethnicity of respondents. In the Indonesian data, individuals are linked to traditional marriage customs using their self-reported

[11] The additional sources also allow us to check the validity of the *Ethnographic Atlas*. We find that in the vast majority of cases the sources report the same marriage practices. There are a very small number of cases where the sources disagree. In these instances we use the coding from the *Ethnographic Atlas*.

[12] All of the results that we report are robust to using the *Ethnographic Atlas* information only.

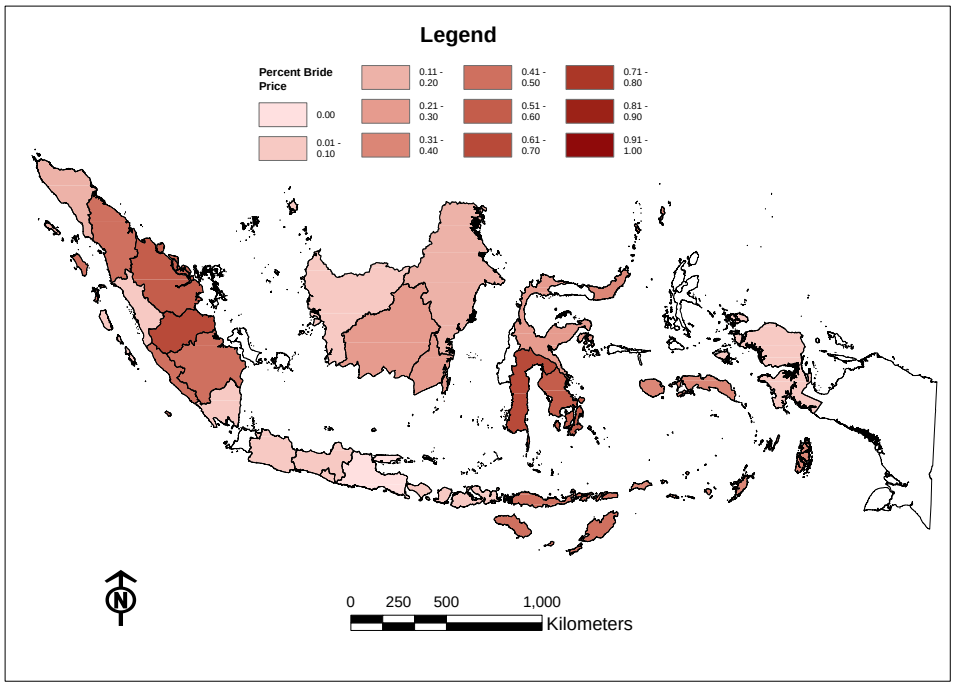

Figure 1: Geographic distribution of the practice of bride price in Indonesia

language (i.e., mother tongue).[13] In the Zambian data, individuals are linked to traditional marriage customs using their self-reported ethnicity.[14] Figure 1 reports the proportion of respondents in each province in Indonesia that are from an ethnic group that traditionally practices non-token bride price,[15] while figure 2 reports the same measure, but for each district in Zambia.

As a concrete example of the variation in our analysis, consider the Javanese, who are an Indonesian ethnic group that does not pay bride price. Instead, there is no common universal practice, but it is customary for the man to give a present to the bride at the time of engagement and another present at the time of marriage. The present could be expensive or cheap, depending on the specific customs of different social groups, with wealthier groups giving more expensive presents (Geertz, 1961, pp. 62–65). In our sources, the Javanese are categorized as having "no significant consideration," although "token bride price" is also listed as an alternate custom. By contrast, an example of an ethnic group that practices bride price is the Alorese, who live on the islands of Alor and Pantar, which lie about 50 miles north of Timor. Among the Alorese, the dominant form of marriage payment

[13]In total, 174 different languages are recorded as being spoken in the Intercensal Survey, which we match to 44 distinct ethnic groups for which we have bride price information. 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.

[14]The Zambia DHS reports 65 distinct ethnic groups. Of these, we are able to match 53 of them to 30 more coarsely-defined groups for which we have bride price information. The remaining unmatched groups are small and comprise less than 2.5 percent of the DHS sample.

[15]In the actual analysis for Indonesia, we work at a much finer spatial resolution (districts). However, for clarity of presentation, we display the more aggregate provincial averages here.

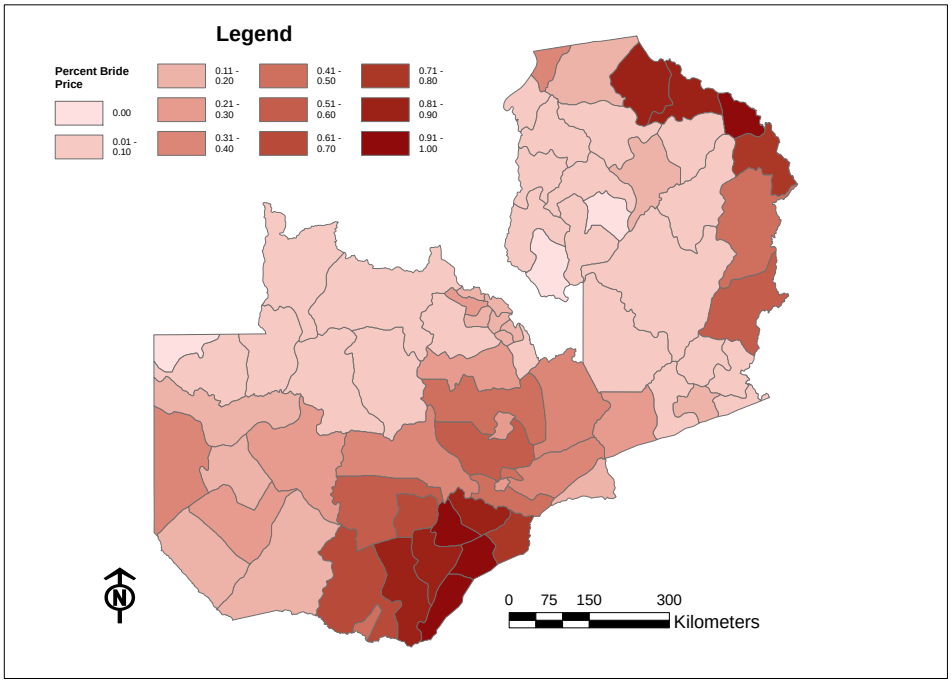

Figure 2: Geographic distribution of the practice of bride price in Zambia

is a bride price. Traditionally this took the form of gongs, kettledrums, pigs, and rice (DuBois, 1944, pp. 84–104). In our sources, the Alorese are reported as having "bride price."

An important fact, made clear by table 1, is that for none of the ethnic groups within Indonesia or Zambia is dowry the primary marriage practice. 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.

We leave the important question of whether the custom of dowry also influences educational investment for future research. While this is an interesting and important empirical question, particularly for other settings in which dowry is prevalent, our conceptual framework is not suitable for the study of dowry payments without substantial modifications. In particular, one should not necessarily view dowry as the flip-side of bride price – or as a negative bride price (Goody and Tambiah, 1973). While bride price is a transfer of resources from the groom or groom's parents to the *parents* of the bride, dowry is a transfer of resources from the bride's parents to the *bride and her husband* at the time of marriage (Anderson, 2007a). In other words, unlike bride price, with dowry the payment is given to the new couple and not to the other parents. This has led scholars to view the dowry as having important pre-mortem bequest motives (e.g., Goody and Tambiah, 1973; Botticini and Siow, 2003; Anderson and Bidner, 2016). A practice that is the flip-side of bride price does exist. It is called a groom-price and consists of a payment made from the bride or bride's parents to the groom's

parents at the time of marriage. This practice, however, is extremely rare and only found in a few societies globally (Divale and Harris, 1976).

2.2 Correlates of the Presence of Bride Price

While the historical origins of the bride price practice are not known with complete certainty, there are two dominant theories within the field of anthropology. The first is that the bride price historically originated in patrilineal societies, where the wife joins the husband's kinship group following marriage (Vroklage, 1952). Within this system, the bride's lineage loses a member of their lineage (as well as future offspring) at the time of marriage. Thus, the bride price arose as a way of compensating the bride's lineage for this loss, and as a way of showing appreciation for the investments they made in raising their daughter. It is believed that the practice, although originating in patrilineal societies, spread and was adopted by nearby matrilineal societies.

The practice of bride price has also been linked to the participation of women in agriculture. In societies where women were actively engaged in agriculture, their families would have been more reluctant to part with a daughter unless compensated. As a result, at the time of marriage, the custom of transferring money to compensate for the loss of a productive member of the family may have evolved (Boserup, 1970).

Using data from the *Ethnographic Atlas*, we examine the extent to which cross-ethnicity correlations are consistent with these hypotheses. The estimates are reported in table 2. Each cell of the table reports estimates from a regression where the outcome is an indicator variable that equals one if the ethnic group has traditionally practiced bride price. This is explained by a constant and the custom reported in the first column. Estimates are reported for three samples: a global sample, Indonesia only, and Zambia only. The estimates show that, consistent with the hypotheses from the anthropology literature, in the global sample, the practice of bride price is positively associated with patrilineal inheritance and negatively associated with matrilineal inheritance. This same pattern is found (and even more strongly so) in Zambia, but is not found in Indonesia. The estimates also show that, globally, traditional female participation in agriculture is positively and significantly correlated with bride price. Within Indonesia and Zambia, the relationship is still positive and sizable in magnitude but is no longer statistically significant.[16]

The last factor that is potentially relevant for bride price is the practice of polygyny. The work on polygyny by Becker (1981) and Tertilt (2005, 2006) indicates that, in societies where polygyny

[16]See Giuliano (2014) who, using data from the *Ethnographic Atlas*, finds a correlation between bride price and female participation in agriculture globally.

Table 2: Correlations Between Bride Price and Other Customs

	Global		**Indonesia**		**Zambia**	
	Dependent variable: Indicator for Traditional Practice of Bride Price					
Indep. Var.	Constant	Coefficient	Constant	Coefficient	Constant	Coefficient
Patrilineal	0.300***	0.458***	0.529***	-0.165	0.278	0.722**
	(0.017)	(0.025)	(0.124)	(0.198)	(0.103)	(0.272)
	N = 1,229		N = 28		N = 21	
Matrilineal	0.531***	-0.116***	0.500**	-0.250	0.625***	-0.394*
	(0.015)	(0.042)	(0.104)	(0.275)	(0.166)	(0.211)
	N = 1,229		N = 28		N = 21	
Female Partic. in Agric., 1-5	0.453***	0.036***	0.437***	0.022	0.200	0.067
	(0.027)	(0.010)	(0.163)	(0.065)	(0.487)	(0.132)
	N = 716		N = 23		N = 16	
Polygyny	0.238***	0.328***	0.444***	0.029	0.381	0.000
	(0.036)	(0.039)	(0.172)	(0.209)	(0.109)	(. . .)
	N = 1,219		N = 28		N = 21	

Notes: This table reports cross-ethnicity estimates of the relationship between the listed customs and the practice of bride price. The data on traditional practices are from the *Ethnographic Atlas* (Murdock, 1967). The ethnicities in the *Ethnographic Atlas* were identified as being present in Indonesia or Zambia if they were matched with languages or ethnicities listed in the 1995 Indonesia Intercensal data or the 1996, 2001, 2007, and 2013 Zambia Demographic and Health Surveys. Each cell reports estimates from one regression where the dependent variable is an indicator variable that equals one if the ethnic group traditionally practices bride price. Each cell reports the number of observations, the coefficient on the constant, and the coefficient for the independent variable of interest. Robust standard errors are reported in parentheses. *, **, and *** indicate significance at the 10, 5, and 1% levels.

is prevalent, high bride prices are necessary to clear the marriage market. By this logic, we expect a positive association between the traditional practice of bride price and polygyny. The final row of table 2 reports this relationship. In the global sample, we do indeed see a significant positive association between the two. However, within Indonesia or Zambia, there is no relationship. The point estimates are small (zero in the case of Zambia) and statistically insignificant.

Given these correlations, in our analysis, we are particularly careful to check the robustness of our findings to conditioning on differences in lineage practices and in traditional female participation in agriculture.

3 Differential Effects of Education Policies: Evidence from Indonesia

To examine whether education-oriented development policies have differential effects on bride price and non-bride price females, we exploit the same quasi-experimental variation as Duflo (2001) and estimate the effects of Indonesia's school-construction program on female schooling. The program was initiated in 1973, and over the following five years, 61,800 primary schools were constructed, increasing enrollment rates for children aged 7–12 from 69 percent in 1973 to 83 percent in 1978 (Duflo, 2001). The program was equivalent to adding an average of 2 schools per 1,000 children enrolled in 1971. Duflo (2001) shows that the program increased years of schooling completed by male students by 0.27 years in the average district.

Our analysis uses data from the 1995 Indonesia Intercensal Survey. Individuals in the survey are linked to traditional marriage customs using their self-reported language (i.e., mother tongue). In total, 172 different languages spoken are recorded as being spoken in the Intercensal Survey, which we match to 44 distinct ethnic groups.[17]

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

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

where i indexes individuals, d indexes district of birth, and k indexes year of birth. y_{idk} is the dependent variable of interest, an indicator variable that equals 1 if individual i finished primary schooling.[18] α_k and α_d denote 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 was already too old for primary school by the time of the intervention). As in the baseline specification of Duflo (2001), partial treatment cohorts born between 1963 and 1967 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 birth-year fixed effects interacted with the following district-level covariates: the number of school-aged children in the district in 1971

[17] All but 11 of the 172 language groups in the Indonesia Intercensal Survey could be matched to an ethnicity in the *Ethnographic Atlas*. These comprise 0.29 percent of the observations with non-missing language data.

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

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.

Estimates of equation (1) are reported in table 3.[19] Column 1 reports estimates for the sample of males only, which is the group examined in Duflo (2001). Column 2 reports the estimates for females. While there is a strong positive effect of school construction on schooling for the sample of males, the estimated effect is much weaker, and not different from zero, for the female sample.[20]

We next show that this average masks 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 traditionally practices bride price payments:

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

where all indices and variables are defined as in equation (1). Additionally, e indexes the ethnicity of individual i, $I_e^{BridePrice}$ 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.

The specification includes district fixed effects, but now also allows the district fixed effects to vary depending on bride price customs of the ethnic group by including $\alpha_d I_e^{NoBridePrice}$ and $\alpha_d I_e^{BridePrice}$ as well. These terms absorb the double interaction components, $Intensity_d \times I_e^{NoBridePrice}$ and $Intensity_d \times I_e^{BridePrice}$, of the triple interactions of interest. We also interact the ethnicity fixed effects with the post-treatment indicator variable, $\alpha_e I_k^{Post}$. These fixed effects 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. This is done through the inclusion of 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 3. As shown, we find a significant,

[19] Summary statistics are reported in panel A of appendix table A1.

[20] This finding has been previously documented in Hertz and Jayasundera (2007).

Table 3: 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	Bride Price Females	Non-Bride Price Females
$I_k^{Post} \times Intensity_d$	0.012*	-0.002		0.025**	-0.001
	(0.006)	(0.007)		(0.013)	(0.010)
$I_k^{Post} \times Intensity_d \times I_e^{BridePrice}$			0.026**		
			(0.012)		
$I_k^{Post} \times Intensity_d \times I_e^{NoBridePrice}$			-0.001		
			(0.010)		
Ethnicity FE $\times I_k^{Post}$	N	N	Y	Y	Y
Ethnicity FE	N	N	Y	Y	Y
Ethnicity FE $\times Intensity_d$	N	N	Y	Y	Y
District FE $\times I_e^{BridePrice}$	N	N	Y	N	N
Duflo Controls $\times I_e^{BridePrice}$	N	N	Y	N	N
Duflo Controls	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y
Cohort FE $\times I_e^{BridePrice}$	N	N	Y	N	N
Cohort FE	Y	Y	Y	Y	Y
F-test			2.84		
Number of observations	75,286	76,959	65,403	9,707	55,696
Number of clusters	258	255	240	155	217
Adjusted R^2	0.124	0.179	0.184	0.175	0.185

Notes: This table reports estimates of the effect of school building on educational attainment for females from ethnicities with and without bride price traditions. The sample consists of individuals born between either 1968 and 1972 or 1950 and 1962. I_k^{Post} refers to the treated cohort, born between 1968 and 1972, while the untreated cohort was born between 1950 and 1962. Educational attainment data are taken from the 1995 Indonesia Intercensal Survey. Bride price data are from the *Ethnographic Atlas* (Murdock, 1967) and LeBar (1972). $Intensity_d$ is the number of schools built in a district per 1,000 people in the school-aged population. The Duflo controls consist of the interaction of cohort fixed effects with the 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, following the empirical strategy of Duflo (2001). The subscript d indexes birth districts, k indexes cohorts, and e indexes ethnic groups. Standard errors are clustered at the birth-district level. *, **, and *** indicate significance at the 10, 5, and 1% levels.

positive effect of the school construction program on primary school completion rates for bride price females but not non-bride price females. The point estimates suggest that an increase of one 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 2.6 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). A Wald test of whether the school construction had identical effects for bride price and non-bride price ethnic groups gives an F-statistic of 2.84 ($p = 0.09$).

Robustness Checks

As we have discussed, the practice of bride price is related to other cultural characteristics. If these characteristics themselves are important for determining educational responses to school construction, then not accounting for their differential impacts may bias our estimates of interest. In particular, given our discussion in section 2.2, we test the robustness of our findings to also accounting for matrilineal lineage and traditional female participation in agriculture. Information on an ethnic group's traditional participation of women in agriculture is taken from variable $v54$ of the *Ethnographic Atlas* and information on lineage is taken from variable $v43$. Using these measures we construct a female-participation-in-agriculture indicator variable that equals one if women participate more than men in agriculture and zero otherwise, and a matrilineality indictor variable that equals one if the ethnic group has a matrlineal inheritance system as their major descent type.[21] We re-estimate equation (2), but also control for the two indicator variables, each interacted with $Intensity_d \times I_k^{post}$, and all of the appropriate double interactions. The estimates are reported in appendix table A2. The coefficients on the bride price and non-bride price interactions remain virtually unchanged.

A more recent data source than the 1995 Indonesia Intercensal Survey is the 2010 Indonesia Census, which also reports elementary school completion. A benefit of the 2010 data over the 1995 data is its much larger sample size. However, the data also have a number of important drawbacks, which is why we follow Duflo (2001) and use the 1995 Intercensal Survey as our baseline source. First, in 2010, the oldest members of the sample are 60 (compared to 45 in the 1995 data), which raises concerns about selective attrition due to mortality. Second, due to the creation of many new districts in Indonesia between 1995 and 2010, the school construction data are less precisely matched to individual birth districts in the 2010 data.[22] Despite these shortcomings of the 2010 data, we check that our findings are robust to the use of this alternative data source. Estimates of equations

[21] A finer description of the construction of the variables is provided in the data appendix.

[22] IPUMS is currently in the process of attempting to harmonize district definitions over time in Indonesia.

(1) and (2) are reported in appendix table A3. We obtain results that are qualitatively similar to the estimates using the 1995 data. The estimated impact of school construction is positive and significant for bride price ethnic groups, but not statistically different from zero for non-bride price groups.

As a placebo test, we follow Duflo and estimate equations (1) and (2), but assign 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, which are reported in appendix table A4, show that the placebo treatment had no statistically significant effects on males, females, bride price females, or non-bride price females. 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 were too old to attend primary school by the time of the intervention. The estimates, which are reported in appendix table A5, show that the effect of school construction for bride price females is generally positive. The coefficients for the interactions between the cohort indicator variables and the intensity of treatment are jointly significant. By contrast, for non-bride price ethnic groups, the coefficients are typically small in magnitude, negative, and jointly insignificant.

Although the dominant religion in Indonesia is Islam, the custom of the bride price does not have its roots in Islam, but in traditional indigenous customs, referred to as *adat*, that pre-date conversion to Islam. The fact that Indonesian bride price customs do not originate from Islamic customs is important given the common Muslim custom/law that a dower, or *mehr*, has to be paid by the husband to the wife at the time of marriage. In addition, upon divorce, the additional payment, *mehr*, must be given to the woman. This latter provision serves as divorce insurance (Ambrus et al., 2010; Quale, 1988). As a robustness check, we re-estimate equation (2), but allow the effect of interest to differ depending on whether an individual reports being Muslim or not. The estimates, which are reported in appendix table A6, show similar heterogeneous effects for Muslim and non-Muslim girls. In addition, we find that, if anything, the differential effect of bride price is larger and more significant among non-Muslims, suggesting that an Islam effect is not driving our results. In addition, as we show in the following section, we obtain very similar estimates in Zambia, which is a predominantly Christian country.

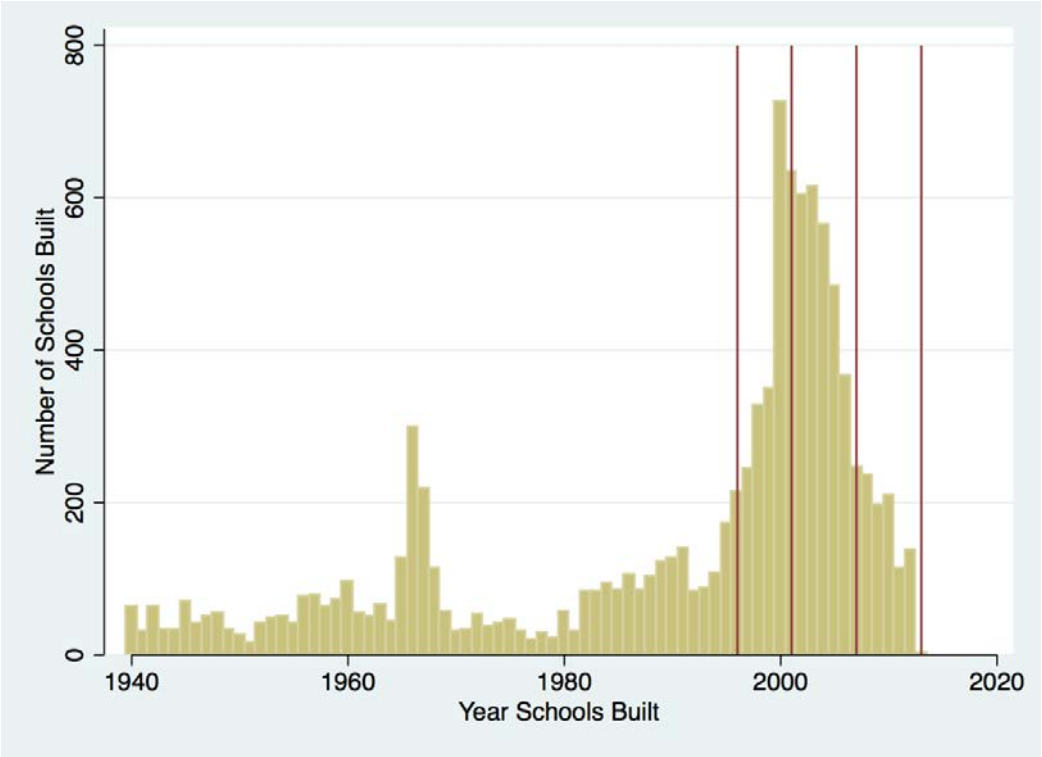

Figure 3: Number of schools constructed each year in Zambia (Ministry of Education, Government of Zambia).

4 Differential Effects of Education Policies: Replicating the Finding in Zambia

Having identified heterogeneous impacts of the 1970s Indonesian school construction project on female education, we now show that the same relationship is present in a very different context. There are a number of reasons why Zambia provides a valuable 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.

As we summarize in table 1, within Zambia, ethnic groups have traditionally either practiced bride price payments, token bride price, or bride service. A benefit of the Zambian sample is that many of the cultural traits that may be correlated with marriage payments do not vary across Zambian ethnic groups. As we saw in table 2, within Zambia there is no variation in the traditional practice of polygyny, which has been traditionally practiced by all groups.

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.[23]

Our analysis uses data provided by the Zambia Ministry of Education on the stock of elementary schools by year and district. We combine the school construction data with four rounds of the Zambia DHS. 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, the third is from 2007, near the end of the episode, and the fourth is from 2013, after the main expansion. Figure 3 graphs the number of schools built by year in Zambia between 1940 and 2013, and shows the four rounds of the DHS. Appendix figure A1 reports the same information, but by province. The figures show clearly the large school construction boom between the mid-1990s and the early-2000s. Between 1994 and 2007, a total of 5,649 schools were built in Zambia.

In contrast to Indonesia, school construction in Zambia occurred over a longer period of time and the strategy for when and where schools were built is unclear. Therefore, rather than examining variation arising from the interaction of 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 given time period and the average enrollment of children aged 5–12 in the same district and time period. Thus, our main estimating equations are:

$$y_{iedkt} = \beta_1 Schools_{dt}/Area_d + \alpha_{kt} + \alpha_{et} + \alpha_{ed} + \varepsilon_{iedkt}, \tag{3}$$

$$\begin{aligned} y_{iedkt} &= \beta_1 Schools_{dt}/Area_d \times I_e^{NoBridePrice} + \beta_2 Schools_{dt}/Area_d \times I_e^{BridePrice} \\ &+ \alpha_{kt} I_e^{NoBridePrice} + \alpha_{kt} I_e^{BridePrice} + \alpha_{et} + \alpha_{ed} + \varepsilon_{iedkt}, \end{aligned} \tag{4}$$

where i indexes children, e ethnic groups, d districts, k birth year, and t the year of the survey (1996, 2001, 2007 or 2013). Our outcome of interest is an indicator variable that equals 1 if child i is enrolled in school in year t: y_{iedkt}. Our measure of school construction is given by $Schools_{dt}/Area_d$, which is the stock of schools in district d and year t, normalized by the district area in square kilometers. 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.[24]

[23]Within Africa, there are other school expansion episodes that one could potentially use to examine the impacts of interest: Zimbabwe (Agüero and Bharadwaj, 2014), Sierra Leone (Mocan and Cannonier, 2012), and Nigeria (Osili and Long, 2008). However, for Sierra Leone and Nigeria, there is insufficient variation in the practice of bride price. In both countries, nearly all people belong to ethnic groups that practice bride price. In Zimbabwe, sufficiently fine-grained data on ethnic affiliation are not available from the data sources that report education.

[24]The Zambia DHS reports 52 distinct ethnic groups. Of these, we are able to match 48 of them to 30 more coarsely-

The specification also includes cohort-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 are reported in table 4. Columns 1–2 report estimates of equation (3) for boys and girls.[25] We see that in Zambia a similar pattern emerges as in Indonesia. Among boys, there is some evidence that school construction increases enrollment, but for girls the estimates are smaller and close to zero. Column 3 reports estimates of equation (4), which allows for heterogeneity. As in Indonesia, the positive impacts of school construction are concentrated among girls from ethnic groups that traditionally practice bride price payments at the time of marriage. The F-statistic for a Wald test of whether the school construction had identical effects for bride price and non-bride price girls is 5.22 ($p = 0.03$). Columns 4 and 5 confirm this finding by reporting estimates of equation (3) separately for girls from each of the two sets of ethnic groups. For girls from bride price ethnic groups, we estimate a positive and significant relationship between school construction and enrollment. For girls from non-bride price ethnic groups, we estimate a relationship that is not different from zero.

In terms of magnitudes, we also find similar effects in Zambia as in Indonesia. In Indonesia, for girls from bride price ethnic groups, a one-standard-deviation increase in school construction (0.85) is associated with an increase in primary school completion by 2.2 percentage points (0.85×0.026). In Zambia, for girls from bride price ethnic groups, a one-standard-deviation increase in the stock of elementary schools (0.271) is associated with an increase in primary school attendance by 1.1 percentage points (0.271×0.042).[26]

Robustness Checks

We now turn to tests of the robustness of the Zambian estimates. We first test whether our findings can be explained by pre-trends in districts that received more schools. In appendix table A8, we report estimates of equation (4) with the inclusion of a forward lag of 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

defined groups for which we have bride price data. The four unmatched groups are small and comprise less than 0.01 percent of the DHS sample.

[25] Appendix table A7 reports summary statistics.

[26] The mean of primary school completion in Indonesia is 0.61 and the mean of primary school enrollment in Zambia is 0.51.

Table 4: School Construction and Primary School Enrollment in the Pooled Zambia DHS (1996, 2001, 2007, and 2013)

	(1)	(2)	(3)	(4)	(5)
	Dep var: Indicator for primary school enrollment				
	Males	Females	Females	Bride Price Females	Non-Bride Price Females
$Schools_{dt}/Area_d$	0.024*	0.009		0.042***	-0.007
	(0.012)	(0.010)		(0.014)	(0.014)
$Schools_{dt}/Area_d \times I_e^{BridePrice}$			0.042***		
			(0.014)		
$Schools_{dt}/Area_d \times I_e^{NoBridePrice}$			-0.007		
			(0.014)		
Age FE $\times I_e^{BridePrice}$	Y	Y	Y	Y	Y
Ethnicity $\times$ Year FE	Y	Y	Y	Y	Y
Ethnicity $\times$ District FE	Y	Y	Y	Y	Y
F-test			5.22		
Number of observations	21,779	22,191	22,191	6,443	15,748
Number of clusters	71	71	71	69	71
Adjusted R^2	0.396	0.398	0.398	0.433	0.384

Notes: This table reports estimates of the differential impact of school building in Zambia on bride price and non-bride price females. The sample consists of girls aged 5–12 at the time of the survey. Educational attainment data are taken from the 1996, 2001, 2007, and 2013 rounds of the Demographic and Health Survey. Bride price data are from the *Ethnographic Atlas* (Murdock, 1967) and the *Ethnographic Survey of Africa* (Willis, 1966; Whiteley and Slaski, 1950; Schapera, 1953). The treatment variable, $Schools_{dt}$ is the number of schools built in a district d by survey year t. This is normalized by the area of the district, $Area_d$. The subscript d indexes districts, t survey years, and e ethnic groups. Standard errors are clustered at the district level. *, **, and *** indicate significance at the 10, 5, and 1% levels.

enrollment. In fact, the negative coefficients for the forward lags suggest that, as in Indonesia, schools may have been allocated to poorly performing districts.

As we did for the Indonesian sample, we also allow for differential effects of schooling based on traditional female participation in agriculture and matrilineal inheritance. Appendix table A9 reports estimates of equation (4) with the inclusion of interactions between the treatment $Schools_{dt}/Area_d$ and our traditional-female-participation-in-agriculture and matrilineality variables.[27] When female agriculture controls are included, both β_1 and β_2 become larger, and the effect of the school building

[27]Unfortunately, for the Zambian sample, five of the ethnic groups from the *Ethnographic Atlas* do not report a value for female participation in agriculture. This is because either agriculture is not practiced (e.g., the group is pastoral) or agriculture is practiced but the information is unknown. To account for this, we include an indicator variable that is equal to one if information on female agriculture participation is not reported, as well as its interaction with the treatment variable.

program becomes positive and significant for non-bride price ethnic groups as well. Nonetheless, a F-test for the final column of appendix table A9 shows that β_2 is significantly larger than β_1 ($F = 7.36$, $p = 0.01$).

5 Model

Having provided evidence that school construction policies in both Indonesia and Zambia affect girls' education differently depending on whether the ethnic group practices bride price, we now present a simple model of parents' decisions to educate their daughters in response to increased access to schooling, with and without the bride price. In the framework we outline, if bride price payments are higher when the bride is more educated, then the presence of the custom provides an additional reward to parents for their investments in their daughters' education.[28]

Under fairly general conditions, three simple but important predictions emerge. The first is that girls in bride price ethnic groups have higher levels of educational attainment than girls in non-bride price groups. The second prediction is that, because they are drawn from a larger interval of the ability distribution, average ability conditional on education is lower for girls from groups that traditionally engage in bride price payments. The third prediction is that, if the baseline level of education is low, then reducing the costs of schooling has a larger effect on the enrollment rates of girls who belong to ethnic groups that practice bride price. We now turn to a full description of the model.

5.1 Setup

The model has two periods. Parents enjoy utility from consumption $\{c_t\}_{t=1}^2$ and from the well-being of their daughter v^f, through $\gamma \in (0, 1)$, which is the weight parents place on their daughter's utility. Let r be the discount rate, and parents' income in each period is $\{y_t\}_{t=1}^2$. Daughters, indexed by i, are endowed with an innate ability a_i, which is distributed according to a unimodal probability density function $g(\,)$ and a strictly monotone cumulative distribution function $G(\,)$.

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 k. There is no borrowing nor saving.[29] In the second period, parents

[28] When parents are altruistic, they may invest in the education of their daughter as long as she receives a return from it. However, if daughters cannot commit to repaying them for the sunk investment, unless parents are perfectly altruistic, 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.

[29] As long as income in the first period is greater than the cost of schooling, the household does not need to borrow

choose consumption (c_2), and daughters marry. In line with the reality in our settings of interest, we assume that all daughters marry.[30]

At the time of their daughter's marriage, parents receive a bride price payment if they belong to an ethnic group that engages in this practice. A family's ethnicity is indexed by e and I_e indicates ethnic groups that practice bride price ($I_e = 1$) and ethnic groups that do not ($I_e = 0$). We make two crucial assumptions about the bride price payments, which we later verify in the data.

Assumption 1. ***(A1)*** *Bride price payments depend on a woman's ethnicity and are higher for women from ethnic groups that traditionally practice bride price ($I_e = 1$).*

In line with the prevailing interpretation of bride price, we view it as a payment from the groom to the parents of the bride to compensate them for the loss of their daughter and for the investments that were made in raising her. Given this, we expect the bride price payment to be increasing in the daughter's educational attainment.

Assumption 2. ***(A2)*** *For ethnic groups that engage in bride price, the payments made to the bride's parents are increasing in the educational attainment of the bride S.*

In particular, we assume that bride price payments take the following form:

$$BP_i(I_e, S_i) = I_e \cdot [b + \pi S_i],$$

where $b > 0$ and $\pi > 0$.[31]

We now turn to the utility of daughter i. We assume that her utility in the first period of life depends both on innate cognitive ability a_i and on her educational attainment S_i. We make a common separability assumption (e.g., Noldeke and Samuelson, 2015), and assume that ability only affects the utility from schooling in the first period, in a multiplicative way, $a_i S_i$, and that ability has no direct impact on the daughter's utility in the second period.[32]

to finance the education of the daughter. Hence, the same household could have multiple daughters and sons, and as long as borrowing constraints do not bind, their problems can be separated.

[30] In both countries, marriage rates are high. In the Indonesia 1995 Intercensal Survey, 91.99% of women aged 25–45 have been or are married. In the pooled Zambia DHS from 1996, 2001, 2007, and 2013, that rate is equal to 95.15%. Importantly, primary school completion is not associated with a statistically significant change in the marriage probability in Zambia, and with a slightly *higher* probability of marriage in Indonesia, which would reinforce our interpretation. In appendix A, we describe under which assumptions we obtain an equilibrium in which everyone marries.

[31] This specification assumes that the bride price of groups that traditionally do not engage in the practice, $I_e = 0$, is zero. In our empirical analysis, among groups that do not practice bride price, some do engage in token bride price payments, which are bride price payments that are very small and symbolic rather than substantive. For simplicity, we have normalized these payments to zero.

[32] The separability assumption is particularly important in the equilibrium marriage market model developed in appendix A. Relaxing this assumption preserves the predictions in this section, but would require substantially modifying the equilibrium framework described in appendix A.

Let $v_2(S_i, I_e, k)$ denote the utility that the daughter obtains in the second period (from both the labor and the marriage markets). This depends on her schooling obtained in the first period S_i. We also allow her second-period utility to depend on whether she belongs to an ethnic group that engages in bride price I_e and on the cost of schooling k.[33]

This formulation allows women who belong to bride price groups to have a different (and potentially worse) marriage experience because of the bride price payment. It also allows women from bride price groups to receive different returns to education than non-bride price women. By allowing the daughter's second-period utility to depend on the cost of schooling k in the first period, we intend to also capture any potential general equilibrium effects of school construction on returns in the marriage and labor markets.

Thus, the daughter's overall utility is given by:

$$v^f(a_i, I_e, k, S_i) = a_i S_i + \frac{v_2(S_i, I_e, k)}{1+r}.$$

And the parent's maximization problem is:

$$\begin{aligned} max_{S_i \in \{0,1\}, c \geq 0} \quad & c_1 + \frac{c_2}{1+r} + \gamma \left[a_i S_i + \frac{v_2(S_i, I_e, k)}{1+r} \right] \\ s.t. \quad & c_1 + k \cdot S_i \leq y_1 \\ & c_2 \leq y_2 + BP_i(I_e, S_i). \end{aligned}$$

5.2 Bride price and the education decision

Define the returns to schooling by $\Delta v(I_e, k) \equiv v_2(S_i = 1, I_e, k) - v_2(S_i = 0, I_e, k)$. Then, substituting the budget constraints into the objective function, we find that parents will choose to educate the daughter ($S_i = 1$) whenever

$$a_i > \frac{1}{\gamma} \left[k - I_e \cdot \frac{\pi}{1+r} \right] - \frac{\Delta v(I_e, k)}{1+r}.$$

We denote the daughter's ability for a household that is on the margin between making the educational investment or not by $a^*(I_e, k)$. This threshold depends on whether bride price is practiced

[33] See Platteau and Gaspart (2010) for evidence from Senegal on the extent to which women felt that a high bride price is associated with increased difficulties for women. Interestingly, 40.3% of women in his sample did not see any negative consequences of high bride prices (see table 2).

I_e and on the cost of education k. Specifically, it is given by the following expression:

$$a^*(I_e, k) \equiv \frac{1}{\gamma}\left[k - I_e\frac{\pi}{1+r}\right] - \frac{\Delta v(I_e, k)}{1+r}.$$

Let $a^*_{BP} = a^*(I_e = 1, k)$ be the ability threshold for girls from bride price groups and let $a^*_{NoBP} = a^*(I_e = 0, k)$ be the ability threshold for girls from non-bride price groups.

Parents will educate their daughter i as long as her ability a_i is greater than the threshold ability $a^*(I_e, k)$. Therefore, the probability that daughter i is educated is given by:

$$Pr(S_i = 1|I_e, k) = Pr(a_i \geq a^*(I_e, k)) = 1 - G\left(a^*(I_e, k)\right).$$

To obtain testable implications, we now impose some restrictions on how ethnicity and school construction may affect the daughter's returns to schooling.

Assumption 3. ***(A3)*** *The returns to education for bride price women and non-bride price women are sufficiently similar. Specifically, the difference in the returns to education for the two groups satisfies:* $\gamma[\Delta v_{NoBP}(k) - \Delta v_{BP}(k)] < \pi$.

If the returns to education among bride price and non-bride price groups are identical, Assumption 3 is satisfied when $\pi > 0$. However, the assumption of identical returns is stronger than what we need to derive our predictions. Assumption 3 can be interpreted as requiring that the returns to education that daughters in different ethnic groups experience are sufficiently similar – from the point of view of parents – relative to the size of the bride price education premium π the parents receive.[34]

We now turn to the necessary assumption to address the potential for the presence of general equilibrium effects that are sufficiently strong that they would affect our comparative static of interest. We thus impose the following assumption.

Assumption 4. ***(A4)*** *The decline in the returns to schooling that arises due to lower education costs, which increases educational attainment, has to be sufficiently small (for both bride price and non-bride price groups):* $\frac{\partial \Delta v(I_e,k)}{\partial k} < \frac{1+r}{\gamma}$.

This assumption tells us that, in any ethnic group, a decline in the cost of schooling may not generate general equilibrium effects large enough to induce parents to not respond by increasing

[34]The intuition behind the assumption is that in order for bride price parents to be more responsive to educational opportunities, it must be the case that these parents value the bride price payment more than they dislike the cost that this payment could impose on their daughter. For example, even if the bride price education premium were entirely incident on the daughter – that is, if the utility of the daughter declined one-for-one with the amount of bride price paid – this assumption stipulates that parents still would prefer to obtain the payment. Clearly, the fact that parents are imperfectly altruistic (i.e. that $\gamma < 1$) plays a key role here.

daughters' schooling on the margin. Because $\frac{1+r}{\gamma} > 1$, this assumption allows for some decline in the returns to schooling following school construction, but it imposes an upper bound on how large such effects can be. In our data, we do see effects on schooling, which suggests that this is the empirically relevant scenario.

We now turn to our first two predictions. The first deals with how schooling differs due to the bride price practice and due to costs.

Prediction 1. *If A1-A4 hold, then the probability that a girl is educated, $Pr(S_i = 1)$, is:*
(i) higher among ethnicities that engage in bride price payments:
$Pr(S_i = 1|I_e = 1, k) > Pr(S_i = 1|I_e = 0, k)$;
(ii) decreasing in the cost of education: $\frac{\partial Pr(S_i=1|I_e,k)}{\partial k} < 0$.

Proof. See appendix A. □

Prediction 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. □

These predictions are intuitive. The bride price provides an additional incentive for parents to educate their daughter. Thus, as long as general equilibrium effects are not too large and parents are not perfectly altruistic, we will observe higher rates of enrollment among ethnicities that practice bride price. In addition, higher enrollment rates among bride price ethnicities imply, in this setting, that girls with relatively lower ability will get educated in bride price ethnicities because the bride price premium justifies the education investment by the parents.[35]

5.3 Bride price and response to education policies

We now turn to our primary comparative static of interest: how the increase in education due to a reduction in the cost of education k depends on the presence of a bride price custom.

Consistent with our setting of interest, we consider the case in which education levels are low, namely the case in which the girl with modal ability does not get educated. Because the distribution of ability is assumed to be unimodal, when female schooling is low, $g\left(a^*_{BP}\right) - g\left(a^*_{NoBP}\right) > 0$. Recall that $a^*_{BP} = a^*(I_e = 1, k)$ is the ability threshold for girls from bride price groups and $a^*_{NoBP} = a^*(I_e = 0, k)$ is the ability threshold for girls from non-bride price groups.

[35] From an intergenerational perspective, efficient investment in schooling implies that every girl with $a_i > \left[k - \frac{\Delta v(I_e,k)}{1+r}\right]$ gets educated. However, because altruism is imperfect, the bride price custom can help overcome under-investments in daughters' schooling due to imperfect commitment across generations.

To explain our empirical results, we need an additional restriction: if school construction reduces the returns to education, bride price groups cannot experience declines that are too large relative to those experienced by other ethnic groups. A sufficient condition for this to be true is that the way in which school construction changes the returns to education does not vary across ethnic groups.[36]

Assumption 5. ***(A5)*** *The returns to schooling of girls of all ethnic groups are equally affected by a change in the cost of schooling:* $\frac{\partial \Delta v_{BP}(k)}{\partial k} = \frac{\partial \Delta v_{NoBP}(k)}{\partial k}$.

Under this assumption, our main empirical results follow directly.[37]

Prediction 3. *A decline in the cost of schooling increases the probability of education more for ethnicities that engage in bride price payments, compared to other ethnicities.*

Proof. See appendix A. □

Figure 4 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.

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 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 ability is closer to the modal ability.

A noteworthy aspect of the model is that the heterogeneity in the response to school construction is entirely due to the fact that the bride price custom generates structurally different levels of education at baseline across different ethnic groups. Therefore, a strict interpretation of the model suggests that after controlling flexibly for the baseline levels of education in each ethnic group, there should be no additional role for the bride price custom. This is a point that we return to below.

[36] This is a sufficient, but not necessary, condition for the predictions to hold. The (weaker) necessary condition is that: $\left[\frac{\partial \Delta v_{BP}(k)}{\partial k} + \frac{g\left(a^*_{NoBP}\right)}{g\left(a^*_{BP}\right) - g\left(a^*_{NoBP}\right)}\left(\frac{\partial \Delta v_{BP}(k)}{\partial k} - \frac{\partial \Delta v_{NoBP}(k)}{\partial k}\right)\right] < \frac{1+r}{\gamma}$.

[37] The unimodality 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. Becker et al. (2010) use a related argument to explain why women's education rates have overtaken those of men in developed countries.

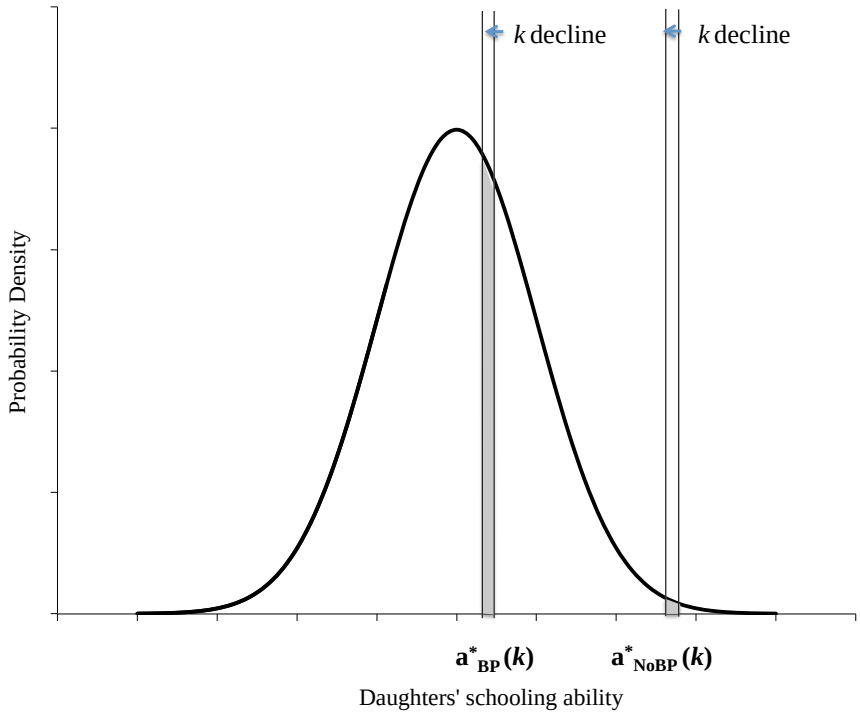

Figure 4: Distribution of girls' returns to education and declines in the cost of education

Extending the model and validating A3–A5

In appendix A, we extend the model to also study male educational choice in the presence of bride price, and to construct a simple equilibrium model of the marriage market. We show that, in this frictionless matching framework, in which spouses sort on educational attainment, we do not expect men to have different schooling rates nor to respond differently to a decline in the cost of schooling depending on their bride price custom. Specifically, this is the case as long as men's educational attainment is higher than women's educational attainment both before and after the school construction.

In the same appendix, we use the equilibrium model to examine the validity of assumptions *A3–A5* in a setting where the daughter's utility is affected by the equilibrium outcome of the marriage market. We show that these assumptions hold as long as educated women are more scarce than educated men, which is the case in our context.

6 Bringing the Model to the Data

We now return to the data, in an attempt to test the necessary assumptions of the model and its additional predictions. We begin with an examination of Assumptions 1–3.

6.1 Assumption 1. Do bride price payments vary systematically by ethnic group?

We begin by examining data on the magnitude of bride price payments to verify that bride price payments are, in fact, substantially larger among ethnic groups that have traditionally engaged in bride price.

We examine contemporary bride price payments in Indonesia and Zambia using household survey data. In Indonesia, we use rounds 3 and 4 of the Indonesian Family Life Surveys (IFLS), which report information on bride price payments for married couples.[38] We find that a non-zero bride price payment is reported for 92% of couples that belong to groups that practice bride price in the *Ethnographic Atlas* and for 91% of the couples that do not practice bride price.[39] The small difference on this margin is expected, since groups within Indonesia without a tradition of bride price typically still engage in token bride price payments, gift exchange, or other forms of symbolic transfer. The differences on the intensive margin (i.e., amount of bride price paid) are much more substantial. For individuals from groups that traditionally practice bride price, the median bride price payment equals 9% of the per capita GDP in the year of marriage and the mean payment is 51%. For non-bride price couples, the median is only 4% and the mean is 25%.[40]

A similar pattern exists in Zambia. We examine information we collected from peri-urban Lusaka, using a module we created and implemented within the Zambia Fertility Preferences Survey (ZFPS).[41] Among individuals from ethnic groups that have traditionally practiced bride price, 88% of couples report non-zero bride price payments, while this figure is 85% among non-bride price couples.[42] Again, the small difference on the extensive margin is expected, since groups that do not traditionally engage in bride price payments typically engage in token bride price or other forms of symbolic transfer. The differences on the intensive margin (i.e., amount paid) are much more substantial. For bride price couples, the median bride price payment is 67% of the per capita GDP in the year of marriage, while the mean is 175%. For non-bride price couples the median is 52% and the mean is 103%.

[38] 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 bride price except for marriages among the matrilocal Minangkabau (RAND, 1999), who we omit from the analysis.

[39] The ethnic group of the couple is identified using the self-reported ethnicity of the respondent.

[40] Appendix table A10 summarizes these statistics and provides further details on the sample.

[41] See the data appendix for further details.

[42] The classification of the marriage is based on the self-reported ethnicity of the wife.

Overall, we see that individuals that belong to ethnic groups that have traditionally engaged in bride price today make bride price payments that are larger in magnitude. In addition, it is also apparent that, in our samples, bride price payments are large, on average. Although this is not necessary for our comparative static of interest, it does provide some sense, ex ante, about the likely importance of the practice and whether we expect it to be important enough to have detectable impacts.

6.2 Assumption 2. Does the bride price increase with the bride's education?

We now turn to assumption 2, and verify that bride price transfers are increasing in the educational attainment of the bride. Our empirical approach relies on hedonic regressions of bride price payments on female educational attainment. However, we caution that if women who command higher bride prices are also more likely to be educated, hedonic regressions of bride price payments will not have a causal interpretation, just 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).

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 payments at marriage. We link individuals to their traditional marriage practices using their self-reported ethnicity.[43]

We begin by estimating the following hedonic regression:

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

where i indexes a marriage, e indexes the ethnicity of the bride, and t indexes the survey year (2000 or 2007). $BridePrice_{iekt}$ is the value of the bride price that was paid at 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 denotes survey-year fixed effects. $\mathbf{X}_i$ varies across

[43]The 2007 IFLS contains information on 27 ethnicities that were matched manually to the ethnic groups for which we have bride price information. Of the 27 IFLS ethnic groups, five could not be matched. These comprise 4.9 percent of the sample of recently married couples for which we have information on bride price payments and ethnicity.

Table 5: Determinants of Bride Price Payment Amounts in the Indonesia (IFLS)

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: Log Bride Price Amount					
$I(Completed\ Primary)_i$	0.663***	0.620***	0.566***	0.433***	0.453***	0.427***
	(0.069)	(0.074)	(0.070)	(0.076)	(0.077)	(0.072)
$I(Completed\ Junior\ Secondary)_i$	0.576***	0.613***	0.613***	0.411***	0.429***	0.446***
	(0.070)	(0.074)	(0.069)	(0.075)	(0.075)	(0.070)
$I(College)_i$	0.863***	0.866***	0.908***	0.430***	0.378***	0.478***
	(0.079)	(0.080)	(0.076)	(0.090)	(0.091)	(0.085)
$MarriageAge_i$		-0.001	-0.003	-0.013	-0.011	-0.015
		(0.014)	(0.013)	(0.015)	(0.015)	(0.015)
$MarriageAge_i^2$		-0.000	-0.000	0.000	0.000	0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$I(Husband\ Completed\ Primary)_i$				0.306***	0.233***	0.203**
				(0.086)	(0.086)	(0.080)
$I(Husband\ Completed\ Junior\ Secondary)_i$				0.344***	0.352***	0.348***
				(0.078)	(0.079)	(0.073)
$I(Husband\ College)_i$				0.679***	0.673***	0.570***
				(0.090)	(0.090)	(0.085)
$HusbandMarriageAge_i$					0.008	0.018
					(0.017)	(0.015)
$HusbandMarriageAge_i^2$					-0.000	-0.000
					(0.000)	(0.000)
Quadratic in Year of Marriage	Y	Y	Y	Y	Y	Y
Ethnicity FE	N	N	Y	N	N	Y
Survey Round FE	Y	Y	Y	Y	Y	Y
Observations	5,995	5,500	5,500	5,476	5,216	5,216
Adjusted R-Squared	0.426	0.429	0.501	0.445	0.421	0.494

Notes: This table reports estimates of the relationship between female education and bride price. The columns regress the natural log of bride price payments at the time of marriage on various covariates. The sample consists of all marriages for which bride price was reported. Bride price and educational attainment data are taken from the 2001 and 2007 rounds of the Indonesia Family Life Survey (rounds 3 and 4). The subscript i indexes a female respondent. Robust standard errors are reported in parentheses. *, **, and *** indicate significance at the 10, 5, and 1% levels.

specifications, but always includes a quadratic in the year of marriage. Depending on the specification, it may also include ethnicity fixed effects, bride's age of marriage and its square, and the following characteristics of the husband: education indicators, and the age at marriage (and its square).

Estimates of equation (5) are reported in table 5.[44] Column 1 reports estimates controlling for only survey-year fixed effects and a quadratic in marriage year. Column 2 adds marriage age controls and column 3 includes ethnicity fixed effects, which are meant to capture any correlation between belonging to an ethnicity that practices higher bride price and receiving more education. Across specifications, the results are very similar.

The estimates show that the bride's educational attainment is positively associated with a higher

[44]Summary statistics for rounds 3 and 4 of the Indonesia Family Life Survey (IFLS) are reported in appendix table A11.

bride price payment at marriage. According to the estimates reported in column 3, completion of primary school is associated with a 57% increase in the value of the bride price (relative to no schooling), completion of junior secondary school is associated with an additional 61% increase in the bride price, and completion of upper secondary schooling and attendance of college is associated with an additional 91% increase. According to the estimates, parents of women who attended college, on average, receive bride price payments that are 209% higher than payments to parents of women who did not complete primary education.

The remaining columns in table 5 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 5 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 3 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 the value of the bride price payment remains large, positive, and statistically significant.

The same relationships can also be estimated in Zambia, using a dedicated module in the first wave of the Zambia Fertility Preferences Survey (Fall 2014), in which 715 households from a poor suburb of peri-urban Lusaka were interviewed. Each spouse was asked a series of questions on the practice of bride price, referred to as *lobola*, leading to a total of 1,430 observations.[45]

Using this data we are able to estimate a variant of equation (5), with the only substantial difference being in the exact way that educational attainment is measured. For Zambia, the indicator variable $I(Primary)_i$ equals 1 if primary education was completed (i.e., completed grade 7); $I(JuniorSecondary)_i$ equals 1 if junior secondary education was completed (completed grade 9); and $I(Secondary)_i$ equals 1 if secondary education or above has been completed (completed grade 12).

Estimates of equation (5) in Zambia are reported in table 6. As in Indonesia, we find that bride price payments increase with the education of the bride. According to the point estimates in column 6, completing primary school is associated with a 22 percentage point increase in the bride price payment (although with p-value 0.134), completing junior secondary school is associated with another 43 percentage point increase, and completing secondary school with another 27 percentage point increase.

[45] Appendix table A13 reports relevant summary statistics.

Table 6: Determinants of Bride Price Payment Amounts in Zambia (ZFPS)

	Dependent Variable: Log Bride Price Amount					
	(1)	(2)	(3)	(4)	(5)	(6)
$I(CompletePrimary)_i$	0.365**	0.253*	0.214	0.240	0.251*	0.218
	(0.150)	(0.146)	(0.142)	(0.149)	(0.147)	(0.145)
$I(CompleteJunSec)_i$	0.587***	0.497***	0.419***	0.479***	0.506***	0.428***
	(0.146)	(0.136)	(0.134)	(0.142)	(0.141)	(0.137)
$I(CompleteHigherSec)_i$	0.229	0.279**	0.270**	0.280**	0.274**	0.267**
	(0.140)	(0.132)	(0.130)	(0.134)	(0.135)	(0.135)
$MarriageAge_i$		-0.0681***	-0.0725***	-0.0678***	-0.0732***	-0.0764***
		(0.0106)	(0.00985)	(0.0107)	(0.0111)	(0.0104)
$MarriageAge_i^2$		2.48e-05	-3.03e-08	3.41e-05	3.59e-05	-3.45e-08*
		(7.34e-05)	(1.96e-08)	(7.35e-05)	(7.53e-05)	(2.02e-08)
$I(HusbandCompletePrimary)_i$				0.147	0.185	0.120
				(0.183)	(0.184)	(0.182)
$I(HusbandCompleteJunSec)_i$				0.0282	0.0173	0.0571
				(0.159)	(0.160)	(0.158)
$I(HusbandCompleteHigherSec)_i$				-0.00199	-0.0233	-0.0804
				(0.132)	(0.132)	(0.130)
$HusbandMarriageAge_i$					-0.0965**	-0.0463
					(0.0439)	(0.0425)
$HusbandMarriageAge_i^2$					0.00205**	0.00117
					(0.000813)	(0.000760)
Quadratic in Year of Marriage	Y	Y	Y	Y	Y	Y
Ethnicity FE	N	N	Y	N	N	Y
Observations	443	443	443	443	442	442
Adjusted R-squared	0.135	0.229	0.281	0.226	0.236	0.282

Notes: This table reports estimates of the relationship between female education and bride price. The columns regress the natural log of bride price payments at the time of marriage on various covariates. The sample consists of all marriages for which bride price was reported. Bride price and educational attainment data were collected by the authors, as part of a special module implemented in the first wave of the ZFPS (Fall 2014). Bride price data are from the *Ethnographic Atlas* and the *Ethnographic Survey of Africa*. SES controls include indicator variables for whether the respondent owns land and property. The subscript i indexes a female respondent. Robust standard errors are reported in parentheses. *, **, and *** indicate significance at the 10, 5, and 1% levels.

Is the bride price-education relationship causal?

While the estimates reported in tables 5 and 6 cannot be interpreted as causal, we now pursue a number of alternative strategies to better understand whether the correlations are spurious. The first is to include in our estimates a control for a measure of the wife's assets prior to marriage available in the IFLS. Unfortunately, this information is missing for a large of number of observations and including the variables reduces the sample size from 5,193 to 1,871. In Zambia, we have data for the full sample of 455 marriages. However, the best available measure is whether the wife's parents' owned land or other property at the the time of marriage. The estimates are reported in appendix table A14. Adding these additional covariates leaves the point estimates essentially unchanged.

The second strategy that we pursue is to follow Duflo (2001) and use primary school construction as an instrument for primary school completion to estimate the causal impact of a bride's education on the bride price payments received at marriage. Because the school construction had no effect on non-bride price ethic groups (i.e., there is no first stage), we restrict our sample to include bride price ethnic groups only.[46] Although our 2SLS estimates are less precisely estimated, we find that they are even greater in magnitude than the OLS estimates. Details of the estimating equations are reported in appendix section C, and the first- and second-stage estimates are reported in appendix table A12.

The final evidence on whether the bride's education increases bride price payments is from survey questions that were included in the first wave of the Zambia Fertility Preferences Survey for exactly this purpose. Each spouse from the 715 households was asked a series of questions on the practice of *lobola* (bride price). 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 7. The plurality of respondents (37%) listed education as the most important determinant of the value of the bride price at marriage. The next most commonly listed first determinants were family values (15%) and good morals (13%). Overall, 63% of respondents listed education as one of the three most important factors affecting bride price.

To obtain a sense of whether individuals viewed the bride price-education relationship as spurious, respondents were asked to indicate the reason why, in their view, bride price payments are higher for more educated brides. Respondents, again unprompted, indicated several reasons that were categorized and then reported in column 1 of table 8. 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, or increased ability to maintain the health and education of children.

These results 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. Alternatively, the estimated relationship could be driven by omitted factors, such as more educated brides having richer parents who demand a higher bride price. We were particularly careful to check for

[46]Following Duflo (2001), we restrict the sample to individuals born between 1950 and 1972, and 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.

Table 7: Perceived Determinants of Bride Price Payment Amounts in Zambia (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: This table reports respondents' answers when asked what factors affect bride price today. The data were collected by the authors, as part of a special module implemented in the first wave of the ZFPS (Fall 2014). The sample comprises 715 couples interviewed in peri-urban Lusaka. An observation is an individual, either male or female.

explanations of this nature. Though some respondents did provide an explanation along these lines – "Is associated with her parents being rich" – it was only chosen by less than 8% of the sample, making it the least popular explanation.

After allowing respondents to answer unprompted, they were then asked directly about each of the potential explanations listed in table 8. Due to the well-known acquiescent response bias, we must interpret the prompted responses with caution and expect respondents' agreement frequencies to be upward biased and their disagreement frequencies to be downward biased. Despite this, 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. When asked whether it "is associated with her parents being rich" (i.e., the relationship is spurious), 56% said that this was not a reason. This explanation was the one most disagreed with among all respondents.

The survey findings are consistent with information garnered from focus groups conducted by our research team in Lusaka. For example, one respondent told us that when a parent negotiates

Table 8: Perceived Reasons for Why Bride Price Payments Increase 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	212	476	716
	15.1%	33.9%	51%
Improves the bride's knowledge and skills as a mother	171	600	625
	12.25%	42.98%	44.77%
Improves the woman's earning potential	207	713	468
	14.91%	51.37%	33.72%
Improves the literacy of children	85	725	573
	6.15%	52.42%	41.43%
Bride's parents should to be compensated for investments	777	448	179
	55.34%	31.91%	12.75%
Is associated with her parents being rich	104	507	785
	7.45%	36.32%	56.23%
Other reasons	25	-	645
	3.73%	-	96.27%

Notes: This table reports respondents' answers when asked why bride price increases with education. The data were collected by the authors, as part of a special module implemented in the first wave of the ZFPS (Fall 2014). The sample comprises 715 couples interviewed in peri-urban Lusaka. An observation is an individual, either male or female.

lobola, he or she calculates how much was spent on education. Parents also 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."

Taken as a whole, the body of evidence is 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.

6.3 Assumption 3. Are the returns to education similar for bride price women and non-bride price women?

The third assumption necessary for the predictions of the model is that the returns to education for bride price and non-bride price women are sufficiently similar. We test for this using the 1995 Indonesia Intercensal data, and examine whether the relationship between a women's level of educa-

tion and either her employment status or her income is stronger for women from bride price cultures, relative to women from non-bride price cultures.

We estimate the following equation:

$$\begin{aligned} y_{iked} &= \alpha_d + \alpha_k + \beta_1 I(PrimarySchool)_i + \beta_2 I(PrimarySchool)_i \times I_e^{BridePrice} \\ &\quad + \beta_3 I(Junior\,Secondary)_i + \beta_4 I(Junior\,Secondary)_i \times I_e^{BridePrice} \\ &\quad + \beta_5 I(College)_i + \beta_6 I(College)_i \times I_e^{BridePrice} + \varepsilon_{kied} \end{aligned} \tag{6}$$

where i indexes a woman between the ages of 25 and 45, e her ethnicity, d her district, and k her year-of-birth. 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,[47] or the wealth index of a woman's household.[48] $I(PrimarySchool)_i$ 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 year-of-birth fixed effects. We cluster our standard errors at the ethnicity-level and report wild-bootstrapped p-values in the square brackets.

The estimates are reported in columns 1–3 of table 9. Unsurprisingly, we find that more education is associated with a higher likelihood of employment, higher wages, and greater household wealth. However, we find no evidence that these relationships are systematically different for women from bride price ethnicities.

[47] The Indonesia Intercensal data only report wages for formal sector employees.

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

Table 9: Relationship between Education and Other Outcomes for Bride Price and Non-Bride Price Women in Indonesia and Zambia

	(1)	(2)	(3)		(4)	(5)	(6)
		Indonesia				**Zambia**	
	Employment	ln (Wage)	Wealth Index		Employment	Wealth Index	Child Stunting
$I(Primary)_i$	-0.059***	0.280***	0.739***	$I(Primary)_i$	0.045**	0.373***	-0.045***
	(0.004)	(0.014)	(0.023)		(0.012)	(0.022)	(0.007)
	[0.004]	[0.000]	[0.000]		[0.020]	[0.000]	[0.004]
$I(Secondary)_i$	0.092***	0.827***	0.991***	$I(Secondary)_i$	0.031**	0.924***	-0.050***
	(0.016)	(0.028)	(0.035)		(0.013)	(0.018)	(0.005)
	[0.000]	[0.000]	[0.000]		[0.016]	[0.000]	[0.004]
$I(College)_i$	0.177***	0.182***	0.313**	$I(SecondaryPlus)_i$	0.222***	0.704***	-0.077***
	(0.020)	(0.015)	(0.070)		(0.016)	(0.054)	(0.013)
	[0.000]	[0.000]	[0.028]		[0.000]	[0.000]	[0.004]
$I(Primary)_i \times I_e^{BridePrice}$	0.002	0.084	-0.121	$I(Primary)_i \times I_e^{BridePrice}$	-0.004	-0.042	0.061*
	(0.019)	(0.062)	(0.063)		(0.028)	(0.062)	(0.024)
	[0.960]	[0.416]	[0.200]		[0.904]	[0.648]	[0.080]
$I(Secondary)_i \times I_e^{BridePrice}$	0.045	-0.105	-0.137*	$I(Secondary)_i \times I_e^{BridePrice}$	0.014	-0.080*	-0.001
	(0.033)	(0.074)	(0.063)		(0.017)	(0.033)	(0.017)
	[0.328]	[0.404]	[0.064]		[0.464]	[0.068]	[0.964]
$I(College)_i \times I_e^{BridePrice}$	-0.033	-0.033	-0.191	$I(SecondaryPlus)_i \times I_e^{BridePrice}$	0.012	-0.038	-0.016
	(0.053)	(0.044)	(0.134)		(0.024)	(0.100)	(0.026)
	[0.576]	[0.456]	[0.296]		[0.612]	[0.716]	[0.568]
$I_e^{BridePrice}$	-0.032	0.011	0.002	$I_e^{BridePrice}$	-0.033	0.083	-0.052**
	(0.028)	(0.028)	(0.082)		(0.035)	(0.075)	(0.019)
	[0.456]	[0.668]	[0.976]		[0.484]	[0.272]	[0.028]
District FE	Y	Y	Y	District × Year FE	Y	Y	Y
Age Controls	Y	Y	Y	Age Controls	Y	Y	Y
F-test of Bride Price Interact Coefficients	6.13	0.73	5.24	F-test of Bride Price Interact Coefficients	0.77	2.71	3.47
Number of observations	84,501	12,423	84,491	Number of observations	19,671	17,145	21,946
Clusters	39	31	39	Clusters	30	30	30
Adjusted R^2	0.108	0.503	0.375	Adjusted R^2	0.151	0.523	0.059

Notes: This table reports estimates of the relationship between education and other outcomes for bride price and non-bride price women in Indonesia and Zambia. The samples consist of women ages 25-45, with the exception of column 6, which includes all children ages 0-5. Age controls consist of age and age squared. For Indonesia, educational attainment and labor market outcomes data are taken from the 1995 Intercensal data. For Zambia, educational attainment, labor market, and child health outcomes data are taken from the 1996, 2001, 2007, and 2013 Demographic and Health Surveys. Bride price data are from the *Ethnographic Atlas* (Murdock, 1967) and LeBar (1972) for Indonesia and from the *Ethnographic Atlas* (Murdock, 1967) and the *Ethnographic Survey of Africa* (Willis, 1966; Whiteley and Slaski, 1950; Schapera, 1953) for Zambia. Wage data in Indonesia are only reported for formal sector employees. $I(SecondaryPlus)_i$ refers to any post-secondary education, which is not necessarily at the university level, while $I(College)_i$ refers specifically to college or university education. Standard errors, clustered at the ethnicity level, are reported in parentheses. p-values obtained using the wild bootstrap procedure with 500 draws are reported in square brackets. *, **, and *** indicate significance at the 10, 5, and 1% levels.

We also perform the same tests in Zambia. We estimate a variant of equation (6) using the four available rounds of the Zambia DHS. As in Indonesia, we examine female employment and a wealth index.[49] These estimates are reported in columns 4 and 5 of table 9. As in Indonesia, we find no evidence of a differential return to education for women belonging to bride price ethnic groups.[50] The DHS does not include information on wages, but does include child stunting, which is an alternative measure that tends to be correlated with female (and household) income. We examine an indicator variable that is equal to one if a woman's child is categorized as being severely stunted.[51] We estimate equation (6), looking at children ages 0–5 in the sample. The estimate is reported in column 6 of table 9. Again, we see no evidence of a differential return to education for women belonging to bride price ethnic groups.

Thus, the evidence indicates that the returns to education are very similar for bride price and non-bride price women.

6.4 Prediction 1. Do bride price ethnic groups have higher levels of female educational attainment?

We now shift from verifying the primary assumptions of the model to verifying its additional predictions. We begin with prediction 1, which predicts that girls are more likely to be enrolled in school in ethnic groups that engage in bride price payments at marriage. We test this prediction by examining variation in schooling enrollment across ethnic groups in both Indonesia and Zambia.

Our estimating equation is:

$$I_{iedt}^{Enrolled} = \alpha_d + \alpha_t + \beta_1 I_e^{BridePrice} + \mathbf{X}_i\mathbf{\Gamma} + \mathbf{X}_e\mathbf{\Pi} + \varepsilon_{iedt}, \quad (7)$$

where i indexes girls aged 5–22, e ethnic groups, d districts, and t the year of the survey. For Indonesia, we use the 1995 Indonesia Intercensal Survey, and for Zambia, we use the pooled 1996, 2001, 2007, and 2013 Zambia DHS.

[49] The wealth index is constructed and reported by the Demographic and Health Surveys (Rutstein and Johnson, 2004).

[50] Although the coefficients of the interactions between educational attainment and bride price custom are not statistically significant, the point estimates suggest that returns to education may in fact be *lower* for girls in bride price groups. This pattern can be explained within our theoretical framework, where more lower-ability girls are educated in bride price groups than in non-bride price groups. While in our model ability only affects girls in the first period of their life, allowing lower ability girls to have lower returns to education later in life would account for these relationships in the data.

[51] Severe stunting indicates that a child has a height more than three standard deviations below the mean of the growth distribution for healthy children based on a study of six baseline countries chosen by the WHO – Brazil, India, Oman, Ghana, Norway and the USA.

The dependent variable $I_{ije}^{Enrolled}$ is an indicator variable that equals 1 if girl i 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_d denotes district fixed effects and α_t denotes survey-year fixed effects (for Zambia). For Indonesia, we have only one survey-year so these are simply district fixed effects. The vector $\mathbf{X}_i$ includes the age of the girl as well as her age squared. The vector $\mathbf{X}_e$ also includes our set of ethnicity-level controls: an indicator for matrilineal inheritance and an indicator for traditional female participation in agriculture. We cluster standard errors at the ethnicity level. Since there are as few as 29 ethnicities in our sample, we also report p-values from a wild bootstrap procedure (Cameron and Miller, 2015).

Estimates of equation (7) are reported in table 10. 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 relationship between bride price and the probability that a girl is enrolled in school. The estimates for the larger Indonesian sample are highly significant, while the estimates for the smaller Zambian sample are smaller in magnitude and imprecisely estimated. According to the point estimates, bride price is associated with 1.8–6.2 percentage point increase in the probability of school enrollment.

The key prediction in the model – that bride price females will increase their educational attainment more in response to school construction – arises because baseline education rates were higher among bride price groups before the school construction took place. Given this, as a robustness check, in our Zambian sample we estimate equation (7), while omitting 2013, which is the round of the DHS that occurs after the school expansion is completed (see figure 3). The estimates are reported in appendix table A16. Bride price females are 3.3 percentage points more likely to be enrolled in school, a difference that is statistically significant at the 5 percent level.

A final test of our theoretical framework can be derived from the fact that the greater responsiveness of bride price groups to school construction arises because bride price groups have higher baseline female education levels than non-bride price groups. Thus, flexibly controlling for pre-treatment primary school completion rates by ethnic group should eliminate the differential effect of school construction for girls from bride price ethnic groups relative to non-bride price ethnic groups. As we report in appendix table A17, this is what we observe empirically.

Table 10: Relationship between the Practice of 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***	0.062***	0.018	0.021
	(0.013)	(0.013)	(0.014)	(0.014)
Wild bootstrap p-value	[0.000]	[0.000]	[0.244]	[0.196]
Age Controls	Y	Y	Y	Y
District FE	N	N	Y	Y
Survey Year FE	N	N	Y	Y
Ethnicity Controls	N	Y	N	Y
Number of observations	103,067	103,067	42,252	42,252
Adjusted R^2	0.412	0.412	0.329	0.349
Clusters	39	39	29	29

Notes: This table reports estimates of the relationship between bride price customs and female enrollment rates in Indonesia and Zambia. The columns regress an indicator variable for whether a child is enrolled in school on an indicator variable for whether the child is a member of an ethnic group that practices non-token bride price. The sample consists of girls ages 5–22. The Indonesia regressions draw on data from the 1995 Indonesia Intercensal data, and the Zambia regressions draw on data from the pooled 1996, 2001, 2007, and 2013 Zambia Demographic and Health Surveys. Bride price data are from the *Ethnographic Atlas* (Murdock, 1967) and LeBar (1972) for Indonesia and from the *Ethnographic Atlas* (Murdock, 1967) and the *Ethnographic Survey of Africa* (Willis, 1966; Whiteley and Slaski, 1950; Schapera, 1953) for Zambia. Age controls consist of age and age squared, and cultural controls consist of indicator variables for belonging to a matrilineal ethnicity and belonging to an ethnicity where women traditionally participate more in agriculture than men. Standard errors, clustered at the ethnicity level, are reported in parentheses. p-values obtained using the wild bootstrap procedure with 500 draws are reported in square brackets. *, **, and *** indicate significance at the 10, 5, and 1% levels.

6.5 Prediction 2. Do bride price ethnic groups have lower test scores?

The second prediction to emerge from the model states that bride price females should have lower academic ability on average, conditional on attending school (prediction 2). We use test score data, taken from rounds 3 and 4 of the IFLS, to test whether this is the case for primary school students in Indonesia. Unfortunately, similar data are not available for Zambia.

Our sample includes all female test-takers who took the Ebtanas state exam, which was in place from 1980–2001.[52] Our estimating equation is:

$$TestScore_{iekpst} = \alpha_{kt} + \delta_{ps} + age_{it} + \beta_1 I_e^{BridePrice} + \beta_2 I_e^{NoBridePrice} + \mathbf{X}_e\mathbf{\Pi} + \varepsilon_{iekpst}, \qquad (8)$$

[52] In 2001, the Ebtanas exam was replaced by the UNAS exam.

Table 11: Relationship between the Practice of Bride Price and Test Scores for Indonesian Girls in Primary-School

	(1)	(2)
	Total Test Score	
$I_e^{BridePrice}$	-0.069*	-0.069**
	(0.027)	(0.032)
Wild bootstrap p-value	[0.054]	[0.050]
Age Controls by Survey Year FE	Y	Y
Province by Year-Tested FE	Y	Y
Ethnicity Controls	N	Y
Number of observations	2,926	2,926
Clusters	17	17
Adjusted R^2	0.087	0.086

Notes: This table reports estimates of whether belonging to a bride price ethnicity predicts lower test scores for females in Indonesia. The sample consists of individuals who self-report scores from the Ebtanas (the testing regime prior to 2001). Self-reported test score data are drawn from the 2001 and 2007 rounds of the Indonesia Family Life Survey (rounds 3 and 4). Bride price data are from the *Ethnographic Atlas* (Murdock, 1967) and LeBar (1972) for Indonesia and from the *Ethnographic Atlas* (Murdock, 1967) and the *Ethnographic Survey of Africa* (Willis, 1966; Whiteley and Slaski, 1950; Schapera, 1953) for Zambia. Age controls consist of age and age squared. 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. Ethnicity controls consist of indicator variables for the traditional presence of female-dominated agriculture and traditional matrilinearity. Standard errors, clustered at the ethnicity level, are reported in parentheses. p-values obtained using the wild bootstrap procedure with 500 draws are reported in square brackets. *, **, and *** indicate significance at the 10, 5, and 1% levels.

where i indexes a female primary school student, e indexes her ethnicity, k indexes her year-of-birth, p indexes a province, s indexes the year the test was taken, and t indexes the IFLS survey year. The dependent variable is the student's test score, normalized to have mean of 0 and a standard deviation 1. α_{kt} denotes year-of-birth by survey-year fixed effects. δ_{ps} denote province by test-year fixed effects, which are included because the Ebtanas exam system is standardized at the province-level each year. The vector $\mathbf{X}_e$ includes our set of ethnicity-level controls. We report standard errors clustered at the ethnicity level, as well as p-values from a wild bootstrap procedure.

Table 11 reports the estimates of equation (8). Column 1 reports estimates without the ethnographic controls and column 2 reports estimates including the controls. Consistent with proposition 2, test scores of girls from bride price groups are estimated to be 0.07 standard deviations lower than girls from non-bride groups.

7 Testing alternative explanations for the differential schooling response among bride price families

Having put forth a formal explanation for the differential responsiveness of bride price ethnic groups to school construction policies, tested its necessary assumptions, and its additional predictions, we now turn to other potential explanations. In particular, we now examine three alternative explanations: differential returns to education, differential wealth, and differential gender attitudes.

7.1 Bride price girls have higher returns to education

One potential explanation for our findings is that the labor market returns to education are higher for females from bride price cultures and this is why parents are more likely to educate their daughters in response to the school-building programs.

In section 6.3, we tested for differential returns to education explicitly. From the theoretical point of view, the concern is that if the returns to education were significantly lower for bride price women, then we cannot obtain the unambiguous prediction that the education of daughters from bride price groups responds more than the education from non-bride price groups. From an empirical standpoint, the concern is the opposite. If the returns to education are higher for bride price women, this may explain our empirical finding that educational attainment is more responsive to school construction among bride price groups. However, as we reported in table 9, we find no evidence, in either Indonesia or Zambia, of higher returns to education for women from bride price groups.

7.2 Bride price families do not appear to have higher ability to pay for schooling

An alternative explanation for our findings is that ethnic groups that engage in bride price payments at the time of marriage are richer and therefore are in a better position to send their daughters to school in response to large school construction programs. We check for this possibility by examining whether households that belong to bride price ethnic groups have greater wealth. In practice, we estimate a variant of equation (7), but at the household-level and with household wealth as the outcome variable.[53]

Estimates are reported in column 1 of table 12. Panel A reports estimates from the Indonesian sample and panel B estimates for the Zambian sample. We find no evidence of differences in the wealth of bride price and non-bride price households in either country. Thus, it is unlikely that

[53] A household's ethnicity is defined by the ethnicity of the household head. The specification also includes district fixed effects and (for Zambia) survey year fixed effects.

Table 12: Bride Price Practice, Wealth, and Sex Ratio in Indonesia and Zambia

	(1)	(2)	(3)
	Wealth Index	Number of Children Born	Sex Ratio
	Indonesian Sample		
$I_e^{BridePrice}$	-0.006	0.223	-0.003
	(0.059)	(0.075)	(0.006)
Wild bootstrap p-value	[0.876]	[0.112]	[0.608]
Age Controls	N	Y	Y
District FE	Y	Y	Y
Survey Year FE	N	N	N
Unit of Observation	HH	Wife	Wife
Number of observations	132,511	79,140	74,966
Clusters	41	39	39
Adjusted R^2	0.224	0.283	0.001
	Zambian Sample		
$I_e^{BridePrice}$	0.014	0.009	-0.008
	(0.100)	(0.088)	(0.005)
Wild bootstrap p-value	[0.932]	[0.928]	[0.164]
Age Controls	N	Y	Y
District FE	Y	Y	Y
Survey Year FE	Y	Y	Y
Unit of observation	HH	Wife	Wife
Number of observations	25,763	19,715	18,879
Clusters	30	30	30
Adjusted R^2	0.339	0.351	-0.001

Notes: This table reports estimates of the relationship between various individual- or household-level characteristics and bride price status within Indonesia and Zambia. In column 1, the unit of observation is households, and in columns 2 and 3 it is women ages 25–45. For Indonesia, individual- and household-level data are taken from the 1995 Intercensal data and combined. For Zambia, individual- and household-level data are taken from the 1996, 2001, 2007, and 2013 DHS. Bride price data are from the *Ethnographic Atlas* (Murdock, 1967) and LeBar (1972) for Indonesia and from the *Ethnographic Atlas* (Murdock, 1967) and the *Ethnographic Survey of Africa* (Willis, 1966; Whiteley and Slaski, 1950; Schapera, 1953) for Zambia. Age controls consist of age and age squared. Standard errors, clustered at the ethnicity level, are reported in parentheses. p-values obtained using the wild bootstrap procedure with 500 draws are reported in square brackets. *, **, and *** indicate significance at the 10, 5, and 1% levels.

differences in wealth levels explain our findings.

Even if household wealth is the same in both groups, it is still possible that bride price ethnic groups have fewer children and therefore more wealth per child. In Indonesia, it has been hypothesized that historically bride price led to delayed marriage and lower rates of fertility (Boomgaard, 2003).

To test for this, in both Indonesia and Zambia, we estimate equation (7) using a cross-section

of women ages 25–45, with the number of children as the outcome variable.[54] The estimates are reported in column 2 of table 12. We find no evidence that bride price families have fewer children, and thus can better afford to send daughters to school. In both Zambia and Indonesia, we find that there is no statistically significant difference between bride price and non-bride price groups.

7.3 Bride price families do not appear to have greater preference for daughters or greater altruism towards women

We next turn to the potential explanation that bride price families have different attitudes towards girls relative to boys and that this explains their greater response to school construction policies. We test for this by examining whether there are differences in the male-to-female sex ratio of children between bride price and non-bride price societies in Indonesia or Zambia. The sex ratio reflects differential preferences for boys relative to girls that result in differential mortality rates due, in part, to differential access to family resources or even sex selective abortion or infanticide. The estimates are reported in column 3 of table 12. We estimate very small differences in the sex ratio, which are not statistically different from zero.

Using the Zambian data, we are able to test more thoroughly the extent to which belonging to a bride price ethnic group is associated with more equal gender attitudes. Using the pooled 2001, 2007, and 2013 data sets, we construct indices that reflect attitudes about the equality of men and women in society.[55] The estimates are reported in table 13. Columns 1–3 report estimates with wives' attitudes as the dependent variable, and columns 4–6 report estimates with husbands' attitudes as the dependent variable. In columns 1 and 4, the dependent variable is an index that measures the proportion of a fixed number of decisions that the respondent reports as being either jointly made by the husband and wife, or being made by the wife in their household.[56] In columns 2 and 5, the dependent variable is the proportion of scenarios in which the respondent reports that he/she feels that a husband beating a wife is justified.[57] In columns 3 and 6, the dependent variable is the proportion of reasons for which the respondent feels it is justified for women to refuse to have sex with her husband.[58] The specific details of the questions asked are reported in the paper's online appendix.

[54] Specifically, the outcome variable is the number of living children the woman 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 (for Zambia) survey-year fixed effects.

[55] The 1996 Zambia DHS does not include questions about gender attitudes.

[56] In 2001, three decisions are asked about, and in 2007 and 2013, there are five decisions.

[57] In all years, there are five scenarios that are asked about.

[58] In 2001, four reasons are asked about, and in 2007 and 2013, three reasons are asked about.

Table 13: Bride Price Practice and Gender Attitudes in Zambia

	(1) Prop. of Decisions Joint	(2) Beating Wife Justified	(3) Wife's Refusing Sex Justified	(4) Prop. of Decisions Joint	(5) Beating Wife Justified	(6) Wife's Refusing Sex Justified
	Wife Sample			**Husband Sample**		
Bride Price, $I_e^{BridePrice}$	-0.008	-0.017	-0.020*	0.010	0.001	-0.001
	(0.010)	(0.012)	(0.007)	(0.012)	(0.007)	(0.009)
Wild boot-strap p-value	[0.496]	[0.216]	[0.056]	[0.472]	[0.856]	[0.932]
Age Controls	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y
Survey Year FE	Y	Y	Y	Y	Y	Y
Unit of observation	Wife	Wife	Wife	Husband	Husband	Husband
Number of observations	13,130	15,964	15,964	9,898	11,106	11,099
Clusters	29	30	30	29	29	29
Adjusted R^2	0.134	0.225	0.079	0.079	0.136	0.057

Notes: This table reports estimates of the relationship between gender attitudes and bride price practice in Zambia. The sample for the first three columns consists of women ages 25–45, while the sample for the remaining columns consists of men ages 25–45. Gender attitude data are taken from the 1996, 2001, 2007, and 2013 Demographic and Health Surveys. Bride price data are from the *Ethnographic Atlas* (Murdock, 1967) and the *Ethnographic Survey of Africa* (Willis, 1966; Whiteley and Slaski, 1950; Schapera, 1953). Age controls consist of age and age squared. The subscript e denotes an ethnicity. Standard errors, in parentheses, are clustered at the ethnicity level. p-values obtained using the wild bootstrap procedure with 500 draws appear in square brackets. *, **, and *** indicate significance at the 10, 5, and 1% levels.

The estimates do not indicate that bride price ethnic groups have more gender equality as measured by more positive attitudes toward women. In all the specifications, the coefficients are small (always less than 0.02), and in all specifications but one the coefficients are statistically insignificant. In the one significant specification, the point estimate indicates that bride price ethnic groups actually report less equal gender attitudes, not more. Overall, the evidence does not support the hypothesis that bride price ethnic groups have stronger attitudes of gender equality than non-bride price ethnic groups.

7.4 An aside: What about boys?

An interesting, but related question to those we examine here is whether we observe differential effects of school construction on sons' education levels. We consider this question theoretically in the online appendix. We show that whether the presence of bride price affects the parents' decision of whether to education their son depends critically on *who* pays the bride price. Although the parents of the bride always receive the bride price, who pays the bride price is less standardized and often

depends on the specifics of the situation. Generally, the groom pays, but often parents, the extended family, or even friends, help with the bride price payments. As we show in appendix A, in the frictionless equilibrium model we construct, if the sons pay the bride price, then parents decision of whether to educate the son or not is not affected by the presence of a bride price custom. If parents pay the bride price, in part or in full, then the impact of the bride price on the parents' decision to educate their son is ambiguous.

For completeness, and out of interest, we also estimate equation (2) using a sample of boys. The results are reported in appendix table A15. Consistent with the ambiguous predictions that arise from the theory, we do not observe a consistent pattern across the two samples. For Indonesia, the impact of schooling appears larger for non-bride price boys, while the opposite is true in Zambia, although the coefficient is smaller and only marginally significant. In addition, the fact that we do not observe the same pattern for boys as we do for girls is important because it shows that it is not the case that bride price ethnic groups are systematically more responsive (for both genders) to school construction.

8 Conclusions

Our analysis has documented a (perhaps surprising) economic consequence of bride price, a tradition that is practiced in many parts of the world, including most of sub-Saharan Africa and many parts of Asia.

Revisiting one of the most well-known large-scale 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 is associated with a significantly higher bride price payment at the time of marriage. Thus, the bride price provides a greater incentive for parents to invest in girls' education. Indeed, 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 the 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 reveal that parents believe that bride price increases with education, which they attribute mainly to providing compensation for parental investment in daughters.

Our results contribute to the lively public debate that has ensued over the past decades over the potentially negative consequences of the bride price custom. The objections to this practice arise from the perceived commodification of women through a transaction, potentially leading to ill-treatment. Parents may have an incentive to "sell" their daughters early for bride price, and women may feel that they cannot leave a marriage because their parents would have to return the payment. In Indonesia, concerns have been raised about women continually needing to "earn" their bride price through obedience to their husbands (Sitompul, 2009).

Citing pervasive anecdotes of domestic violence associated with the practice (Eryenyu, 2014; IRIN News, 2006), activist groups around the world have called for the abolishment of bride price. Our results indicate that bride price payments may also provide significant incentives to invest in daughters' human capital, and hence that any proposed change to this cultural custom should be considered alongside additional policies to promote female education.

Moreover, our findings also highlight the importance of the particular cultural context of societies, and how this can be critical in determining the success of large-scale development policies. Our findings show that the success of the largest and most well-known school construction program depended critically on the cultural context. Among ethnic groups that traditionally practice bride price, the program was able to significantly increase the education of girls. However, among groups that do not traditionally engage in bride price, the program failed to educate daughters. These findings highlight the importance of the cultural context in determining the efficacy of development policies.

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