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**Conference Paper**

# Socio-economic determinants of child marriage: evidence from the Iranian provinces

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**Socio-economic determinants of child marriage: evidence from the Iranian provinces**

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**Socio-economic determinants of child marriage: evidence from the Iranian provinces**

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**Abstract**

We study the socio-economic determinants of child (girls below age of 19 years) marriage using a panel data of thirty Iranian provinces from 2007 to 2015. Our panel fixed effects and generalized method of moments (GMM) estimations show that the level of income per capita (with negative effect), inflation and income inequality (both with positive effect) are the significant determinants of child marriage. Our results which control for province fixed effects (e.g. local cultural norms or geographical conditions) do not show a significant effect of religiosity captured by a household's spending on religious products and services. To reduce child marriage, which has long-run negative effects on the development of children, policymakers need to focus on economic issues and distribution of income, thus reducing the economic incentives or necessities of families to accept the practice of child marriage. Child marriage is more rooted in economic deprivation than in religiosity of households.

**Keywords:** child marriage; Iran; poverty; panel regression

**JEL Classifications:** J12, J13, P46

## 1. Introduction

Children are one of the most vulnerable groups in society, and the danger of having different people in the family or community threaten their rights is always at stake[1]. Child marriage is one of the issues that deprive children, especially girls, of their rights (Raj, 2010). The United Nations Population Fund (UNFPA), defines early child marriage as "any marriage carried out below the age of 18 years, before the girl is physically and psychologically ready to handle the responsibilities of marriage and childbearing" (International Planned Parenthood Federation, 2006). In principle, a marriage arranged by a guardian on behalf of the child who is less than the legal age, which is usually at least 18 years, is called child marriage. However, the term is generally used for marrying an underage girl mostly to an unusually older man, to maintain ethnic or family traditions.

Since it is typically hard to get official and accurate data in developing countries, very few studies have examined roots and drivers of child marriage. However, several studies deal with its harms and provide evidence on negative consequences of child marriage (e.g., Jensen & Thornton, 2003; Nour, 2009; Le Strat et al., 2011; Nguyen & Wodon, 2012; Maertens, 2013; Riggio, 2015; Parsons et al., 2015; Delprato et al., 2017; Watson, 2018; Yount et al., 2018; John et al., 2019), especially for girls.

Recently, the issue of child marriage has attracted the attention of Iranian society and has been debated by policymakers and non-profit organizations (NGOs) especially after the public outcry over the forced marriage of an eleven year old girl[2]. Iran is one of few developing countries with official annual data on marriages in different ages, including marriages below the legal age. However, little research, with the exception of descriptive study of Ahmady (2017), has been done to examine why, despite all the harms of child marriage, Iranian families in some provinces continue to practice it more than others. Yet, there is neither an empirical study on socio-economic determinants of *child marriage*, nor a consensus on the drivers of the regional difference in *early marriage* in Iran.[3]

In this paper, for the first time, we use public time series data on child marriage (girls) across Iranian provinces to identify the effects of social and economic factors on this phenomenon. Our panel regression method enables us to control province specific factors (e.g., local norms and traditions and differences in local climate) by including fixed effects, reducing the risk of omitted variable bias. Our results covering thirty provinces in Iran from 2007 to 2015 show that lower levels of income per capita, higher levels of inflation, and income inequality are the main drivers of child marriage across Iran. Religiosity measured by share of households spending on religious products and services in total spending is not significantly related to child marriage rate.

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[1] According to the *Convention of Rights of the Child*[1], a child is considered to be from the age of birth to 18, though the age may differ depending on a countries' specific law. (see https://www.ohchr.org/documents/professionalinterest/crc.pdf)

[2] https://observers.france24.com/en/20190906-video-11-year-old-bride-iran

[3] Farzanegan and Gholipour (2016, 2018) and Gholipour and Farzanegan (2015) examined the economic determinants of total marriage and divorce rates in Iran

The rest of the paper proceeds as follows: Section 2 provides a background on child marriage and related laws in Iran. In Section 3, we discuss the relevant literature on the determinants of child marriage in Iran and in other developing countries upon which we base our empirical analysis. Section 4 presents empirical methodology and the data. We discuss the results in Section 5. Finally, Section 6 concludes.

## 2. A background on child marriage in Iran

Iran, in line with target 5.3 of the *Sustainable Development Goals*, has committed to eliminate early and forced marriage by 2030[1]. Moreover, during its 2014 *Universal Periodic Review*, Iran agreed to consider suggestions to cancel laws promoting the marriage of girls as young as 9 years old and to amend the Civil Code to increase the minimum legal age for marriage to 18 years old[2]. Yet, Iran is one of few countries that has not signed or ratified the *Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW)* which has prohibited child marriage[3].

The increasing median age of the Iranian population from the age of 18 in 1980 to 31 in 2018 (Euromonitor, 2019), in tandem with decreasing marriage and increasing divorce rates (Gholipour, and Farzanegan, 2015; Farzanegan and Gholipour, 2016) are among serious concerns for policy makers in Iran. In response to declining fertility rate and future demographic concerns, all policies of population control in Iran have been abolished by the order of the Iran's Supreme Leader Ayatollah Khamenei, thus encouraging more marriages and higher fertility rates as a new agenda objective of all cultural and social institutions in the country (Karami, 2012; Dehghan, 2015). Accordingly, there is a fear that further restrictions on marriage may further reduce the birth rate in the country.

In addition to this general concern on the part of the government, the religious sensitivity of some Islamic scholars to changes in the religious law have also had a significant impact on the process of limiting child marriages in Iran. For religious conservatives in Iran, it seems that withdrawing from traditions such as child marriage is a step toward recognizing different lifestyles, which is not in line with the desired patterns of the Islamic government in Iran[4].

The Iranian religious structure considers menarche to be the transitional pivotal point that signals the end of childhood for girls. Reaching this threshold translates into eligibility and readiness for marriage irrespective of biological age (Loaiza & Wong, 2012). The tradition of early marriage is more about control and power which the patriarchal structure and masculine culture put in place over

[1] https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-5-gender-equality/targets.html
[2] https://www.girlsnotbrides.org/child-marriage/iran/
[3] https://www.ohchr.org/documents/professionalinterest/cedaw.pdf
[4] An example of such opinions is documented in Tahrir Al-Wasilah (Means of Salvation; a book by founder of Iran revolution, Ayatollah Khomeini as a commentary on a traditional theological text, and as a guide for Shia Muslims): "Anyone who has a wife less than nine years of age is not allowed to engage in sexual intercourse, whether she is his permanent or temporary wife. However, other forms of sexual pleasures are permitted…" (Justice For Iran, 2013, p. 2).

this vulnerable segment of the society. It implies an overemphasis on women's pre-marriage virginity and chastity on the one hand, and a control of their sexual desire on the other hand, both of which are deeply tied not only to family pride but also to the honor of the tribe (Ahmady, 2017).

Child marriage avoids the possibility of a girl reaching an age where she is no longer desirable as a wife by a man or his family. In most villages and small towns of Iran, families tend to assume that if their daughters do not marry at an early age, their marriage will become much more difficult at a later age. The practice of *blood marriages* involves a girl being married off to resolve a dispute between two tribes. *Naval string marriages* involve a newborn girl being *pledged* by families, through a symbolic cutting of the umbilical cord, to marry a cousin or distant relative when she is born. Most married children had almost no say in deciding whether or whom to marry (Jensen & Thornton, 2003) and have been encouraged or generally forced by their families (Ahmady, 2017), without having the opportunity to even talk with their suitor before marriage. (Sadat-Safavi and Minaee, 2015).

Sharia-based Iranian law has also empowered a culture whereby child marriage is considered somewhat socially acceptable. The strength of these social norms over child marriage laws have led to a continuation of this custom in Iran that is not just limited to villages and small towns, but is widespread throughout the country, although the situation is more critical in the northwest and east of the country such as Zanjan and Sistan & Baluchistan. Moreover, marrying a girl below 14 years old is particularly concentrated in rural, nomadic and suburban areas (Parliament Research Center, 2018).

According to the latest statistics from the Iranian Census Bureau, the proportion of women who married under the age of 15 in 2016, and also earlier years, was about 5.5%. However, based on other reports, 17% of girls in Iran are married before the age of 18 and 3% are married before the age of 15 (Independent Chief Inspector of Borders and Immigration, 2017)[1].

Education is often seen as the key to prevent early child marriage worldwide[2]. One of the factors affecting child marriage in Iran seems to be literacy. This is substantiated by the fact that illiterate people are much more likely to have an early marriage. According to the 2016 Census of Population and Housing, more than 9% of married men aged 15 to 19 were illiterate, which is more than four times more than literate married men at these ages, 2.13%. Also, about 4.5 % of married women between the ages of 10 and 14 were illiterate, which is more than three times the rate of illiterate married women in these ages, at 1.26 . (for more details see Table 1).

[1] The United Nation Report of the Special Rapporteur on the situation of human rights in the Islamic Republic of Iran (UN, 2017, p.15) illustrates the situation in Iran: "*Child marriage remains legally possible for girls aged 13 years and boys aged 15 years… In June 2016, a spokesperson for the Tehran-based Association to Protect the Rights of Children stated that child marriages had reached alarming levels and stressed that approximately 17 per cent of all marriages in the country involved girls married to old men*."

[2] UNICEF, 'Girls' Education: Introduction', www.unicef.org/girlseducation/index.htm

**Table 1.** Percentage of marriages between 15 to 19 years old for men and 10 to 14 years old for women by literacy (Population and Housing Census results of the Statistical Centre of Iran)

| Year | Literate | | Illiterate | |
|---|---|---|---|---|
| | Man | Woman | Man | Woman |
| 1996 | 2.2 | 1.1 | 10.5 | 3.6 |
| 2006 | 1.9 | 1.4 | 8.1 | 4.3 |
| 2016 | 2.13 | 1.26 | 9.15 | 4.51 |

Since there are restrictions on the education of married girls in regular schools in Iran, early marriage can inevitably deprive school-age girls of continuing their education and thus might lead to lower self-esteem and personal isolation. Statistics show that urban women are more educated on average than rural women.

## 3. A Review of literature on determinants of child marriage

The consequences of child marriages are devastating, yet its roots are poorly understood. In this section, we present a review of studies which have looked at this issue in Iran and other developing countries.

### 3.1. The drivers of child marriage in Iran

Using data from the Statistical Centre of Iran in 2001, Qasemi (2007) showed that education affects the women's marriage age and can explain the significant difference between the average marriage age of women in urban and rural regions. Ebrahimi and Fakhraei (2015) showed that early marriage in Iran is positively associated with the traditionality of families, women's security in the community, and the general perception of their trustworthiness. Eftekharzadeh (2015) considered poverty, family and ethnic traditions, particularly the concern for disgrace and disrepute, as the most important factors in early marriage.

The qualitative research of Ahmady (2017) in seven provinces with the highest rate of child marriages in Iran, i.e., Khorasan Razavi, East Azerbaijan, Khuzestan, Sistan and Baluchistan, West Azerbaijan, Hormozgan, and Isfahan, concluded that the propagation of this phenomenon is a result of traditional views and social norms, especially those focused on controlling girls' sexual relations, legal and religious support, and poverty.

Religion is a prominent contributory factor to child marriage. Religious recommendations, e.g., encouraging the marriage of girls early, even before adolescence, has a profound effect on the decision of religious people. Some Islamic scholars also give arguments based on the Quran, religious narrations, history, and moral grounds to support the allowance of temporary marriages, known as *Sigheh* or literally pleasure marriages.

Ahmady (2019) revealed that temporary marriages not only legalize illicit relationships but also facilitate the narrative of early child marriage in Iran, especially since they are mostly not registered.

This is probably the reason why the families living in Khorasan Razavi province (northeast of Iran), which is known to be more religious than other provinces, have the highest number of child marriages among all the provinces in Iran (Ahmady, 2018). Moreover, the results of Ahmady's (2017) survey of sexual orientation in this province showed that more than one third of people believe that a girl or boy cannot choose their spouse. In addition, more than one quarter believe that even the time of marriage should not be left to girl or boy, and that pre-marital virginity is vital for most people.

Finally, poverty is another important contributing factor to child marriage and is linked to its prevalence in Iran (Ahmady, 2018). In difficult financial circumstances and economic downturns, some poor families might consider marrying their daughters to cut their household expenses.

**3.2. The drivers of child marriage in other developing countries**

Several studies have investigated the determinants of child marriage, particularly in developing countries, over the past decade. For example, using survey data, Rumble et al. (2018), Grijns and Horii (2018), and Marshan et al. (2013) showed that a wide range of socio-demographic factors (e.g., education, family income, age of household head, number of children in a family, access to media, religiosity) are statistically correlated with female child marriage in Indonesia.

Hossain et al. (2016), Islam et al. (2016) and Kamal et al. (2015) utilized Bangladeshi's survey data and explained the trend and determinants of child marriage in Bangladesh in recent years. They also found that socio-demographic variables such as religion, husband's education, wealth and unemployment are major explanatory variables for child marriage in Bangladesh. Using case study and regression analyses, Seth et al. (2018), Raj et al. (2015), and Paul (2019) showed that factors such as age at menarche, education, social customs and norms, poverty, and female autonomy can explain child marriage in India.

For Tanzania, Stark (2018), by conducting interviews, found that Islamic religiosity, poverty, gendered economic inequality, high costs of education and high unemployment are important determinants of child marriage. Using a survey dataset from rural Tanzania, Corno and Voena (2016) showed that when households have no access to credit markets, they severely count on bride price payments to smooth their consumption. Therefore, adverse rainfall shocks increase the probability of early marriages and early fertility among women. Moreover, ensuring access to credit markets makes legal barriers on child marriage more likely to be enforced.

For Ethiopia, Workineh et al (2015) and Pankhurst et al. (2016) used information gathered from surveys and interviews to show that residency in a rural area, customs, marriage regulation, parental education, poverty and death or absence of parents can increase probability of child marriage. Sabbe et al. (2013), by applying semi-structured interviews, reviewing existing studies, and thematic qualitative analysis, found that education, economic opportunities, and weak legal framework have positive

impacts on child, and forced, marriage in Morocco. For Congo, Mpilambo et al. (2017) found that age at first sexual intercourse and education have positive and negative impact on early marriage among young women, respectively.

Finally, two studies explored the key determinants of child marriage of girls across countries (Bhan et al., 2019; Kalamar et al., 2016). For example, Bhan et al. (2019) provide evidence that good parent-child communication, as well as high parent-child relationship quality at the age of 12 years, decrease the rate of child marriage but other factors such as dropping out of school, early menarche and rural residence increase child marriages. The Independent Human Rights Commission Oversight (2016) suggests that erroneous traditions, social patriarchal structures, poverty, legal deficiencies in determining legal marriage age, social insecurity, weakness of the government and the rule of law are factors in child marriage in Afghanistan.

Table 2 provides a summary of existing studies in other countries. As can be seen, while previous researchers in South Asia, South East Asia, North Africa and Central Africa provide valuable insights on determinants of child marriage, to the best of our knowledge, very few empirical studies have investigated the determinants of child marriage using longitudinal data from provinces of Iran.

**Table 2.** Previous studies on determinants of child marriage in other countries

| Authors | Topic | Location/Data | Method | Main determinants |
|---|---|---|---|---|
| Rumble et al. (2018) | Determinants of female child marriage | Indonesia | Multivariate regression with survey data | Education (-), having more siblings (-), wealth (-), media exposure (-), rural residence (+) |
| Marshan et al. (2013) | Prevalence of child marriage and its determinants among young women | Indonesia | Multivariate regression with survey data | Income per capita (-), exposure to the media through the internet (-), floor per capita (-), education of household head (-), number of children in a family who are in high school and higher education (-), source of a family to cooking (-), and access to the free healthcare (-), the use of internet through cellular phone (+), age of household head (+), number of children in a family who are in elementary school (+) |
| Grijns & Horii (2018) | Child Marriage | Indonesia | Survey and descriptive statistics | Conservative Islamic perspective (+) |
| Hossain et al. (2016) | Prevalence of child marriage among Bangladeshi women and trend of change over time | Bangladesh | Multivariate regression with a survey data | Education (-), women with uneducated husbands (+), Muslims (+), poor economic backgrounds (+), rural areas (+) |
| Islam et al. (2016) | Regional variations in child marriage in Bangladesh | Bangladesh | Multivariate regression with a survey data | Education (-), employment status (-), husband's education (-) and wealth index (-) |
| Kamal et al. (2015) | Trends and determinants of Child marriage | Bangladesh | Cross-tabulation and multivariate regression with a survey data | Education (-), unemployment (+), Islamic religiosity (+), Rural area (+) |
| Seth et al. (2018) | Social determinants of child marriage | India | Qualitative case study | Patriarchy (+), coercion (+), social customs (+), and norms (+) |
| Raj et al. (2015) | Age at menarche, education, and child marriage | India | Multinomial regressions with survey data | Younger age at menarche (+), education (-) |
| Paul (2019) | Education and poverty and the prevalence of girl child marriage | India | Multivariate regression with a national survey data | Girls' secondary and higher level of educational attainment (-), household poverty (+), socio–religious practices related to marriage (+), women autonomy (-), urbanization (-) |
| Stark (2018) | Early marriage and cultural constructions of Adulthood | Tanzania | Interviews | Islamic religiosity (+), poverty (+), gendered economic inequality (+), high costs of education (+), high unemployment (+) |
| Workineh et al (2015) | Determinants of Early Marriage among Female Children | Ethiopia | Multivariate regression with a survey data | Rural residents (+), income (-), parents who perceive ideal marital age as less than 18 (+), knowing the legal marital age (-), parents who know individuals who were accused of early marriage crimes (-) |
| Pankhurst et al. (2016) | Determinants of child marriage | Ethiopia | National survey and interview | Rural residence (+), family poverty (+), parental education (-), girls' age (-), girls' education (-), death or absence of parents (+) |

| | | | | |
|---|---|---|---|---|
| Sabbe et al. (2013) | Determinants of child and forced marriage | Morocco | Semi-structured interviews, reviewing existing studies and thematic qualitative analysis | Education (-), economic Opportunities (-), weak legal framework (+) |
| Mpilambo et al. (2017) | Determinants of Early Marriage among Young Women | Congo | Descriptive analyses and multivariate regression with national survey | Age at first sexual intercourse (+), education (-) |
| Bhan et al. (2019) | Effects of parent-child relationships on child marriage of girls | India, Ethiopia, Vietnam, Peru | Multinomial regression with longitudinal data | Good parent-child communication (-), high parent-child relationship quality at age 12 years (-), dropping out of school (+), early menarche (+), rural residence (+) |
| Gastón et al. (2019) | Child marriage among boys | Global | Descriptive statistics for 82 countries | Highest in countries in Latin America, the Caribbean, and East Asia and the Pacific |
| Kalamar et al. (2016) | Interventions to prevent child marriage | Multi-countries | Literature review on intervention program | Cash transfers or programs to decrease school-associated costs (-) |

## 4. Data and methodology

We use panel data of thirty provinces in Iran from 2007 to 2015 to investigate the socio-economic factors contributing to the variation of child marriage across Iran. Our fixed-effects panel regression analysis enables us to infer the within-province effects of such factors on within-province changes of child marriage as well. An important advantage of panel data models is the possibility to eliminate unobserved heterogeneity between provinces by including province fixed effects. Such fixed effects control for province specific characteristics such as norms and local cultural attitudes toward child marriage. In our estimations, we report robust t-statistics, which are corrected for the presence of any pattern of heteroscedasticity and autocorrelation within panels. Our main analysis uses the share of marriage of girls below the age of 19 years old in total marriage of province. However, we use different variables to measure the level of early marriage across, and within, the Iranian provinces. Our findings are robust if we also use the share of married girls below the age of 14 or 10 years old in total marriage. In addition, we find similar significant determinants of child marriage if we use share of married boys below the age of 19 or 15 years old in total marriage.[10]

Among the different drivers of child marriage, we examine the level of economic development of provinces by using logarithm of Gross Domestic Product (GDP) per capita. We expect that deprived provinces with lower levels of average income will show a higher level of early marriage since poor families in these areas not only have a lower economic opportunity cost but also could shrink their expenses through marring off their daughters.

Increasing living costs, proxied by the consumer price index (CPI) inflation rate, are also included in our estimations and are expected to have a positive association with child marriage. Decreasing purchasing power of households may, ceteris paribus, provide more incentives for endorsing early marriage of children and thus the lowering of household costs. We also examine the role of unemployment rate in provinces and expect to find a similar positive association with child marriage. Provinces shown to have higher income inequality, as illustrated by the Gini index, may indicate the financial leverage of wealthier households over the other social layers, and thus the less reliable economic position of lower-income families to support the future of their children. In other words, in a more unequal society it is more likely for poor families to find a rich, and possibly older, man to marry their young daughters.

Finally, we have controlled for the degree of religious activities in provinces. To do this, we have used the share of household spending on religious goods and services as a percentage of their total spending. The higher levels of this ratio may refer to the higher priority of religious activities and

[10] In this study, we only report the results for girls' marriage as a dependent variable. Other results are available upon request.

consumption among households. We expect that there is a positive association between this indicator of religion-related activities and early marriage rates. In addition, we have collected data on the share of spending of households on educational related categories in their total household spending. We expect that provinces with a higher share of educational spending may have higher levels of respect for gender equality as well as place increased social importance on the quality of life of children, thus leading to lower levels of child marriage.[11]

Table 3 shows summary statistics of variables. The data on the spending of households on religious and educational categories and other regional social and economic variables are taken from the Statistical Center of Iran. The source of data for early marriage rates is the Annual Statistics of National Organization for Civil Registration of Iran[12]. The Statistical Center of Iran does not report data on the number of marriages below the age of 18, instead utilizing different age intervals, namely below 10 years old, between 10 and 14 years old, and between 14 and 19 years old for girls. For boys the intervals are below 15 years old, and between 15 and 19 years old. For girls, we aggregate all marriage intervals to get the total number of marriages below 19 years old, and add up the first two intervals to get the total number of marriages below 14 years old. Similarly, for boys, we sum up all marriage intervals to get the total number of marriages below 19 years old.

**Table 3.** Summary Statistics

| **Variable** | **Mean** | **Std. Dev.** | **Min** | **Max** |
|---|---|---|---|---|
| Marriage of girls below the age of 19 (as a share of total marriage) | 0.3843 | 0.0667 | 0.2093 | 0.5917 |
| Marriage of girls below the age of 14 (as a share of total marriage) | 0.0493 | 0.0244 | 0.0155 | 0.1478 |
| Marriage of boys below the age of 19 (as a share of total marriage) | 0.0546 | 0.0271 | 0.0165 | 0.2098 |
| Gini index | 0.3596 | 0.0656 | 0.2192 | 0.5031 |
| Gross Domestic Product per capita (in 10,000,000 IRR) | 91.9 | 92.7 | 11.5 | 690.0 |
| Inflation | 0.19 | 0.08 | 0.07 | 0.39 |
| Unemployment | 0.11 | 0.02 | 0.05 | 0.20 |
| Spending on education by households (as a share of total spending) | 0.0220 | 0.0062 | 0.0061 | 0.0440 |
| Spending on religion by households (as a share of total spending) | 0.0102 | 0.0041 | 0.0024 | 0.0266 |

[11] We also estimated the model using an alternative measure for education (i.e. literacy ratio). There is no official literacy index released at the provincial level in Iran. The only proxy available is from a nationwide survey which is conducted every five years. Therefore, we constructed a literacy index as the ratio of literates in the household expenditure data at the provincial level from the Iran Statistical Centre. Note that the sample size in this data is representative at the province level. Similar to our main analysis, an insignificant association is found between literacy ratio and child marriage. The estimation results are available upon request.

[12] https://www.sabteahval.ir/avej/tab-1499.aspx

To measure the effects of socio-economic conditions on child marriage rates, we estimate the following fixed effects panel regression for thirty provinces of Iran between 2007 and 2015:

$$CMR_{i,t} = \beta_1 GDP_{i,t} + \beta_2 INFLATION_{i,t} + \beta_3 GINI_{i,t} + \beta_4 UNEMPLOYMENT + \beta_5 RELIGION_{i,t} + \beta_6 EDUCATION_{i,t} + \alpha_i + \epsilon_{i,t} \quad (1)$$

Where CMR refers to different indicators of child marriage rates. GDP is logarithm of GDP per capita. GINI is a measure of income inequality (higher values mean higher inequality). UNEMPLOYMENT indicates the unemployment ratio. RELIGION and EDUCATION refer to spending on religion and education-related goods and services by households. Province fixed effects regressions eliminate unobserved heterogeneity between provinces (Baltagi, 2005). There are several factors affecting child marriage rates that we cannot control for, thus increasing the risk of an omitted variable bias. Cultural attitudes and ethnical factors may contribute to cross-province variation in child marriage rates and its acceptance.

## 5. Results

Our measure of CMR is the share of married girls below the age of 19 to total marriage in province. Table 4 shows the estimation results.

**Table 4.** Panel regressions: Determinants of child (girls under 19) marriage rate across Iran

| | **(4.1)** | **(4.2)** | **(4.3)** | **(4.4)** |
|---|---|---|---|---|
| | Dependent variable: share of married girls below the age of 19 to total marriage in province | | | |
| | Pooled OLS | Fixed effect | Random effect | Random effect |
| Log of GDP per capita | -0.051*** | -0.025*** | -0.027*** | -0.026*** |
| | (-8.04) | (-3.79) | (-4.33) | (-3.81) |
| Inflation rate | 0.045 | 0.051*** | 0.050*** | 0.051*** |
| | (0.96) | (5.07) | (5.08) | (4.79) |
| Gini index | -0.080 | 0.119** | 0.107** | 0.115** |
| | (-1.11) | (2.34) | (2.16) | (1.99) |
| Spending on religious products | 1.878** | -0.731 | -0.634 | -0.796 |
| | (2.33) | (-1.32) | (-1.20) | (-1.43) |
| Spending on educational products | | | | 0.305 |
| | | | | (0.57) |
| Unemployment rate | | | | 0.025 |
| | | | | (0.31) |
| Total observations | 270 | 270 | 270 | 270 |
| $R^2$ | 0.29 | 0.48 | 0.47 | 0.48 |

Notes: Robust t- statistics are in parenthesis. **, and *** indicate significance at a 5%, and 1% level, respectively.

We start by showing the estimated relationship between CMR and its determinants in the pooled sample in Model 4.1. This shows the average relationship between explanatory and outcome variables across thirty provinces. In the pooled estimation, we observe that provinces with higher levels of log of income per capita are associated with lower levels of CMR. The effect is statistically significant at 1% level. Another statistically significant variable in the pooled OLS model is the relative share of household spending on religion-related activities. This variable is positively correlated with CMR.

In Model 4.2, we exclude time-invariant unobserved heterogeneity by introducing province fixed effects. According to the fixed effects regression results in Model 4.2, both higher inflation and income inequality show an increasing effect on the early marriage rates of girls below 19. Their positive effect is statistically significant at 1% and 5% levels, respectively. As in Model 4.1, we also consider the negative impact of economic development captured by log of income per capita on the early marriage of children. In fixed effects regression, the effect of religion, proxied by spending on religious items by households, loses its statistical significance. The included explanatory variables explain 48% of within variation in marriage rate of girls below the age of 19.

In Model 4.3, instead of estimating fixed effects, we employ the potentially more efficient random effects. The random effects estimations are in line with the fixed effects results. We employed a Hausman's (1978) test to compare the fixed and random effects estimates of coefficients. The null hypothesis of "no systematic difference between the two estimators" is not rejected according to the Hausman test (p-value of 0.19). In Model 4.4, we add two further control variables namely the relative share of household spending on educational goods and services in their total spending as well as unemployment rate. None of these additional controls are statistically significant and our earlier findings do not change after their controls.

In short, our fixed and random effects estimations show that economic growth has a dampening effect on early marriage of girls while inflation and inequality amplify it. We could not infer a significant effect of religiosity on early child marriage across provinces of Iran.

We also re-examine our initial specification by controlling the lag of the dependent variable (child marriage rate). It is likely that the current practice of child marriage shows some path dependency.

$$CMR_{i,t} = \beta_0 CMR_{i,t-1} + \beta_1 GDP_{i,t} + \beta_2 INFLATION_{i,t} + \beta_3 GINI_{i,t} + \beta_4 RELIGION_{i,t} + \beta_5 EDUCATION_{i,t} + \alpha_i + \epsilon_{i,t} \quad (2)$$

We estimate a dynamic specification (2) using both fixed effects and the Arellano-Bond general method of moments (GMM) estimator (Arellano and Bond 1991). The results of the dynamic model are presented in Table 5.

**Table 5.** Dynamic panel regressions

| | **(5.1)** | **(5.2)** | **(5.3)** |
|---|---|---|---|
| | Dependent variable: share of married girls below age of 19 to total marriage in province | | |
| Log of GDP per capita | -0.015** | -0.021*** | -0.021** |
| | (-2.63) | (-3.22) | (-2.67) |
| Inflation rate | 0.033** | 0.051*** | 0.053*** |
| | (2.59) | (3.35) | (3.16) |
| Gini index | 0.041 | 0.089** | 0.084** |
| | (1.16) | (2.61) | (2.22) |
| Spending on religious products | -0.312 | -1.385 | -1.318 |
| | (-1.03) | (-1.38) | (-1.45) |
| Lag 1 dependent variable | 0.552*** | 0.336* | 0.345* |
| | (3.24) | (1.88) | (1.73) |
| Number of observations | 240 | 210 | 210 |
| Hansen test , p-value | n.a. | 0.429 | 0.429 |
| AR(1), p-value | n.a. | 0.036 | 0.027 |
| AR(2), p.-value | n.a. | 0.680 | 0.656 |

Notes: Robust t- statistics are in parenthesis. AR test is the Arellano and Bond (1991) autocorrelation test of orders 1 and 2 in the case of GMM. *, **, and *** indicate significance at a 10%, 5%, and 1% level, respectively.

Model 5.1 in Table 5 starts with estimating the dynamic model using fixed effects. It shows that there is a significant and positive association between the lag of child (girls below 19) marriage rate and the current period rate (coefficient of 0.55 with statistical significance at 1% level). Among significant predictors, we can refer to the negative effect of the logarithm of GDP per capita, and the positive effect of inflation rate. It is argued that, by the inclusion of the lag of dependent variable in the set of explanatory variables and under fixed effects, we may encounter the Nickell bias (Nickell, 1981).

To exclude the possibility that Nickell biases affect our results when estimating the effect of drivers of child marriage rate, we re-estimate the reduced model using the Arellano-Bond general method of moments (GMM) estimator (Arellano and Bond, 1991). We use both one-step and two-step estimators. The estimation results are shown in Models 5.2 and 5.3, respectively. The results of one-step difference GMM in Model 5.2 implies a significant negative effect of income per capita, and positive and significant effects of inflation and income inequality on the child marriage rate in Iran. The results of the two-step difference GMM in Model 5.3, re-confirm the earlier findings in Model 5.2.

We use three to five lags of potentially endogenous variables as instruments (e.g., lag of dependent variable and Gini index). The Hansen test indicates the adequacy of the instruments. We are not rejecting the null hypothesis of the validity of the instruments, indicating that the specification is correct. In addition, the absence of first order serial correlation is rejected and the absence of second order serial correlation is not rejected. If the instruments are appropriately uncorrelated with the errors, then we expect to reject the presence of the second order serial correlation. The dynamic GMM

addresses country specific effects or any time-invariant country specific variable by using the first difference of variables. Thus, it eliminates any endogeneity owing to the correlation of these province specific effects and the explanatory variables. It also addresses the possible non-stationarity of explanatory variables (Farzanegan and Hayo, 2019).

## 6. Conclusion

In our study, we analyze the socio-economic determinants of child marriage using a panel data of thirty provinces from 2007 to 2015. By employing fixed and random effects as well as GMM estimation methods, our results, which are robust to different specifications, show that the main drivers of early child marriage in Iran are income per capita (negative), inflation, and income inequality (both positive). We did not find a significant effect of religiosity on early child marriage when we control for economic factors and fixed effects (e.g. local norms and traditions or geographical location).

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