Bride Price and Female Education

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We document an important consequence of bride price, a payment made by the groom to the bride's family at marriage. Revisiting Indonesia's school construction program, we find that among ethnic groups without the custom, it had no effect on girls' schooling. Among ethnic groups with the custom, it had large positive effects. We show (theoretically and

We thank Martha Bailey, Jeanet Bentzen, Marianne Bertrand, David Baqaee, Sam Bazzi, Stéphane Bonhomme, Pierre-André Chiappori, Melissa Dell, Esther Duflo, Raquel Fernández, Ingvil Gaarder, Murat Iyigun, Kelsey Jack, Simone Lenzu, Kenneth Leonard, Corinne Low, Neale Mahoney, Cecilia Machado, Costas Meghir, Bryce Millett Steinberg, Magne Mogstad, Suresh Naidu, Ben Olken, Claudia Olivetti, Tommaso Porzio, Al Roth, Aloysius Siow, Chris Udry, Glen Weyl, and participants at various seminars and conferences for helpful comments. Eva Ng, Parina Lalchandani, Poulod Borojerdi, and Matthew Schwartzmann provided excellent research assistance. Data are provided as supplementary material online.

Electronically published January 9, 2020
[*Journal of Political Economy*, 2020, vol. 128, no. 2]

empirically) that this is because a daughter's education, by increasing the amount of money parents receive at marriage, generates an additional incentive for parents to educate their daughters. We replicate these findings in Zambia, a country that had a similar large-scale school construction program.

I. Introduction

Researchers and policy makers now commonly recognize the importance of culture for economic development (World Bank 2015; Collier 2017). However, we continue to have a far more limited understanding of what traditional practices imply for development policy and whether the efficacy of development programs is related to the particular cultural contexts in which they are enacted. Although development policies generally have not been tailored to specific cultural settings, there is growing recognition that a one-size-fits-all strategy may not be optimal and that there may be benefits to understanding a society's cultural context when designing policies (Rao and Walton 2004; World Bank 2015).

To gain a better understanding of whether the success of development programs can depend on cultural context, we revisit one of the best-studied historical development projects, the Sekolah Dasar INPRES school construction program of the 1970s in Indonesia, as well as a similar but more recent program that took place in Zambia starting in the late 1990s. We show that whether the programs were successful in increasing female education depended critically on the presence of a traditional marriage custom called bride price (also referred to as bride wealth), which is a transfer from the groom and/or his family to the bride's parents upon marriage. The payment—which is often greater than a year's income and can take the form of money, animals, or commodities—is widely practiced in many regions of the world, including Southeast Asia and sub-Saharan Africa. In both settings, we find that the school construction projects increased female education only for groups with this marriage custom. For other groups, there was no effect. This finding is particularly striking given the public debate that has ensued over the past decades about the potentially negative consequences of the bride price custom. In recent years, it has received condemnation as a repugnant and harmful practice that should be abolished (e.g., Wendo 2004; Mujuzi 2010; Eryenyu 2014).

We begin our analysis by modeling the relationship between the marriage market, the practice of bride price, and parents' decisions of whether to educate their daughters. The model helps us to understand how the effectiveness of school construction policies that reduce the costs of education depends on the presence of the bride price custom. In the model, imperfectly altruistic parents choose whether to educate their children. After children become adults, men and women match in a frictionless marriage market, taking into account their education, which is complementary in the marriage surplus function. The bride price is modeled as the marital transfer to women that is appropriated by the bride's parents. We show that in equilibrium, the bride price transfer is increasing in the education of the bride and, as a result, the bride price provides an additional monetary incentive for parents to invest in their daughters' education. Therefore, if the bride price custom is present, female education rates are higher and, as long as education rates are low (as is often the case in developing countries), female education is more responsive to policies that reduce the costs of schooling. In the model, because of the presence of transferable utility in a frictionless marriage market, male education rates and their responsiveness to the cost of schooling do not depend on bride price.

We use the model's predictions to guide our empirical analysis, which takes place in Indonesia and Zambia, two countries that have subnational variation in bride price practices and have also recently experienced large-scale school construction projects. In both countries, the value of bride price payments is quantitatively important and is correlated with traditional ethnic customs. In Indonesia, average payments among ethnic groups that practice bride price are 80% of per capita GDP, while this figure is 205% in our data from peri-urban Lusaka, Zambia.

Consistent with the first predictions of the model, we find that matching is similarly assortative by education in both bride price and non–bride price ethnic groups and that more educated brides command a higher bride price at marriage. In Indonesia, completing primary school is associated with a 58% increase in the bride price payment, completing junior secondary is associated with a further 67% increase, and attending college is associated with another 86% increase. These estimates imply that the present discounted value of the return to parents to ensuring their daughter completes primary school is 14% of one year of per capita consumption. For junior secondary school and attending college, it is 22% and 38%, respectively. We also find evidence for the model's prediction that in equilibrium, educational attainment is higher among bride price groups. Across multiple data sets, female enrollment rates are 4.1–4.9 percentage points higher for bride price groups in Indonesia relative to non–bride price groups and 1.2–2.1 percentage points higher in Zambia.

We then turn to the model's main prediction, which is that school construction policies that reduce the costs of schooling have a larger effect on the education of girls from bride price ethnic groups. To test this, we first study the Indonesian Sekolah Dasar INPRES school construction program, during which 61,807 primary schools were constructed between 1974 and 1980. We first confirm that, consistent with previous findings in the literature, the program had no detectable effect on female education (Breierova and Duflo 2002; Hertz and Jayasundera 2007). However, we then show that this average effect masks important heterogeneity that depends on a group's marriage custom. We observe a positive effect of the program on female education only among girls from ethnic groups that traditionally practice bride price. Among these ethnic groups, adding one school for every 1,000 school-age children raises female primary school completion rates by 2.5 percentage points.

We corroborate these results by studying another nationwide school expansion program that took place in Zambia in the late 1990s and early 2000s. Using newly collected data from the Zambia Ministry of Education, we find the same patterns as in Indonesia. Among ethnic groups that traditionally practice bride price, school construction has a large and statistically significant effect on female education. Building an additional school per square kilometer raises female primary school completion rates by 4.2 percentage points. However, among ethnic groups that do not traditionally practice bride price, school construction does not have a detectable effect.

Sensitivity and robustness checks show that the differential education response is not driven by other important cultural factors that may be correlated with bride price, such as women's traditional participation in agriculture, matrilineality, polygyny, or the practice of Islam. In addition, we also test for alternative mechanisms behind the differential effects that we find. One possibility is that bride price parents are more responsive because they tend to be wealthier, have fewer children, value daughters more, have more equal gender attitudes, or have different returns to education. Examining each of these alternative explanations, we find that they cannot explain the larger effect of school construction on female education among bride price ethnic groups.

We conclude our analysis by checking an additional testable prediction. The model predicts that the same patterns that we observe for girls should not be observed for boys. Consistent with this, we find no evidence of the same relationships between bride price and either male education or the responsiveness of male education to school construction.

Our findings add to our understanding of the relationship between traditional customs and intergenerational transfers. Cultural practices like patrilocal residence, inheritance, son preference, and polygyny have been shown to play an important role in human capital investments (Jacoby 1995; Levine and Kevane 2003; Tertilt 2005, 2006; Gaspart and Platteau 2010; La Ferrara and Milazzo 2011; Bau 2019; Jayachandran and Pande 2017). In our framework, the practice of bride price allows parents to partake in the returns that their daughters accrue from education and hence helps to complete the intergenerational contract between parents and daughters. Becker (1981, 129) suggested exactly such a role for the practice of bride price: "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."

This interpretation adds a new perspective to the growing policy debate about whether bride price should be discouraged or even banned (Wendo 2004; Mujuzi 2010). Critics of bride price traditions suggest that they are equivalent to the buying and selling of women and lead wives to be poorly treated (IRIN News 2006; Eryenyu 2014). They argue that 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.[1] In Indonesia, concerns have been raised about women continually needing to earn their bride price through obedience to their husbands (Sitompul 2009). Our empirical results suggest that arguments for the elimination of the practice should be considered taking into account the positive effect of this practice on female education.

The proposed mechanism behind the heterogeneous effect of school construction on female education also highlights the importance of the marriage market in driving educational choices. While marriage outcomes are generally considered to be an important component of the returns to education, especially for women (e.g., Goldin 2006; Chiappori, Salanié, and Weiss 2017), it is typically difficult to empirically observe them and to estimate their effects. Our findings also advance the understanding of the economics of marriage markets in developing countries. While we have a good understanding of the practice of dowry and its consequences (e.g., Anderson 2003, 2007b; Botticini and Siow 2003; Arunachalam and Naidu 2015; Anderson and Bidner 2016), our understanding of the consequences of bride price remains much more limited, despite the fact that the practice is widespread and the payments are often large in magnitude (Anderson 2007a; Bishai and Grossbard 2010).

Finally, our findings build on and advance the literature examining the economic effects of culture (e.g., Fernandez 2007; Fernandez and Fogli 2009; Algan and Cahuc 2010; Fernandez 2011; Atkin 2016; Bau 2019; Jayachandran and Pande 2017; Lowes 2017). In particular, we show that important large-scale development policies can have very different effects on different ethnic groups, depending on the cultural tradition of bride price. This finding reinforces the idea that the cultural and historical contexts have persistent and nonobvious effects that matter for the success of development programs. Hence, taking these elements into

[1] For empirical evidence on the relationship between bride price and either early marriage or female well-being, see Corno, Hildebrandt, and Voena (2017) and Lowes and Nunn (2017), respectively.

account is important for evaluating treatment effects and for designing effective policies.

The paper is structured as follows. We begin by providing an overview of the custom of bride price (sec. II), which is followed by the model of the marriage market with premarital educational investments and bride price (sec. III). We then turn to the data, testing the model's predictions about marriage, bride price, and education (sec. IV). We next test the primary prediction of the model, which is about the heterogeneous response to education policies that is generated by the custom of bride price (sec. V). Finally, we provide a discussion of the significance and importance of our findings (sec. VI) before concluding (sec. VII).

II. The Bride Price Custom

A. *Overview and Variation*

The payment of a bride price at the time of marriage is a custom that has deep historical roots and is widespread throughout sub-Saharan Africa and many parts of Asia today. Historically and today, the magnitude of the bride price is typically sizeable. It is common for the value of the bride price to be in excess of a year's income (Anderson 2007a). Our analysis relies on information on the traditional marriage customs of different ethnic groups. Our primary source is Murdock's (1967) *Ethnographic Atlas*, which provides information on transfers made at marriage, categorizing ethnic groups as engaging in one of the following practices (Murdock 1981, 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 (sometimes continuing) exchange of gifts (and/or services) of substantial value in approximately equal amounts between the groom and bride's relatives.
5. Female relative 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 groom.
7. No significant consideration: absence of any significant consideration or giving of bridal gifts only.

TABLE 1
Distribution of Marriage Customs

	Indonesia				Zambia			
	Ethnographic Atlas Only (1)		All Sources (2)		Ethnographic Atlas Only (3)		All Sources (4)	
	Number	Share	Number	Share	Number	Share	Number	Share
Bride price	14	.48	23	.52	8	.38	11	.37
Bride service	2	.07	4	.09	7	.33	12	.40
Token bride price	2	.07	2	.05	6	.29	7	.23
Gift exchange	3	.10	4	.09	0	.00	0	.00
Female relative exchange	4	.14	4	.09	0	.00	0	.00
Absence of consideration	4	.14	7	.16	0	.00	0	.00
Dowry	0	.00	0	.00	0	.00	0	.00
Total	29	1.00	44	1.00	21	1.00	30	1.00

Note.—This table reports the number of ethnicities that practice different traditional marriage customs within Indonesia and Zambia. In cols. 1 and 3, the data on traditional marriage practices are from the *Ethnographic Atlas* (Murdock 1967). In col. 2, the data are from Murdock (1967) and LeBar (1972). In col. 4, the data are from Whiteley and Slaski (1950), Schapera (1953), Willis (1966), and Murdock (1967).

We also supplement information from the *Ethnographic Atlas* with additional 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* (Whiteley and Slaski 1950; Schapera 1953; Willis 1966). These sources provide a finer breakdown of ethnic groups and greater coverage than is possible using only the *Ethnographic Atlas*.[2] For the analysis, we use the coding that is based on all the ethnographic sources, although all of the results that we report are robust to using the *Ethnographic Atlas* only.

The prevalence of each marriage custom for Indonesia and Zambia is reported in table 1 using either the *Ethnographic Atlas* only (cols. 1, 3) or all ethnographic sources (cols. 2, 4).[3] None of the ethnic groups within Indonesia or Zambia traditionally practice dowry. 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, and it does not speak to the question of whether the dowry also influences educational investment.

[2] 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*.

[3] The tabulated ethnic groups are those that match groups listed in the 1995 Indonesia Intercensal Survey data or the Zambia Demographic and Health Survey (DHS). The ethnic groups in each sample and whether they practice bride price are reported in tables A1 and A2 (tables A1–A19 are available online).

Figure 1 provides an overview of the geographic distribution of the practice of bride price in Indonesia and Zambia. The figures are constructed by combining survey data that report respondents' locations and their mother tongue or ethnicity. For Indonesia, the data are from the 1995 Indonesia Intercensal Survey.[4] For Zambia, the data are from the 1996, 2001, 2007, and 2013 rounds of the DHS.[5] Figure 1 reports the proportion of respondents in each province in Indonesia and each district in Zambia that are from an ethnic group that traditionally practices bride price as opposed to the other customs. In the actual analysis for Indonesia, we use finer spatial units (i.e., districts rather than provinces). However, for clarity of presentation, we display the aggregated provincial averages here.

B. *The Origins and Correlates of Bride Price*

While the historical origins of the bride price practice are not known with certainty, there are several dominant theories within the field of anthropology. The first is that the custom 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 (and 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 of showing appreciation for the investments made in raising their daughter. After developing in patrilineal societies, it subsequently spread to nearby matrilineal societies.

The second theory links the practice of bride price 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; therefore, the custom of transferring money to the daughter's parents may have evolved (Boserup 1970). The last, related factor that is potentially relevant for bride price is the practice of polygyny. Existing research on polygyny indicates that in societies where polygyny is prevalent, high bride prices are necessary to clear the marriage market (Grossbard 1978; Becker 1981; Tertilt 2005). Thus, places with polygyny may be more likely to have also adopted bride price.

Using data from Murdock (1967), we examine the extent to which cross-ethnicity correlations are consistent with these hypotheses within

[4] In the Intercensal Survey, we match the 174 reported languages to 44 distinct ethnic groups. We were able to match all but 11 of the 174 languages. These 11 comprise only 0.43% of the sample.

[5] 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 unmatched groups comprise 2.5% of the sample.

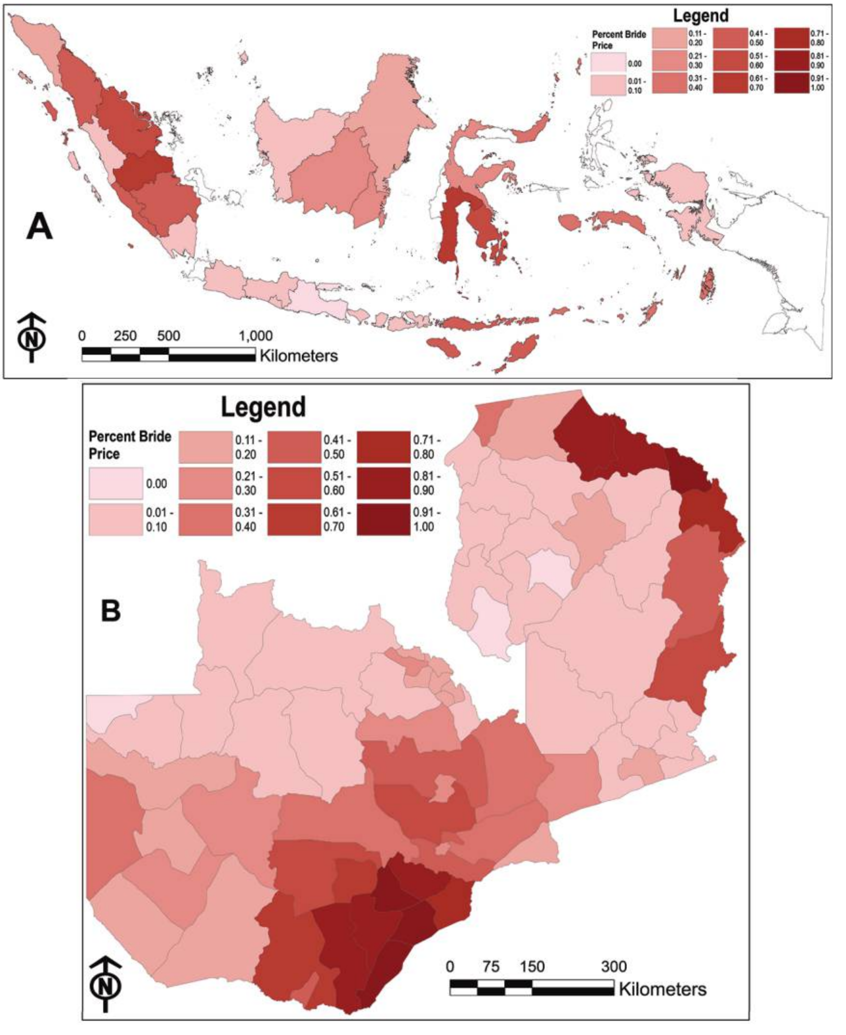

FIG. 1.—Geographic distribution of the practice of bride price in Indonesia and Zambia. The maps show the distribution of the practice of bride price. The figures are calculated using the 1995 Indonesia Intercensal Survey (*A*) and the 1996, 2001, 2007, and 2013 Zambia DHS (*B*). Details of how individuals are linked to the traditional practice of bride price are provided in the appendix (available online).

our countries of interest. Ethnicity-level estimates, where the dependent variable is an indicator variable that equals 1 if the group traditionally practice bride price, are reported in table 2. We find only weak evidence of the correlations suggested by the literature. In Indonesia, indicators for the practice of matrilineality—female participation in agriculture

TABLE 2
Correlations between Bride Price and Other Customs (Dependent Variable: Bride Price Indicator)

	Indonesia				Zambia			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Matrilineal indicator	−.270			−.247	−.500**			−.415
	(.274)			(.351)	(.207)			(.249)
Female agriculture indicator		−.276		−.320		−.038		.009
		(.281)		(.300)		(.304)		(.288)
Polygyny indicator			.056	.040				
			(.208)	(.245)				
Constant	.520***	.526***	.444**	.540**	.714***	.500*	.381***	.708**
	(.102)	(.117)	(.172)	(.191)	(.169)	(.266)	(.109)	(.280)
Observations	29	23	29	23	21	17	21	17

Note.—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). An ethnicity from the *Ethnographic Atlas* was included here if it was matched with languages or ethnicities listed in the 1995 Indonesia intercensus or the 1996, 2001, 2007, or 2013 Zambian DHS. Robust standard errors are reported in parentheses.

* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

and polygyny, either individually or together in the equation—are uncorrelated with bride price. In Zambia, all ethnic groups traditionally practice polygyny, so mechanically there is no relationship between this variable and bride price. There is also no relationship between traditional female participation in agriculture and bride price. However, we do observe a negative relationship between matrilineality and bride price when it is the only variable included in the specification.

The estimates for Indonesia and Zambia can be contrasted with estimates using a global sample (reported in table A3 in app. C; apps. A–D are available online), where one does observe the expected relationships between bride price and matrilineal societies, female participation in agriculture, and polygyny. Thus, while we observe strong patterns globally, they are much weaker when looking within our countries of interest. Nonetheless, our analysis below confirms the robustness of our findings to controlling for these ethnicity-level characteristics. In addition, when data are available, we also control for whether a marriage is polygynous.

C. *Traditional and Contemporary Practices of Bride Price*

Throughout our analysis, our measure of bride price is an ethnicity-level indicator variable for the traditional presence of the custom (i.e., category 1 in sec. II.A). That is, for our main analysis, we do not use contemporary measures of the prevalence of the practice or the size of payments. Relative to traditional practices, these are more likely to be endogenous to contemporary factors, including the policies of interest.[6] Nonetheless, we now verify that the traditional custom of bride price is strongly correlated with actual bride price payments today.

For Indonesia, information on bride price payments at marriage is taken from rounds 3 and 4 of the Indonesian Family Life Survey (IFLS).[7] The survey also collects the self-reported ethnicities of respondents, which we use to assign the presence of a traditional bride price custom (or not) to a married couple.[8] We find that both bride price and non–bride price

[6] As we will show, our conclusions are robust to instead using ethnicity-level measures based on the modern size of bride price payments and to instrumenting for these measures with the ethnicity-level traditions.

[7] 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 group (RAND 1999), which we omit from the analysis.

[8] We use the ethnicity of the survey respondent to determine whether the couple belongs to a bride price ethnic group. In cases where both the husband and the wife were asked about the marriage, we use the husband's responses and his ethnicity, under the assumption that he is more likely to correctly remember the bride price. Since intermarriage between ethnic groups with different bride price customs is very low in Indonesia (1.5% in the Intercensal Survey data), this decision is not consequential.

groups tend to report positive payments at marriage but that there are noticeable differences in the size of payments between the two groups.[9] For individuals from groups that traditionally practice bride price, the median bride price payment equals 8.7% of the per capita GDP in the year of marriage; the mean payment is 80%. For non–bride price couples, the median is only 4%, and the mean is 37% (table A4).[10]

We find a similar pattern in Zambia, where we use information from peri-urban Lusaka that was collected using a module we created and implemented within the Zambia Fertility Preferences Survey (ZFPS; Ashraf et al. 2017). Linking couples to traditional bride price customs using the self-reported ethnicity of the wife, we find that both groups tend to have some payment at marriage but that the size of the payment is much larger for bride price groups.[11] For bride price couples, the median bride price payment is 57% of the per capita GDP in the year of marriage, while the mean is 205%. For non–bride price couples, the median is 45%, and the mean is 87%. In addition to showing differences in bride price payments across ethnic groups, these statistics also provide some sense of the magnitude of bride price payments. In both countries, payments are large.

The fact that non–bride price ethnic groups often report paying a nonzero bride price is explained by the fact that in both countries, non–bride price groups still engage in small payments that take the form of token gifts or symbolic transfers. In the ethnographic data, groups in both countries traditionally had a token bride price, and in Indonesia, a number of groups practice gift exchange (see table 2). These practices still involve a payment or gift at the time of marriage, although one that is much smaller in magnitude than a full bride price.[12]

III. Model

We now describe a theoretical framework that helps us understand how parents' decisions about whether to educate their daughters depend on bride price practices. To do this, we draw on seminal models by Chiappori,

9 A nonzero bride price payment is reported for 92% of couples that belong to groups that practice bride price and for 91% of couples that do not practice bride price in Indonesia.

10 In the data, a small number of observations report extreme bride price values. Since these are likely due to data entry and reporting errors, we omit reported bride price payments that are greater than 100 times per capita GDP. This results in the omission of 43 observations in Indonesia and four observations in Zambia.

11 Among individuals from bride price ethnic groups, 86% of couples report nonzero bride price payments, while this figure is 77% among non–bride price couples.

12 Differences between the two groups are also masked by heterogeneity in wealth, which tends to affect the value of a marriage payment. If we, for example, examine differences for couples with a similar level of wealth, the differences appear starker. For example, for the 20% of the sample with the lowest wealth, which is likely the population that is most relevant for school construction, we find that the average payment at marriage is 420% higher for bride price groups.

Iyigun, and Weiss (2009) and Chiappori, Dias, and Meghir (2016), where individuals choose their education before matching in a frictionless marriage market with transferable utility. In our setting, parents (who are imperfectly altruistic) choose the education of their children. The bride price payment is modeled as the marriage market transfer to the bride's side that is appropriated by the parents.

A. Setup

The model has two periods. There are multiple ethnic groups e, and there is a unit mass of women (daughters) and a unit mass of men (sons) in each ethnic group. Parents have only one child and enjoy utility from consumption $\{c_t\}_{t=1}^{2}$ and from the well-being of their child. A daughter's utility is denoted as v, and the weight parents place on this utility is given by $\gamma \in (0, 1)$. A son's utility is denoted as u, and the weight parents place on this is $\delta \in (0, 1)$. Let y be the parents' income in each period, and let $r \geq 0$ be the discount rate.

In the first period, parents choose consumption (c_1) and also decide whether to educate their child ($S \in \{0, 1\}$ for a girl and $P \in \{0, 1\}$ for a boy) at cost k. There is no borrowing or saving.[13] Daughters, indexed by i, are endowed with innate ability a_i, which is distributed according to a unimodal probability density function $g()$ with a strictly monotone cumulative distribution function $G()$. Sons, indexed by j, are endowed with innate ability a_j, which has the same distribution. Ability affects the first-period utility that children derive from schooling in a multiplicative way (i.e., $a_i S_i$ and $a_j P_j$) and has no direct effect on the children's second-period utility.

In the second period, children marry, transfers are made, and parents consume (c_2). 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. The bride price, which is denoted BP_e, is paid by the groom and is the marriage market transfer the groom would otherwise make to the bride to clear the marriage market. The indicator I_e denotes bride price ethnic groups in which the groom pays a bride price to the bride's family at marriage ($I_e = 1$) as opposed to non–bride price ethnic groups in which he does not ($I_e = 0$). There is no intermarriage between ethnic groups.[14]

[13] As long as income in the first period is greater than the cost of schooling, the household does not need to borrow. In addition, the same household could have multiple daughters and sons, and as long as borrowing constraints do not bind, their problems can be separated.

[14] In the Indonesia 1995 Intercensal Survey, only 1.50% of married household heads ages 25–45 are in a marriage in which the bride price practice of the husband and wife differ. That proportion is 16.80% in the pooled Zambia DHS.

1. Educational Investment

Parents choose whether to educate their child to maximize their utility. For a daughter, their problem is

$$\max_{S_i \in \{0,1\}, c_1, c_2 \geq 0} c_1 + \frac{c_2}{1+r} + \gamma \left[a_i S_i + \frac{v_2(S_i, BP_e)}{1+r} \right],$$

subject to $c_1 + k \cdot S_i \leq y$ and $c_2 \leq y + BP_e$. For a son, the problem is

$$\max_{P_j \in \{0,1\}, c_1, c_2 \geq 0} c_1 + \frac{c_2}{1+r} + \delta \left[a_j P_j + \frac{u_2(P_j, BP_e)}{1+r} \right],$$

subject to $c_1 + k \cdot P_j \leq y$ and $c_2 \leq y$. For ethnic groups without a bride price tradition ($I_e = 0$), $BP_e = 0$. For ethnic groups with the tradition ($I_e = 1$), the bride price is an equilibrium object that depends on the education of the bride and groom and the cost of schooling, $BP(S_i, P_j, k)$. Consistent with the reality of our settings, we assume that the bride price is paid by the groom in the second period, which is reflected by the fact that u_2 depends on the bride price BP_e.[15]

2. Marriage Market

We consider ethnic groups with a bride price tradition ($I_e = 1$), where the bride's parents appropriate the marriage market transfer, and ethnic groups without a bride price tradition ($I_e = 0$), where the bride and the groom share the marriage surplus through the intrahousehold allocation of resources (Choo and Siow 2006; Iyigun and Walsh 2007).

Define ζ_i^f and ζ_j^m to be a woman's and man's respective value if they remain single, that is, their labor market earnings, and let ζ_{ij} be the total value of a marriage between i and j. These values do not depend on ethnicity e. Marriage surplus is defined as $z_{ij} = \zeta_{ij} - \zeta_i^f - \zeta_j^m$. Since one's value when single and the marriage surplus depend on only education, they can be indexed by S_i and P_j: $\zeta_{ij} = \zeta_{S_i P_j}$, $\zeta_i^f = \zeta_{S_i}^f$, $\zeta_j^m = \zeta_{P_j}^m$, and $z_{ij} = z_{S_i P_j}$.

We assume that the marriage surplus is increasing in educational attainment (i.e., $z_{11} - z_{10} > 0$, $z_{11} - z_{01} > 0$, $z_{10} - z_{00} > 0$, and $z_{01} - z_{00} > 0$). We also make the assumption of supermodularity, which is standard in

[15] Our assumption that the groom is generally the one who pays most of the bride price is based on focus groups from Zambia. This has also been documented in similar settings in sub-Saharan Africa. Lowes and Nunn (2017) find that for 80% of 317 marriages in the Democratic Republic of Congo, the groom contributed to the bride price payment. A theoretical rationale for assuming that sons pay the bride price is that the bride price is the portion of the marriage surplus that belongs to the women's side of the marriage market. If the marital surplus accrues to the husband's home, then it is natural to assume that he will be the one to make the payment.

the assignment literature (Becker 1973) and presumes complementarity between the education of the bride and groom, $z_{00} + z_{11} > z_{10} + z_{01}$. Last, we assume that the surplus from a marriage between two uneducated people is always positive, $z_{00} > 0$, which ensures that everyone marries in equilibrium.

B. Predictions

To generate the predictions of the model, we solve it backward, starting with the marriage market.

1. Matching

A match in the marriage market is an equilibrium outcome if it is stable. That is, no man and woman can be made better off by leaving their respective spouses and marrying one another. When utility is transferable, a stable equilibrium maximizes aggregate surplus (Shapley and Shubik 1971; Becker 1973). Hence, under the conditions we have imposed on the marriage surplus, everyone marries in equilibrium and matches assortatively. Consistent with the data, we consider the case in which more men than women are educated. As shown by Chiappori, Iyigun, and Weiss (2009), the stable equilibrium in this market is one in which educated women marry only educated men, while some educated men marry uneducated women.[16] This gives our first prediction.

PREDICTION 1. Matching is assortative by education and is irrespective of the practice of bride price.

Education leads to a labor market return to schooling, R, that varies by gender: $R^f \equiv \zeta_1^f - \zeta_0^f$ and $R^m \equiv \zeta_1^m - \zeta_0^m$. Let $V_{i,e}$ be the material surplus that women or their parents (in the form of a bride price) receive in equilibrium in the marriage market, and $U_{j,e}$ be the surplus that men receive. The marriage surplus z_{SP} is then allocated between the woman's side and the men's side: $V_{i,e} + U_{j,e} = z_{S_iP_j}$. A daughter's utility in the second period is given by the sum of the utility due to the labor market outcomes and the marriage market outcomes: $v_2(S_i, BP_e) = \zeta_{S_i}^f + (1 - I_e)V_{i,e}$.

Let $\Delta V_{i,e} = V_{i,e}(S_i = 1) - V_{i,e}(S_i = 0)$ and $\Delta U_{j,e} = U_{j,e}(P_j = 1) - U_{i,e}(P_j = 0)$ be the marriage markets returns to education (Chiappori, Iyigun, and Weiss 2009). Then, the total returns to schooling enjoyed by the daughter are $v_2(S_i = 1) - v_2(S_i = 0) = R^f + (1 - I_e)\Delta V_{i,e}$, while those enjoyed directly by the parents are the bride price returns, $BP(S_i = 1) - BP(S_i = 0) = \Delta V_{i,e}$.

[16] For a proof of existence and uniqueness, see the online appendix of Chiappori, Iyigun, and Weiss (2009, 2).

An important result from Chiappori, Iyigun, and Weiss (2009) is that in equilibrium, men with the same education all obtain the same share of marriage surplus, and the same is true for women (or their parents when there is bride price). Hence, the shares of surplus in equilibrium do not depend on e, i, or j. When men have higher education rates than women, marriage surplus shares, U_S and V_P, satisfy the following conditions: $V_0 + U_0 = z_{00}$, $V_1 + U_1 = z_{11}$, $V_0 + U_1 = z_{01}$, and $V_1 + U_0 > z_{10}$.

Subtracting these conditions, we obtain the following expressions for the returns to education in the marriage market, which again do not depend on e, i, or j: $(V_0 + U_1) - (V_0 + U_0) = \Delta U = z_{01} - z_{00}$ and $(V_1 + U_1) - (V_0 + U_1) = \Delta V = z_{11} - z_{01}$. Thus, educated women, who are the side in short supply, receive their marginal contribution to a marriage with an educated man, which parents in bride price communities capture. Educated men, the side in excess supply, receive their marginal contribution to a marriage with an uneducated woman, irrespective of whom they actually marry.[17] Hence, because of transferable utility and homogeneity within educational groups, men are indifferent between marrying an educated woman or an uneducated one. Since educated women are scarce, a match will be stable (and therefore an equilibrium outcome) only if women (or their family) can appropriate the entire additional surplus they provide to a match with an educated man. If they do not, another man matched to an uneducated woman would outbid the initial match by offering slightly more to the educated woman, convincing her to marry him instead. Therefore, the initial match would not be stable (Chiappori, Iyigun, and Weiss 2009).

This result has direct implications for how education affects the bride price payment. In bride price ethnicities, the bride price return to education is the whole marriage market return to education, $BP(S_i = 1) - BP(S_i = 0) = \Delta V_{i,e} = \Delta V = z_{11} - z_{01}$, which is strictly positive and appropriated by the parents as the marriage market clearing transfer. This delivers our second prediction.

Prediction 2. Educated women command a higher bride price payment at marriage than uneducated women.

2. Bride Price and Investment in Female Education

We next examine the implications of the returns to education for educational attainment. Substituting the budget constraints into the objective

[17] If there were more educated women than educated men before or after the school construction programs, educated men would marry only educated women, and some educated women would marry uneducated men. Women would obtain their contribution to a marriage with an uneducated man, and the returns to education in the marriage market are $(V_1 + U_0) - (V_0 + U_0) = \Delta U = z_{11} - z_{10}$ and $(V_1 + U_0) - (V_1 + U_1) = \Delta V = z_{10} - z_{00}$, which are still positive.

function, we find that parents choose to educate their daughter ($S_i = 1$) if her ability exceeds a certain threshold:

$$a_i \geq a^*_{I_e}(k) \equiv \frac{k}{\gamma} - \frac{R^f}{1+r} - \frac{\Delta V_{i,e}}{1+r}\left(1 + I_e \frac{1-\gamma}{\gamma}\right). \tag{1}$$

We denote the daughter's ability for the household on the margin of making the education investment as $a^*_{I_e}(k)$, which depends on I_e and k. Parents will educate their daughter i as long as her ability $a_i \geq a^*_{I_e}(k)$.[18] Therefore, the probability that daughter i is educated is given by $\Pr(S_i = 1|k, I_e) = \Pr(a_i \geq a^*_{I_e}(k)) = 1 - G(a^*_{I_e}(k))$.

To derive the condition under which more men than women will be educated in equilibrium, we follow the same procedure as for daughters. Thus, the probability that a son is educated is equal to

$$\begin{aligned} \Pr(P_j = 1|I_e, k) &= \Pr\left(a_j \geq \frac{k}{\delta} - \frac{R^m}{1+r} - \frac{\Delta U_{j,e}}{1+r}\right) \\ &= 1 - G\left(\frac{k}{\delta} - \frac{R^m}{1+r} - \frac{\Delta U_{j,e}}{1+r}\right). \end{aligned} \tag{2}$$

Given these conditions and the equilibrium marriage market returns to education, we expect that more boys than girls will be educated in equilibrium if and only if

$$\left(\frac{1}{\gamma} - \frac{1}{\delta}\right)k + \frac{R^m - R^f}{1+r} + \frac{z_{01} - z_{00}}{1+r} - \frac{z_{11} - z_{01}}{1+r}\left(1 + I_e \frac{1-\gamma}{\gamma}\right) > 0. \tag{3}$$

As long as equation (3) is satisfied before and after the school construction, the marriage market equilibrium is as described in section III.B.1.[19] Therefore, the ability threshold for girls becomes

$$a^*_{I_e}(k) = \frac{k}{\gamma} - \frac{R^f}{1+r} - \frac{z_{11} - z_{01}}{1+r}\left(1 + I_e \frac{1-\gamma}{\gamma}\right).$$

[18] Efficient investment in schooling implies that every girl with $a_i \geq [k - \Delta v(I_e, k)/(1+r)]$ gets educated. However, because altruism is imperfect ($\gamma < 1$), education rates will be lower than the efficient benchmark. The bride price custom can help overcome underinvestments in daughters' schooling due to imperfect commitment across generations. When $\gamma = 1$, all three thresholds are the same.

[19] The first term, $(1/\gamma - 1/\delta)k$, is driven by the gender preferences of parents: if they prefer sons to daughters, they are more willing to educate their sons. The second term captures differential labor market returns, and it is likely to be positive in this context, in which men have higher employment rates and better opportunities in the labor market. The third and fourth terms capture differential returns in the marriage markets, and the difference between them depends on the relative contribution of an educated woman compared with an educated man to the marriage surplus. In groups that do not engage in bride price, the sign of this term,

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. Since $\gamma \in (0, 1)$, we have $a^*_{BP} < a^*_{NoBP}$; hence, $G(a^*_{BP}) < G(a^*_{NoBP})$. This is summarized by the following prediction.

PREDICTION 3. The probability that a girl is educated, $\Pr(S_i = 1)$, is higher among ethnicities that engage in bride price payments: $\Pr(S_i = 1|I_e = 1, k) > \Pr(S_i = 1|I_e = 0, k)$.

Prediction 3 arises from the fact that the bride price provides an additional incentive for parents to educate their daughter, which results in higher rates of enrollment among ethnicities that practice bride price.

An auxiliary prediction is that the average ability of educated girls from bride price ethnic groups should be lower than that of educated girls from other ethnic groups since more girls are educated in bride price ethnic groups. We discuss this further in appendix B.

3. Bride Price and the Responsiveness of Female Schooling 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 the settings we study, we consider the case in which education levels are low, namely, the case in which a girl with modal ability does not get educated.[20] When the distribution of ability is unimodal and female schooling is low, then $g(a^*_{BP}) - g(a^*_{NoBP}) > 0$. Our main empirical result then follows directly from a comparison of the two partial derivatives:

$$\frac{\Delta U_{j,e}}{1+r} - \frac{\Delta V_{i,e}}{1+r} = \frac{2z_{01} - z_{11} - z_{00}}{1+r},$$

depends on how z_{01} and z_{10} compare, i.e., if a household with an educated man and an uneducated woman is more productive than the opposite. Finally, the last term, $[(1-\gamma)/\gamma][(z_{11} - z_{01})/(1+r)]$, captures the impact of the bride price education premium on the parents' budget constraint, which alone should increase female schooling relative to male schooling. We can also rule out that an equilibrium exists in which more women than men get educated because eq. (3) implies that

$$\left(\frac{1}{\gamma} - \frac{1}{\delta}\right)k + \frac{R^m - R^f}{1+r} + \frac{z_{11} - z_{10}}{1+r} - \frac{z_{10} - z_{00}}{1+r}\left(1 + I_e\frac{1-\gamma}{\gamma}\right) > 0,$$

under the assumptions we have imposed on marital surplus.

[20] This assumption does not require that the median-ability girl is uneducated. If the distribution of daughters' schooling abilities is right skewed, as with the lognormal or Pareto distributions, then the median-ability girl will be educated, while the modal-ability girl will not.

$$\frac{\partial \Pr(S_i = 1|k, I_e = 1)}{\partial k} = -\frac{g\left(a^*_{BP}(k)\right)}{\gamma} \quad \text{versus}$$
$$\frac{\partial \Pr(S_i = 1|k, I_e = 0)}{\partial k} = -\frac{g\left(a^*_{NoBP}(k)\right)}{\gamma}.$$

Prediction 4. When female education rates are low, a decline in the cost of schooling increases education more for girls from bride price ethnic groups than for girls from non–bride price ethnic groups.

To help understand the intuition behind prediction 4, consider a hypothetical unimodal distribution of ability a_i and a threshold ability a^* that is different for girls from bride price and non–bride price ethnic groups. As illustrated in figure A1 (figs. A1–A3 are available online), girls with an ability above the relevant threshold for their group become educated, while those below do not. A decline in the costs of schooling results in a decline in the thresholds for the two groups. The unimodal assumption of a_i guarantees that at the ability threshold for girls from bride price groups, there is more density than at the ability threshold for girls from non–bride price groups. Therefore, there will be more girls from bride price ethnicities on the margin who respond to the policy change than girls from non–bride price ethnicities. In other words, the effects of the school construction policy on girls' education will be greater among bride price groups than among non–bride price groups.

4. Bride Price and Male Education

We next turn to the model's predictions for boys. First, note that the boys' education probability in equation (2) no longer depends on I_e once we substitute $\Delta U_{j,e}$ with the expression for the equilibrium marriage market return to education for men:

$$\Pr(P_j = 1|k) = 1 - G\left(\frac{k}{\delta} - \frac{R^m}{1 + r} - \frac{z_{01} - z_{00}}{1 + r}\right).$$

For boy's education, transferable utility and the homogeneity within education groups ensure that returns to education in the marriage market are the same across ethnic groups as long as boys are always more likely to be educated than girls. Thus, the bride price does not affect educational investments. Moreover, because the levels of male education do not vary by ethnic group at baseline, an expansion in the supply of schools does not affect the male education of ethnic groups differently, as long as education rates remain larger among boys than among girls in all groups. Indeed, the expression

$$\frac{\partial \Pr(P_j = 1|k)}{\partial k} = -\frac{1}{\delta} \cdot g\left(\frac{k}{\delta} - \frac{R^m}{1+r} - \frac{z_{01} - z_{00}}{1+r}\right)$$

does not depend on I_e. These results lead to our final prediction.

PREDICTION 5. Neither the probability that a boy is educated nor the responsiveness of male education to a reduction in the cost of schooling differs between bride price and non–bride price ethnic groups.

IV. Testing the Model: Bride Price, Marriage, and Education

We now test the predictions of our model using data from Indonesia and Zambia. We provide a detailed description of the data sets used in the empirical analysis in appendix A. The presence of school construction programs in both countries allows us to examine how the effectiveness of school construction projects depends on the practice of bride price—the ultimate goal of this paper. Indonesia's school construction initiative during the 1970s was the largest of its kind and has been well studied (e.g., Duflo 2001). Zambia had a similar large-scale project in the late 1990s and early 2000s. Additionally, both countries have rich within-country variation in the extent to which different ethnic groups practice bride price.

A. *Prediction 1: Is Matching Assortative by Education?*

Prediction 1 of the model suggests that there should be a positive relationship between the education of the wife and that of the husband and that this relationship should be the same for bride price and non–bride price ethnic groups. We test for this hypothesis by examining married couples and estimating the correlation between the education of the wife and that of the husband. We use the following estimating equation:

$$\begin{aligned} I_{iedt}^{\text{Husband Primary}} = {} & \alpha_e + \alpha_d + \alpha_t + \beta_1 I_{iedt}^{\text{Wife Primary}} \\ & + \beta_2 I_{iedt}^{\text{Wife Primary}} \times I_e^{\text{BridePrice}} + \mathbf{X}_{it}\boldsymbol{\Gamma} + \varepsilon_{iedt}, \end{aligned} \tag{4}$$

where i indexes a marriage, e indexes the ethnicity of the bride, d districts, and t indexes the survey year. The indicator variable $I_e^{\text{BridePrice}}$ is equal to 1 if a wife belongs to an ethnic group that traditionally practices bride price and 0 otherwise. The construction of this variable was described in section II. The terms $I_{iedt}^{\text{Wife Primary}}$ and $I_{iedt}^{\text{Husband Primary}}$ are indicator variables equal to 1 if the wife and husband have completed primary school, respectively; α_e denotes ethnicity fixed effects, α_d denotes district fixed effects, and α_t denotes survey year fixed effects (where applicable). The vector $\mathbf{X}_{it}$ includes a quadratic in the year of marriage, a quadratic in the wife's age of marriage, an indicator variable that equals 1 if the wife reports being Muslim and its interaction with whether she completed primary school, and indicator variables for an individual belonging to an ethnic group that is matrilineal and that has female-dominated agriculture interacted with the wife's education. In the IFLS and DHS regressions, $\mathbf{X}_{it}$ also includes an indicator variable for the marriage being polygynous and its interaction with the wife's education. These controls do not appear in the intercensus regressions because, although asked, no respondents report belonging to a polygynous marriage. To be conservative, we cluster the standard errors at the ethnicity level and report both standard errors and *p*-values generated by a wild bootstrap procedure.

We estimate equation (4) using three different samples: the 1995 Indonesian intercensus, the 2000 and 2007 IFLS, and the 1996, 2001, 2007, and 2013 Zambia DHS.[21] Estimates using the intercensus sample are reported in columns 1 and 2 of table 3, those using the IFLS are reported in columns 3 and 4, and those using the DHS are reported in columns 5 and 6. The odd-numbered columns report estimates using a more parsimonious set of controls, while the even-numbered columns use the full set of covariates. The estimates show that matching on education is positively assortative in all three samples and that the strength of this relationship is not statistically different between bride price and non–bride price ethnic groups. Thus, as predicted by the model, the practice of the bride price does not affect the nature of sorting in the marriage market.

B. *Prediction 2: Do the Bride Price Amounts Increase with the Bride's Education?*

We now turn to prediction 2 of the model and test whether the value of the bride price is increasing in the educational attainment of the bride. Our empirical strategy is to estimate hedonic regressions where bride price payments are a function of the wife's educational attainment. The estimating equation is

$$\begin{aligned} \ln (BP\ Amount)_{iet} = \alpha_e + \alpha_t + \beta_1 I_{iet}^{Primary} + \beta_2 I_{iet}^{JuniorSec} \\ + \beta_3 I_{iet}^{SeniorSec} + \mathbf{X}_{it}\mathbf{\Gamma} + \varepsilon_{iet}, \end{aligned} \tag{5}$$

where i indexes a marriage, e indexes the ethnicity of the wife, and t indexes the survey year. *BP Amount* is the value of the bride price that was

[21] Each data source has a slightly different measure of primary school completion. The intercensus records whether individuals have completed primary school. In the IFLS, we infer primary school completion by whether the reported educational attainment is some junior secondary school or more. In the DHS, we infer primary school completion by whether the respondent has attended secondary school (or higher).

TABLE 3
Degree of Assortative Matching in Indonesia and Zambia (Dependent Variable: Indicator Variable for Husband Completed Primary)

	Indonesia Intercensus		IFLS		Zambia Pooled DHS	
	(1)	(2)	(3)	(4)	(5)	(6)
$I_i^{Wife\ Primary}$	.466***	.460***	.445***	.440***	.534***	.510***
	(.005)	(.016)	(.021)	(.021)	(.016)	(.018)
	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]
$I_i^{Wife\ Primary} \times I_e^{BridePrice}$	.022	.022	−.041	−.042	−.006	.004
	(.024)	(.020)	(.031)	(.030)	(.023)	(.019)
	[.424]	[.376]	[.204]	[.186]	[.870]	[.850]
Baseline covariates	Yes	Yes	Yes	Yes	Yes	Yes
Wife Muslim controls	No	Yes	No	Yes	No	Yes
Ethnicity interaction controls	No	Yes	No	Yes	No	Yes
Polygynous marriage controls	NA	NA	No	Yes	No	Yes
Mean of dependent variable	.653	.653	.655	.659	.565	.571
Standard deviation of dependent variable	.476	.476	.475	.474	.496	.495
Observations	107,338	107,338	4,847	4,785	22,793	18,574
Clusters	40	40	17	17	29	29
Adjusted R^2	.367	.367	.338	.336	.348	.336

Note.—This table reports evidence on assortative matching using the Indonesian 1995 Intercensal Survey data, rounds 3 and 4 of the IFLS, and the pooled 1996, 2001, 2007, and 2013 rounds of the Zambia DHS. The unit of observation is a married couple (i.e., a husband and a wife). For all three samples, the husband and wife's education levels are measured as indicator variables for completing primary schooling. The mean (and standard deviation) of the indicator for the wife completing primary school, $I_i^{Wife\ Primary}$, is 0.465 (0.499) for the Indonesia intercensus, 0.599 (0.490) for the IFLS, and 0.204 (0.403) for Zambia. "Baseline covariates" consist of the year married and its square, the wife's age at marriage and its square, ethnicity fixed effects, and district fixed effects. "Wife Muslim controls" consist of an indicator variable that equals 1 if the wife is Muslim and its interaction with whether she completed primary school. "Ethnicity interaction controls" consist of indicator variables for an individual belonging to an ethnic group that is matrilineal and that has female-dominated agriculture respectively interacted with the wife's education. "Polygynous marriage controls" consist of an indicator variable that equals 1 if the marriage is polygynous and its interaction with the wife's education. Standard errors clustered at the ethnicity level are reported in parentheses, while wild cluster bootstrap p-values are reported in square brackets. NA = not applicable.

*** Significant at the 1% level.

paid at marriage.[22] The variables $I_i^{Primary}$, $I_i^{JuniorSec}$, and $I_i^{SeniorSec}$ are indicators that equal 1 if the wife in marriage i completed primary school, junior secondary, and senior secondary, respectively. The vector $\mathbf{X}_{it}$ includes a quadratic in the year of marriage. Depending on the specification, it also

[22] In cases where both the husband and wife report the bride price amount, we use the amount reported by the husband under the logic that as the individual who pays the price, he is most likely to remember it accurately. When the husband's report is missing, we use the wife's reported value. Using the wife's value instead delivers similar results.

includes a quadratic in the wife's age of marriage, fixed effects for the husband's education, a quadratic in the husband's age at marriage, a measure of the wife's premarital wealth, an indicator for the wife being Muslim, and an indicator for the marriage being polygynous. We use two different samples, one from the 2000 and the 2007 IFLS and the other from the ZFPS, which includes information on 715 monogamous couples from a poor suburb of Lusaka (Ashraf et al. 2017).

Estimates of equation (5) are reported in table 4. Columns 1–5 report estimates for the hedonic regressions in Indonesia, while columns 7–11 report estimates for Zambia. For each country, we report five different specifications, with additional covariates added incrementally. The estimates show that the amount of bride price paid at marriage is positively associated with the bride's educational attainment. In addition, as shown in columns 3–5 and 9–11, the relationship remains robust to the inclusion of controls for the husband's characteristics, which are potentially endogenous. It is also robust to accounting for the wife's premarital socioeconomic status, as measured by her self-reported log premarital wealth in the IFLS (col. 5) and by whether her family owned any property or land in the ZFPS (col. 11). This is despite the fact that because of missing data,[23] the sample size in the IFLS is reduced from 4,548 observations to 2,190.[24]

The estimated effects of education on bride price are large. For example, according to the estimates for Indonesia, reported in column 2, completion of primary school is associated with a 58% increase in the value of the bride price, completion of junior secondary school is associated with an additional 67% increase in the bride price, and completion of senior secondary schooling is associated with another 86% increase.[25] According to the estimates, parents of women who completed secondary school receive bride price payments that are on average 211% larger than

[23] An observation is missing if the wife was not included in the sample and therefore was not asked about her premarital wealth or if she did not know when asked.

[24] Interestingly, we observe a positive and significant relationship between the bride price payment and a man's education in Indonesia (although not in Zambia). In our model, where people sort on only education, strictly speaking, the bride price should not vary with a man's education. However, the model also predicts that some uneducated women match with educated men since there are fewer educated women than men. If these (uneducated) women are more desirable in other dimensions (e.g., attractiveness, health) than the uneducated women who do not match with educated men, and if these characteristics are reflected in the bride price paid, then as a result of assortative matching, we will observe a positive relationship between the husband's education and bride price, even after we control for the wife's education. To check for this, we use the IFLS data to test whether, conditional on a wife's level of education, her husband's education predicts the wife's self-reported health (an indicator equal to 1 if the wife's reported health is good or very good) or the log of her self-reported premarital wealth. The estimates, which are reported in table A5, show a significant relationship between a husband's education and both characteristics of his wife.

[25] For Indonesia, the indicator measures are having completed secondary school and attended some college.

TABLE 4
Determinants of Bride Price Payment Amounts (Dependent Variable: Log Bride Price Amount)

	Indonesia (IFLS)					2SLS	Zambia (ZFPS)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Wife's education:											
$I_i^{Primary}$	.615***	.579***	.366***	.373***	.285**	2.329**	.002	.023	−.015	−.008	−.027
	(.066)	(.071)	(.077)	(.078)	(.111)	(1.173)	(.137)	(.142)	(.141)	(.141)	(.141)
$I_i^{JuniorSecondary}$	.658***	.672***	.471***	.456***	.391***		.134	.258*	.255*	.279**	.289**
	(.066)	(.070)	(.074)	(.074)	(.097)		(.137)	(.137)	(.142)	(.142)	(.143)
$I_i^{SeniorSecondary}$	.865***	.857***	.468***	.457***	.306***		.384***	.391***	.398**	.396**	.358**
	(.077)	(.078)	(.089)	(.091)	(.115)		(.131)	(.147)	(.153)	(.153)	(.154)
Husband's education:											
$I_i^{H:Primary}$			.237***	.212**	.175				.230	.239	.270
			(.084)	(.084)	(.118)				(.197)	(.197)	(.196)
$I_i^{H:JuniorSecondary}$			.414***	.439***	.470***				.173	.176	.158
			(.077)	(.079)	(.103)				(.164)	(.164)	(.163)
$I_i^{H:SeniorSecondary}$			.532***	.540***	.427***				−.080	−.079	−.070
			(.090)	(.090)	(.114)				(.130)	(.130)	(.129)
F-test for first stage						3.04					
Baseline covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wife marriage age controls	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Husband marriage age controls	No	No	No	Yes	Yes	No	No	No	No	Yes	Yes
Wife's premarital wealth	No	No	No	No	Yes	No	No	No	No	No	Yes
Wife Muslim	No	No	No	No	Yes	No	NA	NA	NA	NA	NA
Polygynous marriage	No	No	No	No	Yes	No	NA	NA	NA	NA	NA

Mean of dependent variable	11.501	11.495	11.553	11.595	12.335	11.234	7.327	7.327	7.330	7.330	7.326
Standard deviation of dependent variable	2.375	2.366	2.342	2.309	1.965	2.596	1.293	1.292	1.292	1.292	1.290
Observations	5,555	5,092	4,713	4,548	2,190	264	542	543	540	540	539
Adjusted R^2	.467	.463	.472	.467	.344	.433	.229	.237	.241	.242	.240

NOTE.—This table reports estimates of the relationship between female education and bride price payments. The unit of observation is a married woman. The sample includes all women from the relevant data source for which a bride price payment was reported. Data for Indonesia are from the 2001 and 2007 rounds of the IFLS. Data for Zambia are from a special module implemented in the first wave of the ZFPS in fall 2014 (Ashraf et al. 2017). The indicator variables for senior secondary school attainment, $I_i^{SeniorSecondary}$ and $I_i^{H:SeniorSecondary}$, are measured slightly differently in Indonesia and Zambia. In Indonesia, they indicate that an individual completed secondary school and attended some college. In Zambia, they indicate that the individual completed senior secondary school. "Baseline covariates" include ethnicity fixed effects and the year married and its square. "Wife marriage age controls" and "Husband marriage age controls" consist of the wife's (and husband's) age at marriage and its square. "Wife's wealth" is a measure of the wife's premarital wealth. In Indonesia, it is measured as the natural log of 1 plus her premarital assets, while in Zambia, it is measured using an indicator variable for premarital property ownership. Wife Muslim is an indicator variable equal to 1 if the wife reports being Muslim. "Polygynous marriage" is an indicator variable that equals 1 if the marriage is polygynous. Column 6 reports two-stage least squares (2SLS) estimates, where the school construction program instrument from Duflo (2001) is used as an instrument for female primary completion, with the sample restricted to women from bride price ethnic groups. Robust standard errors are reported in parentheses. NA = not applicable.

* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

parents of women who did not complete primary education. The estimates for the smaller Zambian sample are also large and replicate the pattern of findings in Indonesia. According to the point estimates from column 8, completing primary school is associated with a 2% increase in the bride price payment, completing junior secondary school is associated with another 26% increase, and completing secondary school is associated with another 39% increase. Hence, bride price payments for secondary school graduates are 67% higher than payments for women who did not complete primary education.[26]

It is important to emphasize that if more desirable women (who command larger bride prices) are also independently more likely to be educated, the estimates of table 4 do not have a causal interpretation. Given this, we pursue a number of alternative strategies to better understand the extent to which the correlations we observe are potentially driven by third factors, such as the wife's unobserved quality. The first strategy follows Duflo (2001) and uses primary school construction as an instrument for a wife's completion of primary school.[27] In doing this, we restrict our sample to ethnic groups that practice bride price. As we will show (when testing prediction 5), school construction had no effect on the education of girls from non–bride price ethnic groups. Following Duflo (2001), we also restrict the sample to individuals born between 1950 and 1972, and we allow the effect of school construction to vary by a child's age in 1974, restricting the effect to 0 if a child was older than 12 years in 1974.[28] In the end, the restrictions result in a sample of only 264 women. The two-stage least squares estimates of the effect of primary school completion on the value of the bride price at marriage are reported in column 6 of table 4. The first-stage estimates are reported in table A6. Although the two-stage least squares effect is less precisely estimated than the ordinary least squares effect, it is larger in magnitude. The estimates should be interpreted with caution given that the school construction instruments are fairly weak (the first-stage F-statistic is 3.04), which is not surprising given the small sample size.[29]

As a second strategy, we provide additional evidence on the extent to which the bride's education has a causal effect on bride price payments by

[26] Since the Zambian sample is drawn from the capital city Lusaka, which has higher levels of educational attainment than the rest of the country, secondary schooling may be a more important determinant of bride price (and primary schooling less important) in this sample than for the rest of Zambia.

[27] In our model, a school construction program affects bride price only through its impact on female education, as long as men remain more likely to be educated than women in equilibrium.

[28] Details of the estimating equations for the instrumental variables strategy are reported in app. B.

[29] To partially address the weak instruments problem, we also check the robustness of our estimates to using a limited information maximum likelihood estimator. This yields a very similar estimate of 3.78 (with a standard error of 2.05).

using additional information from the ZFPS. In the survey, each spouse of the 715 couples was asked a series of questions about the practice of bride price (or *lobola*, as it is called locally). Respondents were asked to indicate the factors that affect the value of the bride price in their community today (starting with the most important). The answers are summarized in table A7. Education was the most frequently listed determinant. It was listed by 39% of the respondents as the most important factor and by 69% of respondents as one of the three most important factors.[30]

As a further check of whether the relationship between bride price and education is spurious, respondents were also asked to indicate why, in their opinion, bride price payments are higher for more educated brides. Although the responses should be interpreted with caution, they are potentially informative. As summarized in table A8, the most common answer was that parents should be compensated for the educational investments made in their daughter.[31] The other common set of explanations was that education increased the bride's productivity in terms of improved labor market earnings, skills within the household, or ability to promote the health and education of her children. Few respondents agreed with the interpretation that the estimated relationship could be driven by omitted factors, such as more educated brides having richer parents who demand a higher bride price. Only 7.5% of the sample said the association between bride price and education is because education is associated with her parents being rich, making it the least popular answer.[32]

C. *Prediction 3: Do Bride Price Groups Have Higher Rates of Female Education?*

We now turn to prediction 3, which states that girls from bride price ethnic groups are more likely to become educated. We test this prediction by estimating the relationship between the traditional practice of bride price and school enrollment in Indonesia and Zambia. Our estimating equation is

$$I_{iedt}^{Enrolled} = \alpha_d + \alpha_t + \beta_1 I_e^{BridePrice} + \mathbf{X}_i\mathbf{\Gamma} + \mathbf{X}_e\mathbf{\Pi} + \varepsilon_{iedt}, \tag{6}$$

where i indexes girls ages 5–22, e indexes ethnic groups, d indexes districts, and t indexes the year of the survey. As before, for Indonesia we use the 1995 Intercensal Survey, and for Zambia we use either the pooled

[30] The next most frequently identified most important factors were family values (16%) and good morals (15%).

[31] Respondents were first asked unprompted (col. 1). After this, they were then asked about specific reasons and could either agree or disagree (cols. 2, 3).

[32] The evidence reported in tables A7 and A8 is consistent with information garnered from focus groups conducted in Lusaka. We were told that parents often explicitly calculate the amount that was spent on education when they negotiate the *lobola*.

DHS or the ZFPS. When we use the Indonesia Intercensal Survey and the Zambian DHS, the dependent variable $I_{iedt}^{Enrolled}$ is an indicator variable that equals 1 if girl i is enrolled in school. For the ZFPS sample, because the sample comprises married women who are older than school age, the dependent variable is an indicator that equals 1 if the woman completed primary 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. The term α_d denotes district of birth fixed effects, and α_t denotes survey year fixed effects (which are relevant for the Zambia DHS sample only). The vector $\mathbf{X}_i$ includes the age of the girl at the time of the survey as well as her age^2, and in all samples but the ZFPS sample, it also includes an indicator that equals 1 if woman i reports being Muslim and an indicator for whether she reports being in a polygynous marriage. The vector $\mathbf{X}_e$ includes our baseline set of ethnicity-level covariates: an indicator for traditional matrilineal inheritance and an indicator for traditional female participation in agriculture. We cluster our standard errors at the ethnicity level and report p-values from a wild cluster bootstrap procedure.

Estimates of equation (6) are reported in table 5. Columns 1 and 2 report estimates for Indonesia, while columns 5–9 report estimates for Zambia using either the DHS (cols. 5–7) or the ZFPS (cols. 8, 9). The first column of each sample (cols. 1, 5, 8) reports estimates of equation (6) without the Muslim, polygynous marriage, matrilineal, or female participation in agriculture controls. The next column of each sample (cols. 2, 6, 9) includes these controls. For the Zambian DHS sample, we also report a third specification (col. 7) that replaces district fixed effects with much finer census cluster × survey year fixed effects.

In all specifications, we estimate a positive relationship between belonging to an ethnic group that practices bride price and female education. The estimates for the larger Indonesian sample indicate that girls from ages 5–22 in bride price ethnic groups are 4.1–4.9 percentage points more likely to be enrolled in school than girls from ethnic groups that do not practice bride price. In the Zambian DHS sample, the coefficients are smaller (1.2–2.1 percentage points), while in the smaller Lusaka-based ZFPS sample, they are larger in magnitude (4.5–7.7 percentage points), although imprecisely estimated. In line with the auxiliary prediction discussed in appendix B that higher rates of schooling for bride price girls will result in negative selection on ability and lead bride price girls who are enrolled in school to have lower test scores, bride price girls also self-report lower test scores (table 5, cols. 3, 4).

V. Prediction 4: Differential Effects of Education Policies

We now turn to the main prediction of our model, which describes how the presence of a bride price custom generates heterogeneity in the effects

TABLE 5

Relationship between Bride Price, Female Enrollment, and Test Scores in Indonesia and Zambia

	Indonesia				Zambia				
	1995 Intercensal Survey: Currently Enrolled in School		IFLS: Standardized Test Score		Pooled DHS: Currently Enrolled in School			ZFPS: Primary School Completion	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$I_e^{BridePrice}$	.041***	.049**	−.126**	−.128	.017	.021***	.012*	.077	.045
	(.014)	(.011)	(.048)	(.061)	(.014)	(.007)	(.006)	(.042)	(.042)
	[.006]	[.026]	[.026]	[.132]	[.260]	[.022]	[.086]	[.146]	[.410]
Age of sample (years)	5–22	5–22	All	All	5–22	5–22	5–22	All	All
Baseline covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census cluster × survey year fixed effects	NA	NA	NA	NA	No	No	Yes	NA	NA
District fixed effects	Yes	Yes	No	No	Yes	Yes	NA	NA	NA
Ethnicity controls	No	Yes	No	Yes	No	Yes	Yes	No	Yes
Muslim	No	Yes	No	Yes	No	Yes	Yes	NA	NA
Polygynous household	No	Yes	NA	NA	No	Yes	Yes	NA	NA
Mean of dependent variable	.578	.578	.036	.036	.552	.552	.539	.625	.625
Standard deviation of dependent variable	.494	.494	1.023	1.023	.497	.497	.498	.485	.485
Observations	107,994	107,994	2,926	2,926	42,252	42,306	31,212	706	706
Clusters	39	39	17	17	29	29	29	23	23
Adjusted R^2	.405	.407	.088	.086	.349	.393	.412	.028	.028

Note.—This table reports estimates of the relationship between the traditional practice of bride price and school enrolment (cols. 1–2, 5–7), primary school completion (cols. 8, 9), or standardized test scores (cols. 3, 4). In all specifications, the unit of observation is a female. The Indonesia data are from the 1995 intercensus, and the Zambia data are from either the pooled 1996, 2001, 2007, and 2013 DHS or the ZFPS. "Baseline covariates" include age and age squared, survey year fixed effects when relevant (cols. 3–7), and year tested by province fixed effects when relevant (cols. 3, 4). "Ethnicity controls" consist of indicator variables for an individual belonging to an ethnic group that is matrilineal and that traditionally had female-dominated agriculture. "Muslim" is an indicator variable equal to 1 if the individual reports being Muslim. "Polygynous household" is an indicator variable that equals 1 if the individual lives in a polygynous household. The ZFPS and intercensus do not contain any polygynous households. In the ZFPS, we do not control for district fixed effects since the entire sample lives in Lusaka. Census cluster fixed effects are finer than district fixed effects. Standard errors clustered at the ethnicity level are reported in parentheses, while wild cluster bootstrap p-values are reported in square brackets.

* Significant at the 10% level according to wild cluster bootstrap p-values.

** Significant at the 5% level according to wild cluster bootstrap p-values.

*** Significant at the 1% level according to wild cluster bootstrap p-values.

of a decline in the cost of schooling on female education. To test the prediction, we first exploit the same quasi-experimental variation as Duflo (2001) and estimate the effects of Indonesia's INPRES school construction program on female education. We then explore the large expansion in the supply of schools in Zambia in the late 1990s and early 2000s.

A. *Evidence from Indonesia*

The INPRES program was initiated in 1973, and over the following five years, 61,807 primary schools were constructed, which is equivalent to two schools for every thousand children enrolled in 1971. Between 1973 and 1978, the average aggregate enrollment rate for boys ages 7–12 increased from 69% to 83%. In her study, Duflo (2001) estimates the causal effect of the program on boys' education and finds a positive effect of the program on male education. We now examine the effects of the program on women by using the same estimating equation as in her study:

$$y_{idk} = \alpha_k + \alpha_d + \beta_1 I_k^{Post} \times Intensity_d + \sum_j \mathbf{X}'_d \mathbf{I}_k^j \mathbf{\Gamma}_j + \varepsilon_{idk}, \tag{7}$$

where i indexes individuals, d indexes the district of birth, and k indexes the year of birth. The dependent variable, y_{idk}, is an indicator that equals 1 if individual i completed primary school.[33] The term α_k denotes birth year fixed effects, and α_d denotes district fixed effects. The term I_k^{Post} is an indicator variable equal to 1 if an individual belongs to the younger cohort who were born between 1968 and 1972 (and would have fully experienced the intervention). The term I_k^{Post} equals 0 for the older cohort who were born between 1950 and 1962 (and who would not have experienced the intervention since they would have been too old for primary school by time it was implemented). As in the baseline specification of Duflo (2001), partial treatment cohorts born between 1963 and 1967 are not included in the sample. $Intensity_d$ is the number of schools (per 1,000 school-age children) built in birth district d during the school construction program. The term 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 $\Sigma_j \mathbf{X}'_d \mathbf{I}_k^j \mathbf{\Gamma}_j$ denotes birth year fixed effects interacted with the following district-level covariates: the number of school-age children in the district in 1971 before the school building program took place, the enrollment rate of the district in 1971, and the exposure of the district to the second-largest INPRES program, a water and sanitation program. Following Duflo (2001), we cluster standard errors at the level of an individual's district of birth. However, for robustness, we also report Conley standard errors, which account for spatial correlation.

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

Estimates of equation (7) are reported in column 1 of table 6. In contrast to Duflo's findings for males, for females the estimated effect of school construction on primary school enrollment is small in magnitude and not statistically different from zero.

We next show that this average effect masks significant heterogeneity. To do this, we estimate an extension of equation (7) that allows for a differential effect of the school construction program depending on whether a girl's ethnic group traditionally practices bride price:

$$\begin{aligned} y_{iedk} = {} & \beta_1\, I_k^{Post} \times Intensity_d \times I_e^{NoBridePrice} + \beta_2\, I_k^{Post} \times Intensity_d \times I_e^{BridePrice} \\ & + \alpha_k I_e^{NoBridePrice} + \alpha_k I_e^{BridePrice} + \alpha_e + \alpha_e I_k^{Post} + \alpha_e Intensity_d + \alpha_d I_e^{NoBridePrice} \\ & + \alpha_d I_e^{BridePrice} + I_e^{NoBridePrice} \sum_j X'_d \mathbf{I}_k^j \mathbf{\Gamma}_j + I_e^{BridePrice} \sum_j X'_d \mathbf{I}_k^j \Upsilon_j + \varepsilon_{iedk}, \end{aligned} \tag{8}$$

where all indices and variables are defined as in equation (7). As in our previous analyses, e indexes the ethnicity of individual i, and $I_e^{BridePrice}$ is an indicator variable equal to 1 if ethnic group e traditionally practices bride price. Additionally, $I_e^{NoBridePrice}$ is an indicator that equals 1 if the group does not traditionally practice bride price. 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 make bride price payments at marriage and those that do not. Thus, β_1 and β_2 are our primary coefficients of interest.

Equation (8) allows the district fixed effects to vary depending on the bride price customs of the ethnic group: $\alpha_d I_e^{NoBridePrice}$ and $\alpha_d I_e^{BridePrice}$. These terms absorb the double interactions $Intensity_d \times I_e^{NoBridePrice}$ and $Intensity_d \times I_e^{BridePrice}$ of the triple interactions of interest. We also interact the ethnicity fixed effects with the posttreatment indicator variable, $\alpha_e I_k^{Post}$. These fixed effects absorb the double interaction terms $I_k^{Post} \times I_e^{NoBridePrice}$ and $I_k^{Post} \times I_e^{BridePrice}$. Last, we allow the effects of our baseline set of district-level covariates interacted with cohort fixed effects to vary depending on whether ethnicity e practices bride price: $I_e^{NoBridePrice} \sum_j \mathbf{X}'_d \mathbf{I}_k^j \mathbf{\Gamma}_j$ and $I_e^{BridePrice} \sum_j \mathbf{X}'_d \mathbf{I}_k^j \mathbf{\Gamma}_j$.[34]

The estimates of equation (8) are reported in column 2 of table 6. We find a positive and statistically significant effect of the school construction program on primary school completion rates for bride price females but not for non–bride price females. The point estimates suggest that an increase of one school per 1,000 school-age children in a district increases the likelihood that a female from a bride price ethnicity will complete primary school by 2.5 percentage points. The Wald test of the equality of the

[34] For the interested reader, balance statistics for the difference between bride price and non–bride price groups are reported in table A9.

TABLE 6

Bride Price Status and INPRES School Expansion in 1995 Indonesia Intercensal Survey (Dependent Variable: Indicator Variable for Completion of Primary School)

	Females (1)	Females (2)	Bride Price Females (3)	Non–Bride Price Females (4)	Females (5)	Females (6)
$I_k^{Post} \times Intensity_d$	−.002		.025**	−.001		
	(.007)		(.013)	(.010)		
	{.009}		{.011}	{.008}		
$I_k^{Post} \times Intensity_d \times I_e^{BridePrice}$		.025**			.035***	.034***
		(.012)			(.011)	(.011)
		{.011}			{.010}	{.010}
$I_k^{Post} \times Intensity_d \times I_e^{NoBridePrice}$		−.001			.003	.004
		(.010)			(.009)	(.009)
		{.008}			{.006}	{.007}
Baseline covariates	Yes	Yes	Yes	Yes	Yes	Yes
Ethnicity fixed effects	No	Yes	Yes	Yes	Yes	Yes
Ethnicity fixed effects $\times I_k^{Post}$	No	Yes	Yes	Yes	Yes	Yes
Ethnicity fixed effects $\times Intensity_d$	No	Yes	Yes	Yes	Yes	Yes
District fixed effects $\times I_e^{BridePrice}$	No	Yes	No	No	Yes	Yes
Duflo controls $\times I_e^{BridePrice}$	No	Yes	No	No	Yes	Yes
Cohort fixed effects $\times I_e^{BridePrice}$	No	Yes	No	No	Yes	Yes
Muslim controls	No	No	No	No	Yes	Yes
Ethnicity controls interactions	No	No	No	No	No	Yes

F-test (equality of coefficient)		2.67			4.61	4.20
Mean of dependent variable	.642	.609	.638	.603	.609	.609
Standard deviation of dependent variable	.480	.488	.481	.489	.488	.488
Observations	76,959	65,403	9,707	55,696	65,403	65,403
Clusters	255	240	155	217	240	240
Adjusted R^2	.179	.184	.175	.185	.189	.188

NOTE.—This table reports estimates of the effect of school building on educational attainment for females from ethnicities with and without bride price traditions. Following the empirical strategy of Duflo (2001), the sample consists of individuals born between 1968 and 1972 or between 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. $Intensity_d$ is the number of schools built in a district per 1,000 people in the school-age population. "Baseline covariates" include district fixed effects, cohort fixed effects, and the covariates included by Duflo (2001): the interaction of cohort fixed effects with the number of school-age children in the district in 1971, with the enrollment rate in 1971, and with the district-level implementation of a water and sanitation program under INPRES. "Muslim controls" consist of an indicator variable for being Muslim, its interactions with birth year and birth district fixed effects, and the triple interaction of the Muslim indicator, belonging to a treated cohort, and treatment intensity. "Ethnicity controls interactions" consist of the interactions between ethnicity-level indicator variables for female-dominated agriculture and matrilineality, being a treated cohort, and treatment intensity. The subscript d indexes birth districts, k indexes cohorts, and e indexes ethnic groups. Standard errors clustered at the level of the district of birth are reported in parentheses. Conley standard errors that allow for correlation in errors of observations within 400 km appear in curly brackets.

** Significant at the 5% level according to the clustered standard errors.

*** Significant at the 1% level according to the clustered standard errors.

effects of school construction for bride price and non–bride price ethnic groups gives an F-statistic of 2.67.

We confirm this finding by estimating equation (8) separately for girls belonging to ethnic groups with bride price (col. 3) and for those belonging to ethnic groups without bride price (col. 4). The separate estimates also help to illustrate the importance of bride price for policy evaluation. If an evaluator estimated the effects looking within bride price ethnic groups (col. 3), she would conclude that the program was highly successful. However, if she estimated the effects looking within non–bride price groups (col. 4), she would conclude that the program was a failure.[35]

The remaining columns of table 6 test the robustness of the estimates. First, we focus on the possible relationship between bride price and religion in Indonesia. 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 predate conversion to Islam (Vroklage 1952).[36] As a robustness check, we allow the estimated effects of the school construction program to differ for those that report being Muslim in the Intercensal Survey. In practice, this means including the individual-level Muslim indicator variable interacted with birth-cohort fixed effects α_k, district-of-birth fixed effects α_d, and the posttreatment indicator interacted with the district-level treatment intensity measure, $I_k^{Post} \times Intensity_d$. The estimates, which are reported in column 5 of table 6, show that our finding of interest remains robust, with the effect of the school construction program becoming slightly larger and more precisely estimated for bride price females.[37] Additionally, the F-statistic for the test of the equality of the bride price and non–bride price effects of the school construction program is 4.61, indicating that we can reject that the effects are the same at the 5% level.

Another robustness check accounts for the possibility that bride price might be correlated with other ethnicity-level characteristics that could lead to differential effects of the schooling program. Thus, we allow the effect of the school construction program to differ depending on whether

[35] One important caveat to keep in mind when interpreting the estimates is the possibility of measurement error. Although it is unlikely that this would affect the differential response between the two groups, it could affect the level for each group. Therefore, it is possible that the effect for bride price girls is higher than estimated and that the effect for the non–bride price girls is not exactly zero but has a small or even modest positive effect.

[36] The fact that Indonesian bride price customs do not originate from Islamic customs is important given the common Muslim custom/law that a payment, or *mehr*, be paid by the husband to the wife at the time of marriage. Upon divorce, the *mehr* is kept by the woman, thereby serving as a form of divorce insurance (Quale 1988; Ambrus, Field, and Torero 2010). It is important to point out that the bride price is different from *mehr*.

[37] As another robustness check, we reestimate eq. (8) also allowing the differential effect of schooling between bride price and non–bride price groups to vary depending on whether an individual reports being Muslim or not. The estimates, which are reported in table A10, show that the differential effect by bride price is similar for Muslim and non-Muslim girls.

an ethnic group traditionally has matrilineal inheritance or significant female participation in agriculture. This is done by re-estimating equation (8) with the inclusion of the ethnicity-level characteristics, each interacted with $I_k^{Post} \times Intensity_d$. The double interaction terms associated with this triple interaction are captured by ethnicity fixed effects interacted with the post treatment indicator I_k^{Post} and ethnicity fixed effects interacted with the district-level treatment intensity measure $Intensity_d$, which are already included in the specification. The estimates, which are reported in column 6, show that the inclusion of these variables leaves the bride price and non–bride price interactions virtually unchanged, and we can again reject that the effects are the same at the 5% level.

An alternative estimation strategy to equation (7), which rigidly defines a pretreatment and a posttreatment cohort, is to allow the effects of school construction to vary flexibly and across a fuller range of cohorts. Specifically, in the more flexible specification, in equation (7) the term $\beta_1 I_k^{Post} \times Intensity_d$ is replaced by $\Sigma_l \beta_l I_k^l \times Intensity_d$, where l indexes 3-year birth cohorts (e.g., those born from 1950–1952, those born from 1953–1955, and so on). This gives the following equation:

$$y_{idk} = \alpha_k + \alpha_d + \sum_l \beta_l I_k^l \times Intensity_d + \sum_j \mathbf{X}_d' \mathbf{I}_k^j \mathbf{\Gamma}_j + \varepsilon_{idk}, \qquad (9)$$

To examine the differential effects of the program, we estimate equation (9) separately for females from bride price and non–bride price ethnic groups. The estimated relationships between school construction and primary school completion for the different cohorts (i.e., β_l's) are reported in table A9 and shown visually in figure 2, where figure 2*A* reports estimates (and confidence intervals) for girls from bride price ethnic groups and figure 2*B* reports this for girls from non–bride price ethnic groups. In both graphs, the *X*-axis denotes each cohort's age as of 1974, the year in which the first schools were completed, and the *Y*-axis is the estimated coefficient. The vertical lines in the figure indicate the cohorts that were partially treated. The left vertical line indicates the youngest cohort that would have been too old to have been affected by the school construction program. This cohort was older than primary school age when the construction began in 1974. The right vertical line indicates the youngest cohort that would not have received full treatment. The next youngest cohort, which would have been 4–6 years old in 1974, had the potential to receive virtually full treatment if their location received new schools early in the project period.

The estimates show that for all cohorts that were 13–15 years or older in 1974, there is no detectable effect of the program on elementary school completion. This is expected since girls belonging to these cohorts would have already finished primary school by the time the program was completed in 1978. The program had the potential to fully affect the

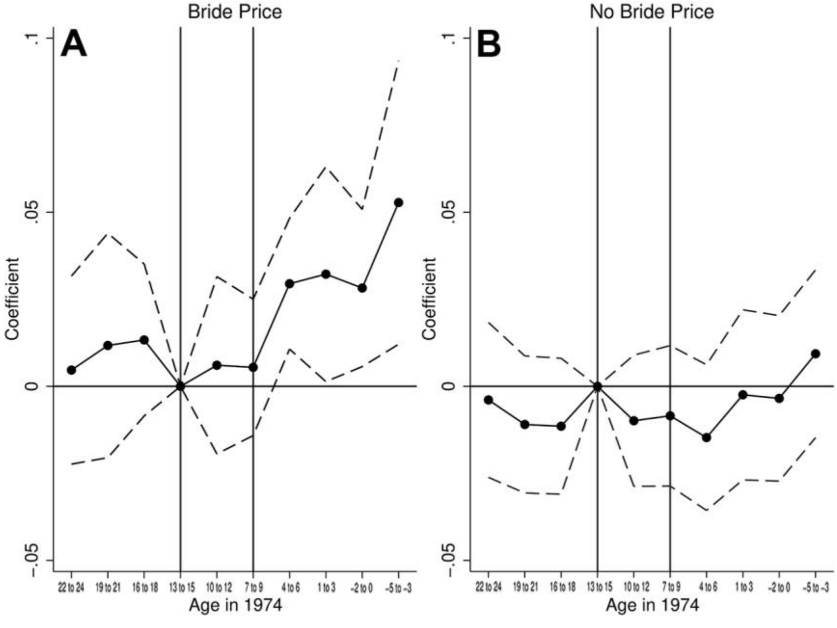

FIG. 2.—Estimates of the effect of school construction in Indonesia on female education by cohort of birth for bride price and non–bride price ethnic groups. The graphs report the coefficient estimates (and 95% confidence intervals) of the β_l's from equation (10). The graphs report the effect of school construction on primary school completion for three-year cohorts for girls belonging to ethnicities with (*A*) and without (*B*) the bride price tradition. In both *A* and *B*, the *X*-axis reports the age range (in 1974) of each cohort, and the *Y*-axis reports the estimated coefficient. The sample consists of girls born from 1950–1979. The left vertical line indicates the youngest cohort that did not receive any treatment from school construction. The right vertical line indicates the youngest cohort that could not have received full treatment from school construction. Thus, the 10–12 and the 7–9 cohorts are ones that received partial treatment. The corresponding coefficients and standard errors are reported in table A9 (available online).

cohorts who were 4–6 years or younger in 1974. Figure 2 shows that for these cohorts, there is a positive effect for girls from bride price groups but not for girls from non–bride price groups. More generally, we see a very different pattern for the two groups. For bride price girls, the program appears to have had effects exactly on the expected cohorts, while for non–bride price groups, there is little effect of the program across cohorts.

We next turn to an examination of the sensitivity of our estimates of a differential effect of school construction. We begin by checking the sensitivity of our findings to the use of an alternative data set, the 2010 Indonesia census, which is a more recent data source than the 1995 Indonesia Intercensal Survey. A benefit of the 2010 data over the 1995 data is its much larger sample size due to its being a census rather than an intercensus. 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 age 60 (compared with age 45 in the 1995 data), which raises concerns about selective attrition due to mortality. Second, because of 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. Despite these shortcomings of the 2010 data, we check the robustness of our findings by reestimating equations (7) and (8) using this alternative sample. The estimates, which are reported in columns 1 and 2 of table A12, show that we obtain similar results using the 2010 census data. As with the 1995 intercensus data, the estimated effect of school construction is positive and significant for bride price ethnic groups but is not statistically different from zero for non–bride price groups.

The second check that we perform is to test the robustness of our results to the inclusion of linear time trends that are allowed to vary at the district level (and differentially for bride price and non–bride price ethnic groups). Estimates of equation (8) with the new district-specific time trends are reported in columns 3 and 4 of table A12. Although including the controls reduces the precision of the estimates, it does not change the qualitative pattern that the school construction had larger effects for bride price groups in Indonesia. The estimated effect of school construction remains positive for bride price girls and very close to zero for non–bride price girls.

Third, we also report the results of a placebo test from Duflo (2001), where we reestimate equations (7) and (8) but assign children ages 12–17 at the time of the school construction to the placebo treated cohort and children ages 18–24 at the time to the placebo untreated cohort. The estimates, which are reported in columns 5 and 6 of table A12, show that the placebo treatment had no statistically significant effects on either bride price or non–bride price females.

Last, we check the robustness of our estimates to the use of alternative ethnicity-level measures of bride price that are constructed from contemporaneous data on bride price payments. The process for creating these measures is described in appendix B, and results using these alternative measures are reported in columns 1–4 of table A13. We obtain the same findings whether we construct indicators for bride price and non–bride price ethnic groups or use a continuous measure of bride price use. The estimates are also similar whether we use the measures in place of our baseline traditional bride price variable or use the traditional measure as an instrument for the contemporaneous measure. We continue to find that school construction tends to have larger effects for females from bride price ethnic groups.[38]

[38] As an additional robustness test, we also take advantage of the fact that the *Ethnographic Atlas* lists alternative marriage customs as well as primary customs. Since our measure of traditional bride price uses only the primary custom, we also recode an ethnic group as practicing bride price if their alternative custom is bride price. This applies to only one ethnic group

B. *Evidence from Zambia*

Like Indonesia, Zambia also implemented a large school construction program that built a total of 5,649 schools between 1994 and 2007. Although this expansion in the supply of schools occurred over a longer time span 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 supply that can be used to test prediction 4 of the model in a different setting.[39] We do this using data from the Zambian Ministry of Education on the stock of schools by year and district. These data are then combined with four rounds of the Zambia DHS: 1996, which is at the beginning of the school construction episode; 2001, during the middle of the episode; 2007, near the end of the episode; and 2013, after the episode. To better illustrate the relationship between the DHS surveys and the school construction episode, in figure A2, we show the number of schools built in Zambia each year from 1940–2013 and mark the timing of the four rounds of the DHS. We also report this same information but separately for each province in figure A3. These graphs show that there is significant heterogeneity across space in the timing of the school construction project. As will become clear below, this fact is important given our estimating equation.

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 a pre- versus posttreatment cohort indicator variable with the spatial variation in treatment intensity across districts, we instead estimate the relationship between the stock of schools in a district during a given survey year and the probability of enrollment of children ages 5–12 living in that district during that time. Thus, our initial equation, which estimates an average effect of school construction across all ethnic groups, is given by

$$y_{iedkt} = \beta_1 \frac{Schools_{dt}}{Area_d} + \alpha_{kt} + \alpha_{et} + \alpha_{ed} + \varepsilon_{iedkt}. \tag{10}$$

Our estimating equation, which allows for a differential effect depending on bride price practice, is

in Indonesia, which does not appear in our school construction sample, so the main results are unchanged. Thus, our findings are not sensitive to how we code secondary customs.

[39] Within Africa, there are three other school expansion episodes that one could potentially examine, namely, 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; nearly every ethnic group practices bride price. In Zimbabwe, sufficiently fine-grained data on ethnic identity are not available.

$$y_{iedkt} = \beta_1 \frac{Schools_{dt}}{Area_d} \times I_e^{NoBridePrice} + \beta_2 \frac{Schools_{dt}}{Area_d} \times I_e^{BridePrice} + \alpha_{kt} I_e^{NoBridePrice} + \alpha_{kt} I_e^{BridePrice} + \alpha_{et} + \alpha_{ed} + \varepsilon_{iedkt}. \quad (11)$$

In both equations, i indexes girls who are 5–12 years old, e indexes ethnic groups, d indexes districts, k indexes their birth year, and t indexes the year of the survey (either 1996, 2001, 2007, or 2013). Our outcome of interest, y_{iedkt}, is an indicator variable that equals 1 if girl i is enrolled in school in year t. Our measure of school construction, $Schools_{dt}/Area_d$, 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 traditionally practices bride price, while $I_e^{NoBridePrice}$ is an indicator variable that equals 1 if the ethnic group does not.

The specification also includes cohort × 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 (8). 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 (8). We cluster our standard errors at the district level and also report Conley standard errors that account for spatial correlation.[40]

Estimates are reported in table 7. Column 1 reports estimates of equation (10). We see that in Zambia, we find a similar pattern as in Indonesia: the estimates are small and close to zero. Column 2 reports estimates of equation (11), which allows for a differential effect depending on bride price practice. As in Indonesia, positive effects of school construction are concentrated among girls from ethnic groups that traditionally practice bride price. For girls from ethnic groups that do not engage in this practice, the estimated effect is very close to zero. The estimated difference between the two groups is statistically significant. Results from a Wald test indicate that the hypothesis of the equality of the effects for the two groups can be rejected at a 5% significance level. The F-statistic is 5.22, and the p-value is 0.03.

Columns 3 and 4 report estimates of equation (10) separately for bride price and non–bride price girls. 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 statistically different from zero.

[40] Balance statistics for the difference between bride price and non–bride price groups in Zambia are reported in table A14.

TABLE 7

School Construction and Primary School Enrollment in Pooled Zambia DHS (1996, 2001, 2007, and 2013; Dependent Variable: Indicator for Primary School Enrollment)

	Females (1)	Females (2)	Bride Price Females (3)	Non–Bride Price Females (4)	Females (5)	Females (6)
$Schools_{dt}/Area_d$	.009		.042***	−.007		
	(.010)		(.014)	(.014)		
	{.003}		{.010}	{.002}		
$Schools_{dt}/Area_d \times I_e^{BridePrice}$		.042***			.073***	.266***
		(.014)			(.016)	(.066)
		{.010}			{.019}	{.072}
$Schools_{dt}/Area_d \times I_e^{NoBridePrice}$		−.007			.003	.168***
		(.014)			(.014)	(.051)
		{.002}			{.007}	{.039}
Baseline covariates	Yes	Yes	Yes	Yes	Yes	Yes
Age fixed effects × $I_e^{BridePrice}$	No	Yes	Yes	Yes	Yes	Yes
Polygynous household controls	No	No	No	No	Yes	Yes
Muslim household head	No	No	No	No	Yes	Yes
Ethnicity control interactions	No	No	No	No	No	Yes
F-test (equality of coefficient)		5.22			8.84	14.01
Mean of dependent variable	.617	.617	.628	.613	.607	.607
Standard deviation of dependent variable	.486	.486	.484	.487	.488	.488
Observations	22,191	22,191	6,443	15,748	17,068	17,068
Clusters	71	71	69	71	71	71
Adjusted R^2	.398	.398	.433	.384	.408	.408

Note.—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 ages 5–12 at the time of the survey. Educational attainment data are taken from the 1996, 2001, 2007, and 2013 rounds of the DHS. 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 indexes survey years, and e indexes ethnic groups. "Baseline covariates" consist of age fixed effects, ethnicity × year fixed effects, and ethnicity × district fixed effects. "Ethnicity control interactions" consist of the interactions between ethnicity-level indicators for traditional female-dominated agriculture and matrilineal kinship with the treatment variable, $Schools_{dt}/Area_d$. "Polygynous household controls" consist of an indicator variable that equals 1 if the individual lives in a household that is polygynous and its interaction with the treatment variable, $Schools_{dt}/Area_d$. "Muslim household head" is an indicator variable that equals 1 if the head of the household is Muslim (children do not report their religion in the Zambian DHS). Standard errors clustered at the district level are reported in parentheses. Conley standard errors that allow for correlation in errors of observations within 400 km are reported in curly brackets.

*** Significant at the 1% level according to the clustered standard errors.

The last two columns of table 7 provide evidence that the results are robust to controlling for potential sources of omitted variable bias. In column 5, we report estimates of equation (11) that include controls for whether the girl lives in a polygynous household and whether the household head is Muslim as well as their interactions with the school construction program measure. Including these controls appears to strengthen the results. The estimated effect of the school construction program for bride price girls increases noticeably, while the effect for non–bride price girls continues to be very close to zero. In column 6, we also include our set of ethnicity-level covariates (i.e., traditional matrlineality and traditional female participation in agriculture) as well as their interactions with the school construction program measure. We find that including these controls increases the estimated treatment effects for both bride price and non–bride price girls. However, we continue to find that the school construction program had substantially larger effects on education for bride price girls.

In terms of magnitude, we find similar effects in Zambia as in Indonesia. In Indonesia, for girls from bride price ethnic groups, a 1 standard deviation increase in school construction (0.85) is associated with an increase in primary school completion by 2.1 percentage points (0.85×0.025), and the mean of female primary school completion is 64%. In Zambia, for girls from bride price ethnic groups, a 1 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), and the mean of female primary school enrollment is 63%.

As we did for the Indonesian sample, we test whether our Zambian estimates are robust to the inclusion of district-specific linear time trends that are allowed to vary depending on whether an ethnic group practices bride price. The estimates are reported in columns 1 and 2 of table A15. The inclusion of the time trends leads to estimates that are larger in magnitude. However, it does not change the qualitative pattern that the school construction had larger effects for bride price groups. The estimated effect of school construction remains positive for bride price girls and is not statistically different from zero for non–bride price girls. Additionally, we test whether our findings are potentially explained by pretrends. We estimate a version of equation (11) that includes a one survey-round forward lag of the treatment, $Schools_{d,t+1}/Area_d$, and its interactions with $I_e^{BridePrice}$ and $I_e^{NoBridePrice}$. The estimates, which are reported in columns 3 and 4 of table A15, show that none of the forward-lag interactions positively predict enrollment. In fact, we estimate negative coefficients, which suggests that, as in Indonesia, new schools may have been disproportionately allocated to districts with less schooling. Last, as with Indonesia, we also check the robustness of our estimates to using contemporaneous data from the ZFPS to construct an ethnicity-level measure of bride price practice. The estimates are reported in columns 5–8 of table A13. We continue to find that females from ethnic groups with higher modern bride price payments tend to benefit more from the school construction program.[41]

C. *Testing Alternative Explanations for the Differential Effects*

We now turn to the possibility that the differential effects that we find are due to other factors that are correlated with the bride price practice and also affect female schooling decisions. For example, it is possible that parents from ethnic groups that engage in bride price payments may be systematically wealthier and are therefore in a better position to send their daughters to school and respond more strongly to school construction. 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 (6) but at the household level and with household wealth as the dependent variable. We identify the household's ethnicity using the ethnicity of the household head. The estimates are reported in column 1 of table A16. Panel A reports estimates from the Indonesian sample, which uses the Intercensal Survey data, and panel B reports estimates for the Zambian sample, which uses the DHS data. We find no evidence of differences in the wealth of bride price and non–bride price households in either country.

Even if household wealth is the same in both groups, it is still possible that bride price ethnic groups have fewer children and therefore have more wealth per child. To test for this hypothesis, we estimate equation (6) using a sample of women ages 25–45 and with the number of children born at the time of the survey as the dependent variable. The estimates, which are reported in column 2 of table A16, show no evidence that women from bride price ethnic groups have fewer children. In Zambia, the coefficient is very close to zero and insignificant, while in Indonesia it is actually positive, although only marginally significant.

Another alternative explanation for our findings is that bride price households are more altruistic toward daughters, leading them to educate their daughters more (and to respond more to the school construction program). Therefore, we test for the possibility that bride price families have different attitudes toward girls relative to boys by estimating the relationship between bride price and the fraction of surviving children that are girls. This reflects differential preferences for boys relative to girls that result in differential mortality rates due to differential access to family

[41] As with Indonesia, we also recode an ethnic group as practicing bride price if their alternative custom is bride price. However, no groups in Zambia list their alternative tradition as practicing bride price, so the main results are unchanged.

resources, such as healthcare or nutrition, or even sex-selective abortion or infanticide. The estimates are reported in column 3 of table A16. In both Indonesia and Zambia, we find no evidence of differences in daughter preference, as measured by the fraction of surviving children who are female.

We are able to further explore the evidence for a relationship between bride price and gender attitudes in Zambia using the DHS, which collects information on respondents' attitudes about the rights of women in marriage.[42] The first measure that we use is based on a question that asks respondents whether a husband beating his wife is justified in five different scenarios. The measure is the proportion of the five scenarios for which the respondent reports a beating is not justified. The second measure is similar but is based on the proportion of reasons for which the respondent feels it is justified for a woman to refuse to have sex with her husband.[43] Thus, both measures are increasing in gender equality and female empowerment. The estimates are reported in columns 4 and 5 of table A16, panel B. For both measures, we find no evidence of a relationship between bride price and gender attitudes for either males or females. All the coefficients are small in magnitude and statistically insignificant.

A final alternative explanation for the differential response of bride price ethnic groups to school construction is that the returns to education are higher for this group. We test for this by checking whether the relationship between a women's level of education and either her employment status or her income is stronger for women from bride price ethnic groups. In both Indonesia and Zambia, we estimate the relationship between our three levels of schooling and employment, wages, wealth, and child health (for Zambia only), allowing the effect of education to differ depending on whether a woman's ethnic group practices bride price. The details of the estimation are provided in appendix B, and the estimates themselves are reported in table A17. They show no evidence of a differential return to education for women belonging to bride price ethnic groups.

D. Prediction 5: Do We See the Same Relationships for Men?

We next turn to prediction 5 of the model, which summarizes the model's implications for males and states that we should not see the same relationships in the data for men as we do for women. We test the prediction by replicating the tests of predictions 3 and 4 using a sample of men rather than women.

[42] The analysis does not include the 1996 DHS, which did not ask these questions.

[43] In 2001, four reasons the respondent feels it is justified for a woman to refuse to have sex with her husband are asked about, and in 2007 and 2013, three reasons are asked about. The details of the questions asked are reported in app. A.

We begin by studying whether men from bride price ethnic groups tend to have higher education rates than men from non–bride price ethnic groups (prediction 3 for women). We reestimate equation (6) using the samples of men in the IFLS, the DHS, and the ZFPS, thus replicating the analysis reported in table 5. As reported in columns 1, 2, and 5–9 of table 8, we do not find the same patterns among men. Across the seven regressions, there is a significant positive association between bride price and male education only in Indonesia (col. 1), and unlike for women, this association is no longer significant when we control for being Muslim (col. 2). The point estimates for the coefficient on the bride price indicator are small in magnitude and fluctuate between being positive and negative, depending on the sample. The estimates of the relationship between bride price and test scores for boys are reported in columns 3 and 4 of table 8. In contrast to the case with girls, for boys we do not find a significant relationship, in line with the auxiliary prediction discussed in appendix B.

Estimates of the differential effects of school construction (prediction 4) for males—namely, estimates of equation (8) for Indonesia and equation (11) for Zambia—are reported in table A18. We do not observe the same consistent patterns for males as we do for females. The estimated effects of the program are not systematically different for bride price and non–bride price boys.

VI. Discussion

Our analysis has shown that the traditional practice of bride price is associated with substantially larger investments in female primary education and greater responsiveness to education policies. These findings are particularly important given the high economic and social returns associated with female education (e.g., Sperling and Winthorp 2016, 4). Despite this, primary school enrollment and completion rates remain low in many parts of the world.[44] Therefore, better understanding of what policies and mechanisms can help increase female education is important.

An important question about our estimates is the size of the monetary returns to parents for educating their daughters when there is the custom of bride price. For Indonesia, where we can use the IFLS data on bride price values, we can attempt to calculate an estimate of this return. Using the IFLS data, information on real per capita consumption, and the estimates from table 4, we find that the bride price premium—that is, the extra payment parents receive if they educate their daughter—for a daughter

[44] For example, according to the World Bank's World Development Indicators, many of the countries of Africa have enrollment and completion rates well below 60%. In addition, such figures may be overly optimistic because of low attendance and poor quality instruction (Pritchett 2013).

TABLE 8

Relationship between Bride Price, Male Enrollment, and Test Scores in Indonesia and Zambia

	Indonesia				Zambia				
	1995 Intercensal Survey		IFLS		Pooled DHS			ZFPS	
	Enrolled (1)	Enrolled (2)	Test Scores (3)	Test Scores (4)	Enrolled (5)	Enrolled (6)	Enrolled (7)	Primary (8)	Primary (9)
$I_e^{BridePrice}$	.030***	.027	−.061	−.095	.008	.003	.004	−.015	−.059
	(.009)	(.010)	(.051)	(.046)	(.013)	(.008)	(.008)	(.037)	(.026)
	[.000]	[.216]	[.303]	[.222]	[.604]	[.802]	[.716]	[.718]	[.118]
Age of sample (years)	5–22	5–22	All	All	5–22	5–22	5–22	All	All
Baseline covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census cluster × survey year fixed effects	NA	NA	NA	NA	No	No	Yes	NA	NA
District fixed effects	Yes	Yes	No	No	Yes	Yes	NA	NA	NA
Ethnicity controls	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Muslim	No	Yes	No	Yes	NA	NA	NA	NA	NA
Polygynous household	NA	NA	NA	NA	No	Yes	Yes	NA	NA
Mean of dependent variable	.617	.617	−.017	−.017	.609	.609	.604	.875	.875
Standard deviation of dependent variable	.486	.486	.969	.969	.488	.488	.489	.331	.331
Observations	108,540	108,540	2,735	2,734	40,112	40,164	28,935	681	681
Clusters	39	39	16	16	30	30	29	19	19
Adjusted R^2	.381	.382	.085	.088	.313	.353	.374	−.002	.012

Note.—This table reports estimates of the relationship between the traditional practice of bride price and school enrollment (cols. 1, 2, 5–7), primary school completion (cols. 8, 9), or standardized test scores (cols. 3, 4). In all specifications, the unit of observation is a male. The Indonesia data are from the 1995 intercensus, and the Zambia data are from either the pooled 1996, 2001, 2007, and 2013 DHS or the ZFPS. "Baseline covariates" include age and age squared and year tested by province fixed effects when relevant (cols. 3, 4). "Ethnicity controls" consist of indicator variables for an individual belonging to an ethnic group that is matrilineal and that traditionally had female-dominated agriculture. "Muslim" is an indicator variable that equals 1 if the man self-reports being Muslim. "Polygynous household" is an indicator variable that equals 1 if the boy/man lives in a polygynous household. The ZFPS and intercensus do not contain any polygynous households. In the ZFPS, we do not control for district fixed effects since the entire sample lives in Lusaka. Census cluster fixed effects are finer than district fixed effects. Standard errors clustered at the ethnicity level are reported in parentheses, while wild cluster bootstrap p-values are reported in square brackets.

*** Significant at the 1% level according to the wild cluster bootstrap p-values.

completing primary school is equal to 25.8% of per capita annual consumption.[45] Assuming an 8% discount rate and an 8-year delay between the completion of primary school and marriage, the net present value of the bride price premium at the time of educational investment corresponds to $0.258/(1.08)^8 = 0.1395$, or 13.95% of annual per capita consumption. In the IFLS sample, bride price females are 2 percentage points more likely to complete primary school than non–bride price females, which suggests that the premium, in turn, results in a 2 percentage point increase in primary school completion.[46] These large returns have meaningful effects on education for females.

An alternative way to assess the magnitude of the effect of bride price is to compare it with the effect from a reduction in distance to schools. In appendix B, we undertake such an exercise, using a discrete choice model and variation in distance due to school construction in Indonesia. In the Indonesian intercensus data, we find that belonging to a bride price ethnic group has the same effect on the gains that parents obtain from educating daughters as a 0.7–0.8-km reduction in the distance to the closest primary school (equivalent to a 85%–97% reduction relative to the median distance to the closest school). Additionally, using even finer data on school construction from the IFLS, we find that the effect of belonging to a bride price ethnic group on the gains that parents obtain from educating daughters is 71%–85%, the magnitude of the effect of having an additional school constructed in a community containing 200–300 households.

The sheer size of the bride price returns to education highlights just how effective traditional customs can be in allowing parents to partake in the returns to their children's education. By helping to complete the intergenerational contract between parents and children, they promote investments in human capital and are complementary to programs that aim at improving access to school. In the absence of such customs, individual and public educational investments in developing countries may be hampered if parents cannot capture the returns to their investments. This may be a particularly important obstacle for female education. In many developing countries, including India and China, sons remain in their parents' lineage group and care for them later in life, giving parents an incentive to educate sons (e.g., Bau 2019; Jayachandran and Pande

[45] This is based on the estimated coefficient for primary school completion relative to noncompletion (col. 2 of table 4) in the IFLS data, after the data are normalized to be (in terms of percent of consumption) $0.446 \times 0.579 = 0.258$, or 25.8%.

[46] Bride price premia for higher levels of education are also sizeable. The bride price premium for the completion of junior secondary (relative to primary only) is 22.03% and for the completion of senior secondary (relative to junior secondary only) is 38.22%. The calculations are $(0.446 \times 0.672)/(1.08)^4 = 22.03\%$ and $(0.446 \times 0.857)/(1.08)^0 = 38.22\%$, respectively.

2017). By contrast, daughters typically leave their parents' household and join their husband's lineage group, which exacerbates the incomplete contracting problem in intergenerational investment.

Our study also contributes new insights to the public debate that has ensued over the past decades about the potentially negative consequences of the bride price practice. Our findings indicate that bride price payments may provide significant incentives to invest in daughters' human capital, working to raise aggregate welfare. Hence, in the absence of offsetting policies promoting female education, proposed changes to this practice—such as an attempt to ban bride price in Kenya in 2012 and in Uganda in 2015—may have unintended negative consequences for women and society.

In considering the total effect of bride price for women, it is important to understand that the net effects of the bride price on women's welfare remain unclear. As our model indicates, from a static ex post perspective, the practice grants property rights over the marital transfers to the bride's family rather than to the bride herself. However, from a dynamic perspective, bride price also raises women's welfare since girls receive more education and therefore greater labor market benefits. These benefits may become more important as women's returns to education in the labor market increase relative to the marriage market.

Beyond improving our understanding of the relationship between female education, intergenerational transfers, and marriage markets, the findings in the paper also make a broader point. They provide one concrete example of how the cultural context of a society can influence the efficacy of development policies. Indeed, if policy makers in Indonesia or Zambia were evaluating the effects of their school construction programs on girls' education, they would get dramatically different answers depending on which groups they were examining. If they studied ethnic groups that do not have bride price, they would conclude that the program was unsuccessful at improving female education. If they studied bride price groups, they would conclude that it was instead effective.

From an evaluation perspective, the exact nature of this relationship (including whether it is truly a causal effect of bride price) is not necessarily relevant. Even if the bride price is just a correlate or a proxy for other more fundamental cultural traits, it provides an observable characteristic that can be used when designing and evaluating the effects of education policies. Policy makers should be aware that bride price and non–bride price groups will likely respond very differently to school construction. For non–bride price groups, simply building schools may not be enough. School construction may have to be combined with conditional cash transfers or additional subsidies, such as free school uniforms or scholarships, in order to have a discernible effect on the educational attainment of girls.

VII. Concluding Remarks

Our analysis has documented a (perhaps surprising) consequence of the tradition of bride price, which is a payment made by the husband and/or his family to the wife's parents at marriage. We began our analysis by developing a model of educational choice with and without the practice of bride price. The model developed a number of testable predictions that we tested using data for two countries, Indonesia and Zambia, that were chosen because they had large-scale school construction projects and because they have within-country variation in whether bride price is practiced.

Consistent with the predictions of our model, we found that more educated daughters command a higher bride price. As a consequence of this added monetary benefit to education, girls belonging to bride price ethnic groups are also more likely to be educated. We also find that, consistent with the model, bride price ethnic groups are more responsive to policies that are aimed at increasing female education. In Indonesia, we revisited the Sekolah Dasar INPRES school construction program and found that for bride price ethnic groups, the increased supply of schools resulted in a significant increase in female education. However, for those without the bride price custom, the program had no effect on female education. We examined a similar school construction project in Zambia and found the same effects. The project increased the educational attainment of girls from bride price ethnic groups but had no effect on girls from non–bride price ethnicities.

In addition to improving our understanding of the relationship between marriage customs, marriage markets, and education, our findings illustrate the importance of the cultural context of developing countries for the efficacy of development projects. They also show that the cultural factors that are important for policy purposes are not always ex ante intuitive. In the context of educational policies, it is not immediately obvious that marriage customs would play a role. Thus, our findings highlight the importance of adopting a holistic approach when governments, policy makers, and nongovernment organizations consider new interventions. In other words, it is important to consider all aspects of the culture of a society when designing and evaluating policies, even those that are not obviously related to the outcomes of interest.

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