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Abstract

Reducing child marriage is seen as one of the essentials to women's empowerment and wellbeing, ending the intergenerational cycle of poverty and rights violation. In this paper, we use a longitudinal household survey from Indonesia to study whether a food subsidy (Raskin) reduces child marriage. Modelling treatment assignment with Coarsened Exact Matching and Differences-in-Differences, we show that the unconditional rice subsidy significantly reduces the likelihood of marrying as a child.

Keywords: Child marriage; Food subsidy; Raskin; Indonesia; Coarsened exact matching; Diffs-in-Diffs

JEL Codes: J82 · I21 · I38

1 Introduction

UNICEF defines child marriage as a formal marriage or informal union before the age of 18. For many girls in developing countries marriage may occur much earlier than the age of 18. The marriage of girls at an early age curtails their education and economic opportunities, poses higher pregnancy and child-birth related risks to her and her children, increases the risk of domestic violence, HIV and other infections and carries widespread consequences in social and economic development (Block et al., 2002; Field and Ambrus, 2008; Raj and Boehmer, 2013; Kidman, 2017).

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While child marriage rates have been declining over the past decade, underage unions are still a significant problem around the world. Ending child marriage has been on the recent international and national agenda. Many poor families see marrying children as a way out of poverty. Thus, would a policy targeted at reducing poverty and helping families to weather negative income shocks, such as a financial crisis, alleviate the child marriage problem?

Using data from the longitudinal Indonesian Family Life Survey (IFLS), this paper studies whether an Indonesian food subsidy program (Raskin) can help reduce the likelihood of marrying as a child. To estimate the treatment effect, we model the treatment assignment using the Coarsened Exact Matching (CEM) and difference-in-Differences (DiD) to reduce the selection bias due to non-random distribution of the subsidy and unobserved heterogeneity. We find that receiving the unconditional rice subsidy (Raskin) significantly reduces the likelihood of entering in an underage marriage by about 13 percent.

There is a growing literature regarding conditional and unconditional cash transfers or in-kind food transfers improving education and health outcomes (Bassani et al., 2013; Baird et al., 2014; Kabeer and Waddington, 2015; Baryshnikova and Jayawardana, 2018). One of the most cited studies on the effect of conditional and unconditional transfers on child marriage is a randomized control trial by Baird et al. (2011). They find that unconditional cash transfers reduce child marriage by about 3-8 percent in adolescent girls in Malawi while the conditional cash transfers do not. Erulkar and Muthengi (2009) employ a quasi-experimental pilot project in 2004-2006 showing an asset transfer (a goat) delayed marriage in Ethiopia. Some evidence points out that female conditional school-stipend helped delay marriage in Bangladesh and Pakistan (Khandker et al., 2003; Raynor and Wesson, 2006; Schurmann, 2009; Alam et al., 2011; Greene, 2014). Unconditional cash transfers to mothers immediately after the birth of a child, with an added voucher in the name of the daughter to be redeemed at the age of 18, helped delay child marriage but did not alter the norms in India (Nanda et al., 2014). Less is known about the effect of unconditional transfers on child marriage. Moreover, to the best of our knowledge, there is no literature on whether any in-kind food transfer programs affect the likelihood of entering in an underage union.

Raskin is an unconditional in-kind transfer, a food subsidy or 'rice for poor' program,

that has been introduced in 1997 in Indonesia to help face the economic crisis. It is considered the largest subsidized food program currently in operation in Indonesia. While it is not specifically designed to reduce child marriage or other outcomes besides poverty, Barysh-nikova and Jayawardana (2018) show that Raskin has a surprising effect - increasing girls schooling. As Raskin is meant to reduce the food expenditure and, hence, alleviate the burden of economic crisis, we speculate that this program would also reduce the parents' need to marry their underage daughters to escape extreme poverty.

In terms of methodological contributions, we would like to estimate the effect of the treatment on the treated. However, due to the use of non-randomized data, the counterfactual mean is unobserved in our study. Furthermore, the households that are meant to receive Raskin are in fact the poor households. These problems can result in selection bias, heterogeneous treatment effects and interaction effects. Our solution is to estimate a control group that has characteristics that are as similar as possible to those of the treatment group using Coarsened Exact Matching.

The rest of the paper is organized as follows. In Section 2, we provide some background on the Raskin program and child marriages in Indonesia. In Section 3, we discuss the data and present the methodology. This is followed by the main results and sensitivity checks in Section 4. Section 5 concludes the study.

2 Background

2.1 The Raskin Program

Since the 1970s, Indonesia had embarked on an impressive growth trajectory. Up to the late 1990s, the Indonesian economy grew between 6 to 8 percent per year and the share of population below poverty line declined to about 15 percent.[4] This was disrupted in July 1997, when the Asian financial crisis caused several Asian countries to fall into deep recessions. For the next year, GDP in Indonesia fell by 14 percent, nationwide poverty incidence jumped more than 1.5 times, and the Rupiah lost three-quarters of its value

[4]This is much lower than the poverty rates of 28.6 percent in 2000 in India and of 36.8 percent in 1997 in the Philippines.

(Suryahadi et al., 2003). Coupled with the loss of investor confidence, political uncertainty, and severe weather (i.e. drought) linked to the El Niño phenomenon, Indonesia experienced the worst episode of production shortfalls and price instability in decades (Radelet, 2000; Radelet and Sachs, 2000).

The impact of the Asian Financial Crisis on Indonesia crested in January 1998 when the country experienced the highest monthly inflation rate in 24 years. This inflation was buoyed by rising price of price, which alone, during that period, accounted for 15 percent of total monthly inflation (Government of Indonesia, 1998). The drought and the financial crisis subjected low-income households to severe significant food security risk. Among these households, about a quarter of their total expenditure is spent on rice consumption (Suryahadi et al., 2003). Thus, when the crisis occurred, consumption of rice among them fell. Consequently, children were taken out of school and some were sent to work as a coping mechanism.

As a response to the crisis, the Indonesian government launched the Special Market Operation (OPK) in 1998, which later became known as the Rice for Poor Families (Raskin) program.[5] The objective of Raskin is to reduce the spending burden of low-income households (RTS) through the provision of rice, a staple food crop. Under this program, low-income households may purchase 15 kilograms (kg) of subsidized rice per month at a price of Rp 1,600/kg, which is about a fifth of the market price. In the first year of the program alone, more than a million tonne of rice were supplied to the low-income households. Today, Raskin is the most well-funded social assistance program in Indonesia, accounting for more than half of total social assistance expenditure. The total budget allocation for Raskin now exceeds USD 2 trillion dollars with a target population of more than 15.5 million households, making Raskin the country's largest targeted transfer program ever.

Notwithstanding, there remain issues with ensuring that the intended recipients of Raskin actually receive it. Eligibility, for example, is determined through a combination of proxy means testing and community targeting. The allocation quota for each region is based on

[5]Raskin is an acronym for *beras untuk keluarga miskin* (rice for poor families). According to Timmer et al. (2017), this title was intended to improve targeting accuracy, expecting that the nonpoor would feel ashamed to be seen receiving program benefits. In 2016, Raskin became *beras sejahtera* (literally prosperous rice), an acronym for Rastra. In this paper, we refer to the program as Raskin as this was the Raskin implemented during the time of the Asian Financial Crisis.

its incidence of poverty, which in turn is calculated from a national list of poor households, which in turn is based on household surveys.[6] The final distribution to the beneficiaries at the local level is determined by the village consultative meetings (Mudes). Unfortunately, this had led to misallocation problems, as local officials distributed Raskin to ineligible households for a variety of reasons,[7] while many beneficiaries had little information on program rules and received less than their entitled subsidy as such. This meant that not all eligible households had taken full advantage of the Raskin program, while some households who were ineligible had benefited from it (Banerjee et al., 2018).

2.2 Child Marriage

In Indonesia, the 1974 Marriage Law permits men and women to marry at the age of 21 without parental consent, and girls to marry at 16 and boys at 19 with parental consent. However, with the support of a religious or civil court, parents may obtain a dispensation that allows their children to marry effectively at any age. Therefore, even with the 1974 Marriage Law in place, the marriage of young girls, virtually at any age, could occur in the country.

UNICEF, in 2016, defined child marriage as the formal marriage or informal union before the age of 18. Despite increasing socio-economic development, the marriage of young girls remains prevalent in Indonesia. An estimated 17 percent of Indonesian girls are married before the age of 18. Unfortunately, this rate has not declined in recent years and about 50,000 girls under 15 years of age are still given in marriage each year (UNICEF, 2016). Because of its large population, Indonesia is now ranked seventh globally in terms of the absolute number of child brides.

Child marriage, especially the marriage of young girls, is a serious human rights issue. Girl brides, in particular, face numerous economic and social challenges during their life-times. For example, the marriage of girls poses a significant health risk not only to their children, but to themselves, as they experience higher rates of maternal mortality (Raj and Boehmer, 2013). Children born to young mothers are also at greater risk of having poor

[6] In 2007, the list of poor households was based on the 2005 Household Socioeconomic Survey (PSE-05) conducted by BPS (Central Bureau of Statistics).

[7] The reasons include political pressure, community perceptions of fairness, or maintaining social cohesion.

nutritional health (Block et al., 2002). Girls who marry young are also far more likely to drop out of school, be stuck in poverty, and become victims of domestic violence (Kidman, 2017).

For many poor families, underage unions are often seen as a way out of poverty. Not surprisingly, in Indonesia, girls who live in rural areas are statistically more likely to be married before the age of 18 as rural households tend to be much poorer. For example, in 2014, some 13.8% of the rural population was classified as poor, compared to 8.2% of the urban population (Aji, 2015). As such, the incidence of child marriage may increase when households experienced negative income shocks, such as the Asian Financial Crisis, and by the same token, targeted subsidy programs such as Raskin may help to alleviate the problem.

3 Data and Methodology

3.1 Data

We use data from the Indonesian Family Life Survey (IFLS). The IFLS is an on-going longitudinal household survey where the first wave was conducted in 1993 (IFLS1), then in 1997/98 (IFLS2), 2000 (IFLS3), 2007 (IFLS4), and 2014/2015 (IFLS5). As Raskin was implemented in 1998, we use the IFLS2 and IFLS3 waves to study its effects, with IFLS2 as the pre-treatment wave and IFLS3 as the most immediate post-treatment wave.

For the purpose of our study, we take all brides that married for the first time between the years of 1997 and 2000 inclusively. For our main outcome variable, we construct a binary variable that takes on a value of 1 if the bride is 16 years old or younger at the time of marriage. This is a slightly more stringent definition of child marriage than that of UNICEF. As a robustness check, we also consider the UNICEF definition of child marriage, where the bride is 18 or younger.

Our treatment group consists of girls whose parental households reported in IFLS3 as having received the rice subsidy in the last 12 months. Thus, our key variable of interest is a dummy variable, denoted by *Raskin*, that is equal to 1 if the bride's household received Raskin.

Table 1 provides basic descriptive statistics for the full sample and according to whether the brides married as children or as adults. It is interesting to see how the share of the brides that received Raskin is higher among those that did not marry as children. Child brides on the other hand are more likely to come from rural areas and have higher share of food expenditure, lower education and medical expenditure shares. Their dwellings are in poorer conditions, often without electricity and water, with firewood being used for cooking, and with poor sanitation (using a nearby river, land or sea for toilet). Fewer of the child brides have completed senior high school. A higher percentage of the underage brides are Muslim than their adult counterparts.

3.2 Estimating Equation

Given that the rice is a significant component of total expenditure among poor households, targeted subsidy programs such as Raskin could potentially help reduce child marriage. To investigate this, we estimate a model that relates Raskin and child marriage through the following

$$Y = \beta_1 + \beta_2 yrAFTER + \beta_3 Raskin + X'\theta + e \tag{1}$$

where $Y = 1$ if a bride married for the first time at the age of 16 or younger. The variable equals zero otherwise. $yrAFTER$ is a dummy for the year 2000, the period after Raskin has been introduced. Our key regressor, *Raskin*, equals 1 if the girl's parental household received Raskin in the year 2000. The vector X accounts for a number of individual and household level characteristics likely affecting the child marriage, such as household size, expenditure shares, religion, age of menarche, urban, dwelling conditions and highest level of education.

Low income is usually one of the main reasons for parents pushing to marry their daughters at an early age, hoping it may give them a better, more prosperous life. As income data is rather poor for developing countries, including Indonesia, we use expenditure data to proxy for income. We take the share of expenditure spent on food, the share of expenditure spent on education, and the medical expenditure share from Witoelar (2009). All these measures were computed by dividing household food, medical, and education expenditure

by household total expenditure (Witoelar, 2009). While high share of expenditure on food would indicate lower income, high share of education spending would be characteristic of wealthier families. High medical expenditure share could be a signal for a very poor household or a household that cares a lot about health. Households with a larger number of family members or rural households are expected to be poorer and more likely to marry off girls earlier. As such, we control for the household size and urban location.

As child marriage is a cultural phenomenon and practiced by some religions more commonly than others, we control for the bride's religion. The variable *Islam* is equal to 1 if the bride's religion is Islam, and zero - otherwise. Moreover, in some developing countries, girls are thought to be marriageable at the age of menarche, i.e. her first menstruation (Field and Ambrus, 2008). Earlier menarche could also be a sign of poor nutrition, psychological stress and general wellbeing. Therefore, we include the girl's age at first menstruation (i.e. *age of menarche*) as a control variable.

Education has often been linked to women's wellbeing and child marriage. While education has long been compulsory in Indonesia until grade 12, the enrollment and completion rates have been far from the target. For example, in 2011, the net enrollment rate for primary education was about 93%, decreasing for middle school to 77.71% and for high school to 57.74%.[8] Before the Asian economic crisis 90 percent of children between the age of 7 to 12 were in school.[9] The figure plummeted afterwards partly because children were needed to help bring in money. The drop out rate among poor teenagers doubled to 25 percent. These effects were compounded by the introduction of school fees as government funding disappeared.

We include the highest level of education completed by the woman as dummy variables, with no education being the base case. The variables are completed elementary (i.e. *elementary edu*), completed junior high (i.e. *junior edu*), and completed senior high (i.e. *senior edu*). Similarly, we control for whether parents completed elementary education as their highest degree (i.e. *mother - elementary edu* and *father - elementary edu*). Unfortunately, there is not enough data on the parents to control for their junior and senior education.

[8] Suryadarma et al. (2006) discuss the causes for low enrollment rates.
[9] Taken from http://factsanddetails.com/indonesia/Education_Health_Energy_Transportation/sub6_6a/entry-4072.html

This is not surprising as education enrollments and literacy have been much lower in the earlier years in Indonesia.

Last but not least, we control for the girl's original household's conditions, which could be another indicator of household poverty. We look at whether the girls' original dwelling had electricity and water, whether they had poor sanitation, and whether they used firewood to cook. The variable *health card* indicates whether the parents' household has a health card, another government subsidy, and hence, an indicator of poverty.

3.3 Estimation Strategy

Given that the assignment of Raskin is not random, we use matching as the first step of the empirical approach to estimate the effect of Raskin. The idea behind matching is to find a counterfactual for each individual in the sample who has actually received the treatment (i.e. Raskin). To do so, we need to find at least one non-treated individual (i.e. did not receive Raskin) who shares similar characteristics as the treated individual in the sample. As such, we will first prune our sample to the point where it contains recipients and non-recipients of Raskin with the same characteristics. This involves pre-processing the sample such that the covariates of the Raskin recipients (treatment group) and non-recipients (control group) are balanced. When these covariates are balanced, then Raskin should in principle be independent of them. Subsequently, we may calculate the average treatment effect of Raskin simply by taking the difference between the average of the outcome variable between the Raskin recipients and non-recipients who are matched.

There are many ways to match the treated observations with the non-treated. Some approaches include matching the treated with the non-treated using their propensity scores, or scores calculated from a certain metric (e.g. the Mahalanobis metric). The ideal but also often infeasible approach is *exact* matching. This involves matching a treated with a non-treated that shares exactly the same covariate values. However, when continuous covariates are involved, it is easy to see why it is infeasible to find a non-treated with exactly the same covariate values as a match for the treated.

To address this difficulty, we could pre-process our data by coarsening the covariates. This is achieved by replacing the original covariates values with a set of values that convey

less information than the original. To fix ideas, let us consider the hypothetical example. Suppose we have two households reporting a monthly income of INR 3,152,000 and INR 2,937,000. To coarsen these values, we could replace them with INR 3,000,000 in the data, so that the monthly income data becomes less granular. By coarsening the covariates, we will have a greater likelihood of finding observations with the exact values of the coarsened covariates. This approach of implementing the exact matching technique on coarsened covariates is known as Coarsened Exact Matching (CEM), first proposed by Iacus et al. (2012).

To implement CEM, we use the Freedman-Diaconnis rule to generate bins with which the covariates are coarsened. For example, for the variable x, the Freedman-Diaconnis rule determines the size of the bins based on the rule

$$\text{Bin size} = 2\,\frac{\text{IQR}(x)}{\sqrt[3]{n}}$$

where $IQR(x)$ is the interquartile range of the data and n is the number of observations in the sample. Then, we match the treatment and controls based on our coarsened income related variables, namely, food expenditure share, education expenditure share, medical expenditure share, and household size. After having matched the treatment and controls, we estimate Eq. (1) using Probit regression with robust standard errors clustered at the province level. Province dummies are included in all regressions. For sensitivity checks we use a standard OLS regression with the errors clustered at the province level.

4 Results

4.1 CEM matching results

First, as part of CEM, we match the treated and control households based on the control variables that affect both the treatment and the outcome. The exact assignment rule for Raskin that is used by the government is not known to us. According to Timmer et al. (2017), the assignment rule has been changing over time and was based on surveys. As Raskin is a program targeted at the poorest households based on income, we match our

samples based on the household characteristics that proxy for income and poverty: share of food expenditure, share of education expenditure, share of medical expenditures, and household size. The CEM produces a reasonable match which can be seen by comparing the pre-matching and the post-matching covariates balance (Table 2). The overall balance (i.e. distance) is improved from 0.455 to 0.259, while all the mean differences are reduced to nearly zero (insignificant) in the post-match. It is expected that some imbalance remains after the matching and can be controlled for via our probit model.

4.2 Regression results

We report the results for the probit model in equation (1) with a stricter definition of child marriage (marrying before the age of 16). The results for the same regression using OLS are qualitatively similar (see Tables A1-A4 in Appendix A).

Tables 3 - 6 present the marginal effects at means from estimating several specifications of the model in equation (1) that progressively include information on the expenditure shares, household characteristics, religion, education and a number of dwelling conditions controls. A few findings are worth discussing. First, the effect of Raskin on child marriage remains consistently negative in all specifications. Controlling for expenditure, education, and household dwelling characteristics makes this effect even stronger in magnitude. Our final and preferred model, shown in column 2 of Table 6, suggests that the effect of receiving Raskin significantly reduces the likelihood of child marriage by 13 percentage points among the brides.

Second, other factors also play an important role in decreasing the probability to marry as a child. Having a health card reduces the likelihood of child marriage by about 9 percentage points. Having the onset of period later, which may be linked to good nutrition and general health, and psychological wellbeing, appears to delay the marriage. One year delay in menarche is associated with a 2 percentage points decrease in the probability to marry as a child. Girls who live in better conditions, for example with access to water or electricity in their dwelling, are also less likely to marry early. This is in contrast to cooking with firewood and having poor sanitation, both of which are associated with a higher risk of being married while under age. Religion is another important factor in determining the probability of child

marriage. Girls whose religion is Islam are 8% more likely to marry under the age of 16 compared to their non-Muslim peers.

Education of the bride has a significant effect in our short models (Table 4), though with a different sign for different levels of education. Having elementary or junior high school completion as their highest level of education makes girls more vulnerable to child marriage (by about 7-8%), while completing a senior high school reduces the likelihood of marrying before 16 by 15%. This is in line with the story that completing primary or middle school makes girls more desirable as brides while completing the high school provides girls with some knowledge and power to make more positive decisions. This being said, the strong significant effects of brides' education levels become insignificant once we add the dwelling conditions controls suggesting that these education controls may be reflecting the effects of poverty more than the education itself. Surprisingly, mother's and father's education does not seem to have a statistically significant impact on the likelihood of their daughters being married while under age in any of our specifications. Neither does household size or food expenditure share. Having an urban household or having a higher share of education expenditure are negatively correlated with child marriage, but these effects become insignificant when looking at the full model, perhaps reflecting more the effect of welfare or financial prosperity.

4.3 Sensitivity and Robustness checks

4.3.1 Bayesian Model Averaging Approach

In Section 4.1 we matched the treatment and control groups based on various income and poverty proxies using CEM. However, the matching results may vary across model specifications based on which characteristics we match on. As the exact treatment assignment rule is not known, for robustness checks, we deal with the dependence of inference on matching criteria by applying Bayesian Model Averaging (BMA) by Magnus et al. (2010). The method considers a set of all possible models obtained by permutation of auxiliary explanatory variables and produces posterior weights for each of the models. A posterior distribution for each of the parameters is obtained by averaging the models using their corresponding posterior weights.

For the matching regression, we use a constant and province dummies as the focus regressors and specify all the possible characteristics as auxiliary regressors.[10] Table 7 reports the posterior inclusion probability (PIP) for each of the regressors (Column 1), the posterior mean and the square root of the posterior variance (Column 2). The PIP can be interpreted as a posterior probability that a regressor is included in the true model. The posterior mean and standard deviation represent the model-averaged coefficient estimates and standard errors respectively. Share of food expenditure, urban, Islamic religion and electricity have the PIP greater than 0.5 and are, therefore, most likely to be included in the true model. The CEM matching using these regressors is reported in Table 8. Unfortunately, we do not have enough observations in these groups, so this significantly cuts down our resulting sample size to 321. Nevertheless, we proceed with this exercise as a robustness check.

As the second step, we use BMA for our main regression using OLS with CEM weights to identify the most likely independent variables affecting child marriage ($PIP > 0.5$).[11, 12] These are mother's elementary education and poor sanitation (Table 9, Columns (1) and (2)). The final regression results, after using BMA for both CEM and main regressions, are reported in Table 9, Column (3). The main coefficient of interest, the effect of Raskin on child marriage, is similar to the ones in our main results (around -0.1).

4.3.2 Marriage Under 18

The results are slightly weaker (Table 10) if we relax the definition of child marriage to include girls that marry under the age of 18 instead of 16 (the UNICEF definition).

Table 11 reports the results for the same BMA exercise for those married under the age of 18 instead of 16. The results again paint a similar picture as the main results in Table 10.

[10] Including province dummies into the set of auxiliary regressors would produce over 2 billion models, so we do not proceed with this exercise.
[11] Raskin, year dummies and province dummies were taken as the main focus variables while the rest of the characteristics were taken as auxiliary regressors.
[12] The BMA technique is not available for probit models, so we only use the OLS version.

5 Conclusion

In this paper, we make a first attempt at examining the impacts of the rice for poor program (Raskin) on the likelihood of child marriage in Indonesia. In part, because for many poor families child marriage is often seen as a way out of poverty, subsidy programs like Raskin may ease the financial burdens and help diminish the need for underage unions. Using data from the 1997 and 2000 waves of Indonesian Family Life Survey (IFLS), we find that the Raskin program does reduce the likelihood of marrying under the age of 16 by approximatel 13 percentage points.

Overall, our results shed some light on the implications that targeted subsidy programs such as Raskin, can have on such issues as child marriage, though they are not specifically designed to directly solve these problems.

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Tables

Table 1: Descriptive Summary

	Full sample	Child marriage	
		No	Yes
child marriage	0.106 (0.308)		
Raskin	0.076 (0.265)	0.079 (0.269)	0.056 (0.231)
household size	2.643 (3.022)	2.687 (3.043)	2.271 (2.814)
food expenditure share	29.150 (31.05)	29.079 (30.634)	29.784 (34.46)
edu expenditure share	3.168 (7.951)	3.404 (8.328)	1.165 (2.599)
medical expenditure share	0.838 (3.149)	0.894 (3.301)	0.363 (1.168)
urban	0.471 (0.499)	0.493 (0.500)	0.294 (0.457)
age of menarche	14.01 (3.659)	14.046 (3.270)	13.746 (6.011)
Islam	0.725 (0.447)	0.724 (0.447)	0.730 (0.445)
elementary edu	0.276 (0.447)	0.259 (0.438)	0.417 (0.494)
junior edu	0.150 (0.357)	0.145 (0.353)	0.191 (0.394)
senior edu	0.123 (0.328)	0.136 (0.343)	0.015 (0.121)
mother - elementary edu	0.204 (0.403)	0.199 (0.399)	0.244 (0.431)
father - elementary edu	0.214 (0.410)	0.210 (0.408)	0.244 (0.431)
electricity	0.847 (0.360)	0.864 (0.343)	0.694 (0.463)
water	0.192 (0.394)	0.199 (0.399)	0.129 (0.337)
toilet at river, land, sea	0.297 (0.457)	0.279 (0.449)	0.460 (0.500)
cook with firewood	0.483 (0.500)	0.459 (0.499)	0.702 (0.459)
health card	0.130 (0.336)	0.135 (0.342)	0.081 (0.273)

Note: This table presents mean (sd) of main variables of interest. Standard errors are reported in the parenthesis.

Table 2: Covariates Balance

	Pre-matching Imbalanced = 0.455			Post-matching Imbalanced = 0.259		
	Raskin		Mean Diff	Raskin		Mean Diff
	No	Yes		No	Yes	
household size	2.738	1.497	1.242***	1.606	1.44	0.166
food expenditure share	29.94	19.798	10.142***	22.32	19.134	3.187
edu expenditure share	3.341	1.108	2.233***	1.274	1.098	0.176
medical expenditure share	0.865	0.512	0.353*	0.255	0.366	-0.111

Note: $^{*}p < 10\%, ^{**}p < 5\%, ^{***}p < 1\%$.

Table 3: Baseline results: Effect of Raskin on Child Marriage – Probit Estimates

	(1)	(2)	(3)	(4)	(5)
yrAFTER	0.074**	0.077**	0.070**	0.035	0.153***
	(0.033)	(0.037)	(0.034)	(0.038)	(0.037)
Raskin	-0.098**	-0.103**	-0.102***	-0.099***	-0.095**
	(0.039)	(0.040)	(0.037)	(0.037)	(0.037)
household size			0.002	0.003	0.003
			(0.009)	(0.009)	(0.010)
food expenditure share			0.001	0.000	0.000
			(0.001)	(0.001)	(0.001)
edu expenditure share			-0.009***	-0.008**	-0.008**
			(0.004)	(0.004)	(0.004)
medical expenditure share			-0.029*	-0.023	-0.025
			(0.015)	(0.016)	(0.016)
urban				-0.068***	-0.071***
				(0.026)	(0.026)
age of menarche					0.000
					(0.004)
Islam					0.130***
					(0.031)
Observations	1468	1256	1256	1256	1256
Province FEs	No	Yes	Yes	Yes	Yes
Rsq	0.0131	0.0403	0.0530	0.0631	0.0710

Note: This table reports the marginal effects at the mean. All results are derived from probit regression results. Cluster-robust standard errors are reported in the parenthesis, standard errors are clustered at province level, $^{*}p < 10\%,^{**}\, p < 5\%,^{***}\, p < 1\%$.

Table 4: Effect of Raskin on Child Marriage: Control for Education

	(1)	(2)	(3)	(4)
yrAFTER	0.167***	0.157***	0.158***	0.158***
	(0.040)	(0.042)	(0.040)	(0.040)
Raskin	-0.091**	-0.110***	-0.115***	-0.115***
	(0.036)	(0.032)	(0.028)	(0.028)
household size	0.002	-0.000	0.001	0.000
	(0.010)	(0.010)	(0.010)	(0.010)
food expenditure share	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
edu expenditure share	-0.007**	-0.008**	-0.008**	-0.008**
	(0.004)	(0.004)	(0.004)	(0.004)
medical expenditure share	-0.028*	-0.029**	-0.032**	-0.030***
	(0.015)	(0.012)	(0.012)	(0.011)
urban	-0.054**	-0.051**	-0.050**	-0.051**
	(0.024)	(0.023)	(0.024)	(0.023)
age of menarche	-0.000	0.000	0.000	0.000
	(0.004)	(0.004)	(0.004)	(0.004)
Islam	0.091**	0.094**	0.093**	0.094**
	(0.038)	(0.040)	(0.039)	(0.039)
elementary edu	0.073***	0.074***	0.073***	0.073***
	(0.027)	(0.026)	(0.026)	(0.026)
junior edu	0.084***	0.081***	0.082***	0.081***
	(0.023)	(0.024)	(0.024)	(0.024)
senior edu	-0.148**	-0.150**	-0.150**	-0.150**
	(0.070)	(0.069)	(0.069)	(0.069)
mother - elementary edu		0.036		0.027
		(0.031)		(0.034)
father - elementary edu			0.041	0.033
			(0.035)	(0.037)
Observations	1256	1256	1256	1256
Province FEs	Yes	Yes	Yes	Yes
Rsq	0.0967	0.105	0.105	0.106

Note: This table reports the marginal effects at the mean. All results are derived from probit regression results. All regressions are control for province fixed effects. Cluster-robust standard errors are reported in the parenthesis, standard errors are clustered at province level, $^{*}p < 10\%, ^{**}p < 5\%, ^{***}p < 1\%$.

Table 5: Effect of Raskin on Child Marriage – Control for Household poverty

	(1)	(2)	(3)	(4)
yrAFTER	0.131***	0.145***	0.163***	0.171***
	(0.041)	(0.043)	(0.044)	(0.044)
Raskin	-0.098***	-0.107***	-0.112***	-0.113***
	(0.033)	(0.033)	(0.033)	(0.032)
household size	-0.000	0.001	-0.000	0.001
	(0.009)	(0.009)	(0.009)	(0.010)
food expenditure share	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
edu expenditure share	-0.006	-0.005	-0.004	-0.004
	(0.005)	(0.004)	(0.004)	(0.004)
medical expenditure share	-0.021	-0.024*	-0.023*	-0.023*
	(0.014)	(0.013)	(0.013)	(0.013)
urban	-0.065	-0.055	-0.033	-0.028
	(0.044)	(0.044)	(0.047)	(0.045)
age of menarche	-0.017**	-0.017***	-0.018***	-0.018***
	(0.007)	(0.007)	(0.006)	(0.006)
Islam	0.110***	0.106***	0.102***	0.104***
	(0.017)	(0.017)	(0.017)	(0.016)
electricity	-0.092**	-0.088**	-0.060	-0.057
	(0.037)	(0.036)	(0.037)	(0.037)
water	-0.056	-0.054	-0.048	-0.049
	(0.051)	(0.051)	(0.050)	(0.050)
toilet at river, land, sea		0.096***	0.083***	0.083***
		(0.027)	(0.025)	(0.025)
cook with firewood			0.072	0.076
			(0.047)	(0.046)
health card				-0.078*
				(0.043)
Observations	628	628	628	628
Province FEs	Yes	Yes	Yes	Yes
Rsq	0.142	0.170	0.182	0.189

Note: This table reports the marginal effects at the mean. All results are derived from probit regression results. All regressions are control for province fixed effects. Cluster-robust standard errors are reported in the parenthesis, standard errors are clustered at province level, $^{*}p < 10\%, ^{**}p < 5\%, ^{***}p < 1\%$.

Table 6: Effect of Raskin on Child Marriage – Control for Education and Household poverty

	(1)	(2)
yrAFTER	0.184***	0.196***
	(0.053)	(0.055)
Raskin	-0.134***	-0.137***
	(0.028)	(0.027)
household size	0.002	0.003
	(0.009)	(0.009)
food expenditure share	0.000	0.000
	(0.001)	(0.001)
edu expenditure share	-0.005	-0.004
	(0.004)	(0.004)
medical expenditure share	-0.026**	-0.027**
	(0.012)	(0.011)
urban	-0.018	-0.013
	(0.047)	(0.045)
age of menarche	-0.018***	-0.018***
	(0.007)	(0.006)
Islam	0.084***	0.087***
	(0.025)	(0.025)
elementary edu	0.024	0.026
	(0.039)	(0.039)
junior edu	-0.018	-0.021
	(0.031)	(0.031)
mother - elementary edu	0.029	0.037
	(0.032)	(0.033)
father - elementary edu	0.020	0.019
	(0.046)	(0.048)
electricity	-0.061*	-0.057
	(0.037)	(0.036)
water	-0.051	-0.053
	(0.050)	(0.050)
toilet at river, land, sea	0.077***	0.076***
	(0.026)	(0.025)
cook with firewood	0.077*	0.081*
	(0.047)	(0.046)
health card		-0.091**
		(0.042)
Observations	577	577
Province FEs	Yes	Yes
Rsq	0.189	0.197

Note: This table reports the marginal effects at the mean. All results are derived from probit regression results. All regressions are control for province fixed effects. Cluster-robust standard errors are reported in the parenthesis, standard errors are clustered at province level, $^{*}p < 10\%$,$^{**}p < 5\%$,$^{***}p < 1\%$.

Table 7: BMA results for variables which are important to CEM matching

	(1) pip	(2) LS-BMA
household size	0.116	-0.001
		(0.002)
food expenditure share	1.000	-0.002***
		(0.000)
edu expenditure share	0.092	-0.000
		(0.000)
medical expenditure share	0.033	-0.000
		(0.000)
urban	1.000	-0.106***
		(0.020)
age of menarche	0.139	0.001
		(0.002)
elementary edu	0.102	-0.004
		(0.014)
junior edu	0.081	-0.003
		(0.014)
senior edu	0.337	-0.020
		(0.032)
Islam	1.000	-0.276***
		(0.021)
mother - elementary edu	0.037	-0.000
		(0.005)
father - elementary edu	0.278	0.012
		(0.023)
electricity	0.724	0.051
		(0.037)
water	0.036	-0.001
		(0.005)
toliet at river, land, sea	0.073	0.002
		(0.008)
cook with firewood	0.039	-0.001
		(0.005)
health card	0.159	0.007
		(0.019)
Observations	1,185	1185

Note: $^{*}p < 10\%,^{**}\, p < 5\%,^{***}\, p < 1\%$.

Table 8: Covariates Balance: BMA suggested variables

	Pre-matching Imbalanced = 0.828			Post-matching Imbalanced = 0.000		
	Raskin		Mean Diff	Raskin		Mean Diff
	No	Yes		No	Yes	
food expenditure share	2.738	1.497	1.242***	1.983	1.413	0.57*
urban	29.94	19.798	10.142***	28.738	19.423	9.316***
Islam	3.341	1.108	2.233***	1.46	0.946	0.514
electricity	0.865	0.512	0.353*	0.597	0.498	0.099

Note: $^{*}p < 10\%, ^{**}p < 5\%, ^{***}p < 1\%$.

Table 9: BMA results for child marriage

	(1) pip	(2) LS-BMA	(3) Best model
yrAFTER	1.000	0.201***	0.163***
		(0.061)	(0.044)
Raskin	1.000	-0.094*	-0.105**
		(0.051)	(0.044)
household size	0.063	-0.000	
		(0.003)	
food expenditure share	0.062	-0.000	
		(0.000)	
edu expenditure share	0.063	0.000	
		(0.002)	
medical expenditure share	0.054	-0.000	
		(0.003)	
age of menarche	0.057	0.000	
		(0.001)	
elementary edu	0.053	-0.001	
		(0.063)	
junior edu	0.067	0.014	
		(0.097)	
senior edu	0.080	-0.010	
		(0.057)	
mother - elementary edu	0.701	0.084	0.115**
		(0.065)	(0.044)
father - elementary edu	0.126	0.008	
		(0.028)	
electricity	0.064	0.003	
		(0.023)	
water	0.184	-0.016	
		(0.039)	
toilet at river, land, sea	0.890	0.114**	0.108**
		(0.056)	(0.044)
cook with firewood	0.139	0.009	
		(0.027)	
health card	0.223	-0.019	
		(0.041)	
Observations	321	321	321

Note: Province dummies are included as main focus variables for BMA and main regressors in Column (3). Column (2) reports the posterior mean and standard deviation which represent the model-averaged coefficient estimates and standard errors respectively. Column (3) reports cluster-robust standard errors which are in the parenthesis, standard errors are clustered at province level, $^{*}p < 10\%$,** $p < 5\%$,*** $p < 1\%$.

Table 10: Raskin, Education and Household poverty: UNICEF Definition

	(1)	(2)	(3)	(4)
yrAFTER	0.066***	0.071***	0.051	0.034
	(0.024)	(0.018)	(0.073)	(0.060)
Raskin	-0.042	-0.064	-0.069	-0.087**
	(0.056)	(0.048)	(0.052)	(0.044)
household size	0.035***	0.032***	0.032***	0.028***
	(0.010)	(0.008)	(0.009)	(0.007)
food expenditure share	-0.002***	-0.002***	-0.004***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
edu expenditure share	0.003	0.002	0.006	0.004
	(0.005)	(0.004)	(0.004)	(0.003)
medical expenditure share	-0.022**	-0.025***	-0.022**	-0.023**
	(0.009)	(0.008)	(0.009)	(0.009)
urban	-0.115***	-0.083***	-0.066	-0.031
	(0.031)	(0.030)	(0.044)	(0.044)
age of menarche	-0.002	-0.002	-0.016**	-0.015**
	(0.005)	(0.005)	(0.008)	(0.007)
Islam	0.074*	0.013	0.091	0.022
	(0.045)	(0.045)	(0.060)	(0.063)
elementary edu		0.081***		0.004
		(0.026)		(0.040)
junior edu		0.149***		0.121**
		(0.041)		(0.048)
senior edu		-0.228***		-0.371***
		(0.069)		(0.101)
mother - elementary edu		0.050		0.063
		(0.037)		(0.039)
father - elementary edu		0.104***		0.099***
		(0.038)		(0.037)
electricity			-0.089	-0.072
			(0.055)	(0.051)
water			-0.009	-0.011
			(0.052)	(0.044)
toilet at river, land, sea			0.071**	0.065***
			(0.028)	(0.025)
cook with firewood			0.076	0.071
			(0.050)	(0.046)
health card			-0.154***	-0.152***
			(0.045)	(0.039)
Observations	1381	1381	701	701
Province FEs	Yes	Yes	Yes	Yes
Rsq	0.0867	0.138	0.168	0.218

Note: We use the UNICEF definition of child marriage to include girls that marry under the age of 18. This table reports the marginal effects at the mean. All results are derived from probit regression results. All regressions are control for province fixed effects. Cluster-robust standard errors are reported in the parenthesis, standard errors are clustered at province level, $^{*}p < 10\%$,** $p < 5\%$,*** $p < 1\%$,$^{+}$ $p < 13\%$.

Table 11: BMA results for child marriage: UNICEF Definition

	(1) pip	(2) LS-BMA	(3) Best model
yrAFTER	1.000	0.037	0.067
		(0.093)	(0.131)
Raskin	1.000	-0.063	-0.084+
		(0.066)	(0.051)
household size	0.061	-0.000	
		(0.004)	
food expenditure share	0.061	-0.000	
		(0.000)	
edu expenditure share	0.067	-0.000	
		(0.002)	
medical expenditure share	0.081	0.001	
		(0.006)	
age of menarche	0.080	0.000	
		(0.002)	
elementary edu	0.054	0.002	
		(0.083)	
junior edu	0.055	-0.004	
		(0.099)	
senior edu	0.631	-0.327	-0.483**
		(0.296)	(0.218)
mother - elementary edu	0.895	0.185**	0.211**
		(0.085)	(0.094)
father - elementary edu	0.231	0.028	
		(0.061)	
electricity	0.167	0.027	
		(0.074)	
water	0.060	0.002	
		(0.017)	
toilet at river, land, sea	0.981	0.193***	0.158**
		(0.059)	(0.064)
cook with firewood	0.585	0.083	0.142
		(0.082)	(0.091)
health card	0.569	-0.087	-0.149*
		(0.089)	(0.080)
Observations	321	321	321

Note: We use the UNICEF definition of child marriage to include girls that marry under the age of 18. Province dummies are included as main focus variables for BMA and main regressors in Column (3). Column (2) reports the posterior mean and standard deviation which represent the model-averaged coefficient estimates and standard errors respectively. Column (3) reports cluster-robust standard errors which are in the parenthesis, standard errors are clustered at province level, $^{*}p < 10\%$,** $p < 5\%$,*** $p < 1\%$.

Appendix A: OLS results

Table A1: OLS: Baseline results

	(1)	(2)	(3)	(4)	(5)
yrAFTER	0.089*	0.083*	0.079	0.041	0.100*
	(0.045)	(0.047)	(0.045)	(0.050)	(0.047)
Raskin	-0.110**	-0.107**	-0.106**	-0.105**	-0.102**
	(0.046)	(0.047)	(0.046)	(0.046)	(0.046)
household size			0.002	0.003	0.004
			(0.007)	(0.007)	(0.008)
food expenditure share			0.000	0.000	0.000
			(0.001)	(0.001)	(0.001)
edu expenditure share			-0.006***	-0.005***	-0.005**
			(0.002)	(0.002)	(0.002)
medical expenditure share			-0.007**	-0.005*	-0.006
			(0.002)	(0.003)	(0.003)
urban				-0.066**	-0.068**
				(0.026)	(0.027)
age of menarche					-0.000
					(0.005)
Islam					0.069*
					(0.035)
Observations	1468	1381	1381	1381	1381
Province FEs	No	Yes	Yes	Yes	Yes
Adj. Rsq	0.00896	0.0309	0.0327	0.0394	0.0407

Note: This table reports OLS regression results. Cluster-robust standard errors are reported in the parenthesis, standard errors are clustered at province level, $^{*}p < 10\%, ^{**}p < 5\%, ^{***}p < 1\%$.

Table A2: OLS: Raskin and Education

	(1)	(2)	(3)	(4)
yrAFTER	0.116**	0.103*	0.104**	0.103**
	(0.047)	(0.048)	(0.048)	(0.047)
Raskin	-0.099*	-0.109**	-0.110**	-0.109**
	(0.047)	(0.045)	(0.043)	(0.042)
household size	0.003	0.001	0.001	0.001
	(0.008)	(0.007)	(0.008)	(0.008)
food expenditure share	0.000	-0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
edu expenditure share	-0.004**	-0.005**	-0.005**	-0.005**
	(0.002)	(0.002)	(0.002)	(0.002)
medical expenditure share	-0.007*	-0.006*	-0.006*	-0.006*
	(0.004)	(0.003)	(0.003)	(0.003)
urban	-0.053*	-0.052*	-0.052*	-0.052*
	(0.025)	(0.025)	(0.024)	(0.025)
age of menarche	-0.000	-0.000	-0.000	-0.000
	(0.005)	(0.005)	(0.005)	(0.005)
Islam	0.040	0.039	0.040	0.039
	(0.031)	(0.032)	(0.031)	(0.032)
elementary edu	0.068**	0.068**	0.067**	0.068**
	(0.029)	(0.029)	(0.030)	(0.029)
junior edu	0.069**	0.069**	0.069**	0.068**
	(0.027)	(0.027)	(0.028)	(0.028)
senior edu	-0.040***	-0.042***	-0.042***	-0.042***
	(0.011)	(0.010)	(0.011)	(0.011)
mother - elementary edu		0.019		0.016
		(0.038)		(0.039)
father - elementary edu			0.013	0.007
			(0.036)	(0.038)
Observations	1381	1381	1381	1381
Province FEs	Yes	Yes	Yes	Yes
Adj. Rsq	0.0502	0.0531	0.0530	0.0524

Note: This table reports OLS regression results. All regressions are control for province fixed effects. Cluster-robust standard errors are reported in the parenthesis, standard errors are clustered at province level, $^{*}p < 10\%$,$^{**}p < 5\%$,$^{***}p < 1\%$.

Table A3: OLS: Raskin and Household poverty

	(1)	(2)	(3)	(4)
yrAFTER	0.081	0.103	0.123*	0.129*
	(0.057)	(0.058)	(0.064)	(0.064)
Raskin	-0.102**	-0.110**	-0.113**	-0.113**
	(0.044)	(0.043)	(0.042)	(0.041)
household size	0.001	0.002	0.002	0.002
	(0.008)	(0.008)	(0.008)	(0.008)
food expenditure share	-0.000	-0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
edu expenditure share	-0.003	-0.003	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)
medical expenditure share	-0.004	-0.004	-0.003	-0.004
	(0.003)	(0.003)	(0.003)	(0.004)
urban	-0.061*	-0.057	-0.036	-0.033
	(0.033)	(0.033)	(0.037)	(0.035)
age of menarche	-0.005	-0.005	-0.005	-0.005
	(0.003)	(0.003)	(0.003)	(0.003)
Islam	0.051	0.062	0.059	0.061
	(0.052)	(0.049)	(0.050)	(0.049)
electricity	-0.126**	-0.117*	-0.096*	-0.095*
	(0.056)	(0.055)	(0.051)	(0.050)
water	-0.034	-0.031	-0.028	-0.024
	(0.042)	(0.041)	(0.041)	(0.040)
toilet at river, land, sea		0.100**	0.089**	0.089**
		(0.037)	(0.033)	(0.033)
cook with firewood			0.057	0.058
			(0.050)	(0.050)
health card				-0.049
				(0.032)
Observations	701	701	701	701
Province FEs	Yes	Yes	Yes	Yes
Adj. Rsq	0.0693	0.0872	0.0912	0.0925

Note: This table reports OLS regression results. All regressions are control for province fixed effects. Cluster-robust standard errors are reported in the parenthesis, standard errors are clustered at province level, $^{*}p < 10\%$,** $p < 5\%$,*** $p < 1\%$.

Table A4: OLS: Raskin, Education and Household poverty

	(1)	(2)
yrAFTER	0.126*	0.133*
	(0.071)	(0.070)
Raskin	-0.118**	-0.118***
	(0.040)	(0.039)
household size	0.001	0.002
	(0.007)	(0.007)
food expenditure share	0.000	0.000
	(0.001)	(0.001)
edu expenditure share	-0.003	-0.002
	(0.002)	(0.002)
medical expenditure share	-0.001	-0.002
	(0.003)	(0.003)
urban	-0.034	-0.031
	(0.035)	(0.033)
age of menarche	-0.005	-0.005
	(0.003)	(0.003)
Islam	0.059	0.063
	(0.045)	(0.045)
elementary edu	0.000	-0.004
	(0.039)	(0.041)
junior edu	-0.036	-0.043
	(0.025)	(0.025)
senior edu	-0.060**	-0.059**
	(0.027)	(0.025)
mother - elementary edu	0.024	0.031
	(0.038)	(0.039)
father - elementary edu	-0.013	-0.017
	(0.042)	(0.042)
electricity	-0.096*	-0.095*
	(0.050)	(0.049)
water	-0.034	-0.031
	(0.040)	(0.039)
toilet at river, land, sea	0.079**	0.078**
	(0.031)	(0.032)
cook with firewood	0.055	0.056
	(0.051)	(0.050)
health card		-0.060**
		(0.027)
Observations	701	701
Province FEs	Yes	Yes
Adj. Rsq	0.0931	0.0955

Note: This table reports the marginal effects at the mean. All results are derived from probit regression results. All regressions are control for province fixed effects. Cluster-robust standard errors are reported in the parenthesis, standard errors are clustered at province level, $^{*}p < 10\%$,** $p < 5\%$,*** $p < 1\%$.