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Farzanegan, Mohammad Reza
MACIE, Philipps-Universität Marburg

Gholipour, Hassan F.
Swinburne University of Technology, Australia

Marburg Centre for Institutional Economics • Coordination: Prof. Dr. Elisabeth Schulte
c/o Research Group Institutional Economics • Barfuessertor 2 • D-35037 Marburg

Phone: +49 (0) 6421-28-23196 • Fax: +49 (0) 6421-28-24858 •
www.uni-marburg.de/fb02/MACIE • macie@wiwi.uni-marburg.de

Does Gold Price Matter for Divorce Rate in Iran?

Mohammad Reza Farzanegan^a and Hassan F. Gholipour^b

^a Philipps-Universität Marburg, Center for Near and Middle Eastern Studies (CNMS), Economics of the Middle East Research Group, Marburg, Germany & MACIE (Marburg), CESifo (Munich), ERF (Cairo).
Email: farzanegan@uni-marburg.de

^b Centre for Transformative Innovation, Swinburne Business School, Swinburne University of Technology, Australia. Email: hgholipour@swin.edu.au

Abstract

The increasing divorce rate has become a major social concern for policy makers in the Islamic government of Iran. The price of gold coin is an important factor in cost-benefit analysis for individuals in their marriage and divorce decisions in Iran. Dowries (*Mehrieh*) are usually in the form of gold coin and a wife has a legal right to request them from her husband upon both parties signing the marriage contract. Increasing the price of gold coin may intensify the internal stress and struggles within families, leading to a higher probability of divorce. We investigated the long-run relationship between real price of gold coin and divorce rate for the case of Iran over the period 1980-2014. Controlling for other factors such as women's education, social globalization, economic growth rate and the war period with Iraq, our regression results showed that there is a positive and significant long-run relationship between real price of gold coin (as well as unanticipated changes in real price of gold coin) and marital instability.

Keywords: Divorce, Gold Price, Mehrieh, Dowry, Iran

JEL Classification: D1, O1, E3, E6

Introduction

Several studies have investigated the effect of macroeconomic variables (e.g., economic growth, unemployment rate, inflation rate and house prices) on divorce rate (or marital stability, partnership dissolution) in developed and developing countries (e.g., Amato and Beattie, 2011; Farzanegan and Gholipour, 2016; Fischer and Liefbroer, 2006; Hellerstein and Morrill, 2011; Klein, 2017)¹. However, to our knowledge, no empirical study has analyzed the effect of gold prices on divorce rate. We investigate this relationship in Iran where a strong growth in divorce rate and a rising median age of men and women getting married (from 24 to 27 years of age during 1986-2011) have become one of the major socio-demographic concerns in recent years. Figure 1 shows the post-revolution trend of crude marriage and divorce rates in Iran.²

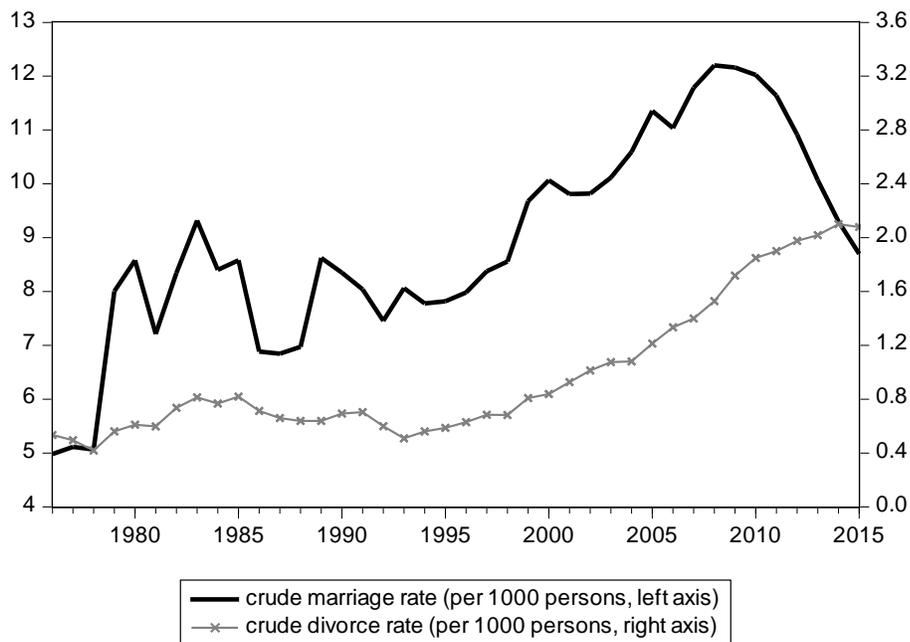


Fig. 1. Marriage and divorce rates in Iran (1980-2015)

Source: National Organization for Civil Registration of Iran

(<http://www.sabteahval.ir/default.aspx?tabid=4756>, retrieved on 23 April 2018)

We hypothesize that increases in gold prices have caused significant rises in the divorce rate in Iran over the past three decades, *ceteris paribus*. How could gold price changes influence divorce in Iran? To answer this question, we first need to understand the concept of *Mehrieh* (marriage portion payable to the wife). *Mehrieh* is a dowry agreement wherein the wife receives some assets such as cash, property or gold coins³. It can be claimed at any time during a

¹ For a survey of the literature, see Farzanegan and Gholipour (2016).

² According to Iran's National Organization for Civil Registration, in 2013, on average 16 divorce cases were registered every hour.

³ In Iran, a dowry or *Mehrieh* is often payable in gold coin-like tokens known as *Bahar Azadi* (Farsi for 'spring of freedom'): <http://www.dw.com/en/in-iran-grooms-to-escape-jail-over-dowry-debts/a-18658344> (retrieved on 23 April 2018). In recent years, the average number of gold coins for *Mehrieh* is approximately 450 coins: <http://www.khabaronline.ir/detail/38556/society/family> (in Persian, retrieved on 23 April 2018).

marriage or while getting divorced. It acts as an insurance policy for women in the case of divorce in a conservative Islamic society. By agreeing on the amount of *Mehrieh*, the future husband commits himself to pay it to his future wife upon signing the marriage contract or at any time that she demands it. The value of *Mehrieh* in most cases is linked a certain number of gold coins which may be the number of the wife's birth year or any other mutually agreed upon criteria.⁴ According to Hofstede Cultural index⁵, Iran is counted as a collectivistic society in which close long-term commitment to the member group, (e.g., family, extended family, or extended relationships) is important. Usually, the complex system of *Mehrieh* and arrangements regarding its amount and conditions are negotiated by grooms' families. This fact also reminds us that the majority of marriages in Iran are family arranged ones. The permission and influence of fathers in marriage of their daughters (especially for the first time) are also mentioned in the Article 1043 of the Iranian Civil Code: "The marriage of a girl who has not married previously is dependent on the permission of her father or her paternal grandfather even if she has reached the full age of majority."⁶ In addition, one of the old social habits in Iran has been consanguineous marriage (i.e., marriage between close blood relatives). Such kinds of marriage are also family arranged ones. Saadat et al. (2004) have conducted a survey to collect information about the percentage of such marriages across 28 provinces of Iran in 2001. Their study, covering 306,343 couples (2.3% of all families in the country at the time of survey), has shown that the average share of consanguineous marriages in Iran was 38.6% with significant cross-province differences. Such differences vary from the lowest level of 15.9% in the Northern provinces to the highest level of 47% in the Eastern and Southern provinces.

Increasing monetary values of gold coins can increase motivation for some married women, on average, to demand their *Mehrieh* sooner rather than later. In such cases, relationship stress is more likely. A complementary argument is that increases in gold coin prices can lower the expected costs of divorce (or increase the expected benefits from divorce) for women. In turn, this lowered cost (or higher benefits) makes it less likely that women will remain in fragile marriages.⁷

The potential positive relationship between the value of *Mehrieh* (particularly, the price of gold coin) and divorce has also been highlighted by several Iranian authorities and observers in major Iranian news agencies and newspapers (e.g., Donya-e-Eqtasad, 2012; Tabnak, 2014). They have argued that some women enter into a marriage aiming to get divorced in the near future in order to receive the *Mehrieh* (Iranian Students' News Agency [ISNA], 2015; ISNA, 2013)⁸. For example, the head of Social Commission of Iran's Parliament has noted that there

⁴ BBC report (23 Feb. 2012) on this issue is available at: <http://www.bbc.com/news/av/world-middle-east-17147842/the-cost-of-a-divorce-in-iran-your-weight-in-gold> (retrieved on 23 April 2018).

⁵ <https://www.hofstede-insights.com/country-comparison/iran/> (retrieved on 23 April 2018).

⁶ <http://corpus.learningpartnership.org/civil-code-of-iran-1928-as-amended-1985-selected-provisions-related-to-women-3-on-marriage-and-divorce> (retrieved on 23 April 2018).

⁷ Hassani-Nezhad and Sjögren (2014) have examined implementation of *Khul* in the Middle East and its effects on divorce rate. Under Islamic law, *Khul* gives a woman the right to unilaterally petition for divorce in return for paying back her *Mehrieh*. Before adoption of *Khul*, unilateral divorce was available only for men and woman petitioning for divorce needed the agreement of the husband.

⁸ <http://www.dailymail.co.uk/wires/afp/article-2985070/Iran-charges-woman-alleged-10-marriage-trick.html> and <https://www.tasnimnews.com/fa/news/1396/07/10/1533957> (retrieved on 23 April 2018).

are a number of marriages in which brides have intended to obtain their dowry after only a few years due to high levels of dowry values (which are often measured by gold coins)⁹.

Historical observations in Iran have also shown a positive association between the real values of gold coin and the divorce rate (Figure 2). However, this bivariate relationship could be caused by factors other than the price of gold coin (as a proxy for the monetary value of *Mehrieh*). Therefore, in our study, we turn to multivariate estimation approaches and investigate whether the influence of price of gold coin remains a strong predictor when alternative explanatory factors for divorce rate are included. To address the research gap, we use annual time-series data from 1980 to 2014. Our findings provide evidence that there is a significant and positive long-run relationship between the real price of gold coin and the divorce rate in Iran. The concluded evidence of this paper provides a starting point for future analyses of the relationship between the gold market and divorce rate in comparable countries where a considerable amount of gold and jewelry are set as *Mehrieh*.

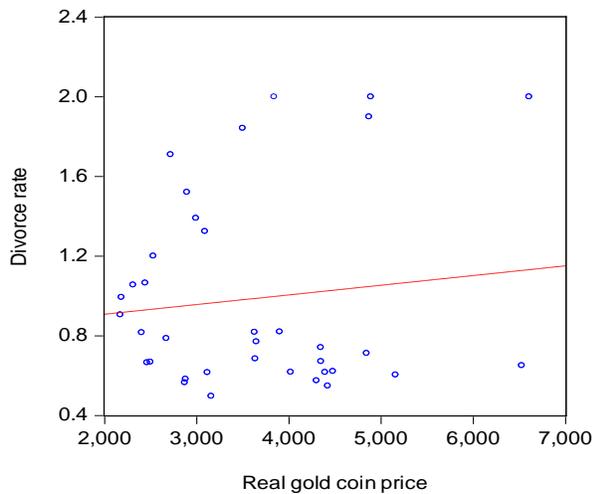


Fig. 2. Relationship between real price of gold coin (in 1000 Rials) and divorce rate (per 1,000 total population) in Iran over 1980-2014

Sources: Data for price of gold coin were obtained from Economic Time Series of Central Bank of Iran (<http://tsd.cbi.ir/DisplayEn/Content.aspx>) and Data for divorce rate were collected from Iran's National Organization for Civil Registration (<http://www.sabteahval.ir/en/default-789.aspx>)

⁹ <http://rc.majlis.ir/fa/news/show/862049> (in Persian, retrieved on 23 April 2018) and <https://www.thenational.ae/world/iran-pre-nups-land-thousands-of-men-in-jail-1.81305> (retrieved on 23 April 2018).

Theoretical Background

The rationale behind the positive relationship between price of gold coin and divorce is mainly related to the literature on the concept of moral hazard, as well as the relationship stress and relative cost of divorce perspectives. The moral hazard problem arises when information is distributed unequally (asymmetric information), meaning that some individuals in the market know more than the others. Although the moral hazard term was originally associated with insurance fraud (Stiglitz et al., 2015), it has been widely used by economists to describe misbehavior encouraged by the existence of compensation for losses.

Besides the extensive discussion about the moral hazards in the field of finance, the literature on household economics has also used this concept for understanding marriage and divorce patterns. The presence of moral hazards in marriage is attributable to the fact that marriage is a type of contract between husband and wife and there is an inherent lack of full information in marriage (Walther, 2017). For example, Friedberg and Stern (2014) have found that couples do not have a perfect knowledge of each other, and this asymmetric information would increase the probability of divorce given the lack of care within a marriage.

Based on the concept of moral hazard and relying on the above-mentioned works as a background, our study contributes to the empirical literature on the application of moral hazard in explaining marital issues. We show that the presence of Dowries (*Mehrieh*) in the marriage contract in Iran is similar to a situation when a person or entity (with different intentions) buys insurance from an insurance company. In our case, the husband plays the role of an insurance company and the wife plays the role of a buyer of an insurance. By agreeing on the amount of *Mehrieh* (insurance), the future husband commits to pay it to his future wife upon signing the marriage contract or at any time that she demands it. Increasing monetary values of *Mehrieh* (usually in the form of gold coin for the case of Iran) has increased the motivation of some wives, on average, to demand their *Mehrieh* sooner rather than later. Therefore, one may expect that increases in the price of gold coin can escalate marital tension and erode marital stability in Iran.

In addition to the concept of moral hazard, we also look at the positive relationship between gold price and divorce from two established channels in related literature: (1) relationship stress or psychosocial stress perspective and (2) relative cost of divorce perspective (Amato and Beattie, 2011; Fischer and Liefbroer, 2006). Increasing gold coin price (adjusted for inflation) as a proxy for real increase in value of *Mehrieh*¹⁰ can amplify mental stress in a fragile marriage. In literature, this channel has been discussed as an explanatory framework for the effect of unfavorable macroeconomic conditions such as high unemployment or inflation on risk of divorce (e.g., Conger et al., 1990; Jensen and Smith, 1990). The second discussed channel is the set of factors which are shaping the relative cost of divorce. Increasing cost of living (e.g., higher property rents, unemployment rate) may increase the costs of divorce (Amato and Beattie, 2011; Fischer and Liefbroer, 2006; Harknett and Schneider, 2012). In the case of Iran, increasing the gold coin price and value of *Mehrieh* increases the expected benefits and reduces expected costs of divorce for the married women given a fragile union. It does, however, have the opposite effects for the married men. The final development in divorce rate at the national level depends

¹⁰ The other main part of *Mehrieh* is real estate properties (Farzanegan and Gholipour, 2016).

on the balance of gender power within the Iranian society and the extent to which the married women are using their leverage in demanding their *Mehrieh*. Hamid Reza Jalaipour, a sociologist at University of Tehran noted in Dehghanpisheh (2014) that:

There has been a big growth in individualism in Iran, especially among women. Women are more educated and have increased financial empowerment...It used to be that a woman would marry and she would just have to get along. Now if she's not happy, she'll separate. It's not taboo.

In summary, we utilized the concept of moral hazard, the relational stress proposition and relative cost of divorce proposition to explain an unaddressed issue in the literature: the link between macroeconomic variables (especially assets prices) and divorce rate in a Muslim-dominated society. In this study, we examined the relationship between gold coin price (as an important part of *Mehrieh* or bride price) and family dissolution in Iran, which has not been empirically investigated in the divorce literature.

Background on Divorce in Iran

This section provides a brief background on estimating the amount of *Mehrieh* and the costs and procedures of divorce in Iran to set the scene for the empirical analysis that follows.

Estimations of the Amount of Mehrieh

The amount of *Mehrieh* is not regulated by the government and is determined within households, taking into account the economic and social conditions. The financial burden of *Mehrieh* has increased in past years due to higher economic insecurity (higher inflation and the unemployment rate), encouraging families of girls to demand higher levels of *Mehrieh* from families of boys.¹¹ According to data from Central Bank of Iran in 2018, on average, the price of one gold coin (in Rial) was approximately equivalent to 6% of annual GDP per capita in Iran (for the average period of 2000-2014). For example, a total number of 100 gold coins (as a lower bound) in a *Mehrieh* contract is approximately 600% of annual GDP per capita in Iran.

Another estimation shows that gold coin price in the Iranian calendar year of 2016 was Rial 11,021,000. Value of (part of) *Mehrieh* = Gold coin price \times number of gold coins (according to the authorities in the Iranian government in 2010, an average number of gold coins in *Mehrieh* was 450¹²)

$$\begin{aligned} &= 11,021,000 \times 450 \\ &= \text{Rial } 4,959,450,000 \end{aligned}$$

At the end of 2015, the average house price per square meter was Rial 42,413,000 in Tehran (the most expensive housing market in Iran). Therefore, the price of a 70-square meter house in Tehran would be Rial 2,968,910,000. This could mean that a divorced woman with *Mehrieh* is

¹¹ <https://www.theguardian.com/world/iran-blog/2014/apr/07/the-rising-price-of-love-in-iran> (in Persian, retrieved on 23 April 2018).

¹² <https://www.mehrnews.com/news/1145830/> (in Persian, retrieved on 23 April 2018)

able to own a house plus pocket a saving of Rial 1,990,540,000, which can purchase two houses in smaller cities in Iran's Northern provinces.

Divorce Law

Regarding the divorce law, we have seen different versions of it before the 1979 revolution (the initial one was in 1934). The Family Protection Act passed by Parliament in 1967 restricted the ability of husbands to apply for divorce without reason and without the agreement of his wife. In the third version of family protection law in 1974, the absolute right of husbands for divorce was cancelled and divorce rights were given to both husband and wife. By the 1979 Islamic revolution, the earlier version of the 1976 absolute right of a husband to divorce his wife was reinstated. However, the husband was required to go through the court process to implement the divorce. In 2002, an adjustment to the post-revolution divorce law saw women receive the right to divorce as well¹³. In any case, if the husband applies for divorce even with justifiable reasons in law, he needs to pay the agreed upon *Mehrieh* in addition to *Jahizieh* (the household items that Iranian brides take to their husband's house) and *Nafaghe* (maintenance; daily costs of the household). If the husband wants to use his legal absolute right of divorce which exists in post-revolution regulation, besides the above payments, he still has to pay the monetary values of household activities and services for his wife during their marriage period (the so-called "*Ojrat-Al-Mesl*").

What's more, women can also initiate divorce under the following conditions¹⁴: A. the husband has not paid the *Nafaghe* or maintenance (daily costs of household) for six months without a reason; B. the husband does not treat her well; C. the husband has a disease that makes it difficult to maintain the marriage; D. the husband has lost mental capacity; E. the husband's job has been found objectionable by the wife and the court and he refuses to leave his job; F. after five years of marriage the wife has been unable to have children due to her husband's impairment; G. the husband has disappeared without trace for six months; H. the husband takes a second wife without the permission of the first wife; or I. in the opinion of the court, the husband does not treat both wives with fairness and equality

Costs of Divorce Applications

The costs of divorce may vary from city to city but generally, the maximum costs (including registration of divorce petition, lawyers' fees for both husband and wife, and registration of divorce at Notary office) are approximately \$1000 – converted from Rial to the US\$ in 2018 (Source: Law Firm in Tehran: <https://goo.gl/waJnjY>).

Spending of the Mehrieh

Once the marriage contract has been formally signed, wives are free to demand their *Mehrieh* at any time and to spend it on any goods and services that they want. Besides *Mehrieh*, the wife is

¹³ <http://www.wluml.org/node/907> (retrieved on 23 April 2018).

¹⁴ <http://www.refworld.org/docid/3ae6aae318.html> (retrieved on 23 April 2018).

entitled to all the furniture and household appliances (*Jahizieh*) that her family or she herself provided at the time of marriage. If a wife was working during marriage or inherited a wealth, all such income and wealth is hers alone and her husband has no right to demand them. In addition, during marriage, the man has to cover the daily costs of the household and maintenance (*Nafagheh*) conditional on the acceptance of the husband's place of residence by the wife and practice of the sexual relationship. The husband/father is also responsible for financial support of the children after divorce. Finally, the wife can demand to receive monetary compensation for household activities she performed free of charge during the marriage (e.g., cleaning, cooking, raising the children, etc.).

Data and Variables

We used annual data for the period of 1980-2014. Data for number of divorces in Iran were collected from *Iran's National Organization for Civil Registration*. We calculated the divorce rate (*DIVR*) as the number of divorces per 1,000 population. Data for price of gold coin (*GOLDP*) in 1,000 Rials were obtained from the *Economic Time Series of Central Bank of Iran*. To separate the effects of rising gold prices from that of rising costs of living on divorce rate, we deflated the nominal price of gold coin by using the annual Consumer Price Index (CPI) of Iran.

In addition to the variable of interest (*GOLDP*), the literature has suggested that some socio-economic variables may have important influences on family instability. Thus, following existing macro-level studies on divorce and based on the current arguments made by Iranian observers, women's education (*WEDU*), social globalization score (*SGLOB*), and GDP per capita growth rate (*GDPCG*) were selected as control variables in the model specification.

In regards to control variables, first it may be argued that the rise of women's education has increased the divorce in Iran (e.g., Aghajanian and Moghadas, 1998; Aghajanian and Thompson, 2013; Dehghanpisheh, 2014). This is because women with higher levels of education have relatively more modern views about women's rights and can enjoy wider career opportunities. In turn, higher education may give women more financial independency which can support their decision to walk away from a difficult marriage. However, a current study in Iran showed that there is a negative and significant long-run relationship between women's education and divorce over the period of 1982-2010 (Farzanegan and Gholipour, 2016). In this paper, we used the female literacy rate as a proxy for *WEDU*. Data for this variable were obtained from the Euromonitor International (2018) database.

Second, social globalization (especially increasing access to Internet and satellite TV) has been identified as another potential driving force of heightened family instability in the Islamic society of Iran. A recent report provided by Iranian parliament noted that exposure to Western culture through access to satellite TV has promoted divorce in their society (Islamic Parliament Research Center 2013). Likewise, Naeimi (2011) and Golchin et al. (2012) showed that access to satellite TV is one of the major determinants of family dissolution in Iran. We used the KOF index social globalization – as a proxy for *SGLOB* – which was collected from the *KOF Swiss Economic Institute* (Dreher 2006). It measures the social dimension of globalization with regard to three categories: cross-border personal contacts, cross-border information flows and cultural

affinity to the global mainstream. The index ranges between 0 and 100, with higher values indicating higher social globalization in a country.

Finally, we used GDP per capita growth (*GDPCG*) as a measure for the business cycle effects. Decreasing economic growth and increasing unemployment will increase the psychological burden within families (cf. Amato and Beattie, 2011). Data for *GDPCG* were collected from the WDI (2017).

Table 1 provides descriptive statistics of variables. Over the study period 1980-2014, the average number of divorces per 1,000 population in Iran was almost 1 which is roughly equal to the average of the Asia Pacific region (1.03), and higher than Latin America (0.73), but lower than Australasia (2.55), Eastern Europe (3.12), Western Europe (1.71) and North America (4.07), according to the Euromonitor International (2018) database. The economic growth rate and the female literacy rate were zero and 0.61, respectively. The average of index of social globalization for Iran was 26.30 which disallows Iran from ranking in the top 100 countries in terms of social globalization.

Table 1 Descriptive statistics before taking logarithm

	<i>DIVR</i>	<i>GOLDP</i>	<i>WEDU</i>	<i>SGLOB</i>	<i>GDPCG</i>
Mean	0.99	3,631.97	0.61	26.30	0.00
Maximum	2.00	6,605.52	0.81	34.75	0.18
Minimum	0.50	2,171.09	0.28	19.33	-0.24
Std. Dev.	0.49	1,136.67	0.17	4.91	0.08

Note: *DIVR* is the number of divorces per 1,000 population; *GOLDP* is real price of gold coin (in 1000 Rials); *WEDU* is female literacy rate; *SGLOB* is KOF index of social globalization and *GDPCG* is GDP per capita growth. We used annual data for the period of 1980-2014.

Empirical Model and Results

Empirical Model

Based on the above discussion, the empirical model we used is as follows:

$$\log(\text{DIVR})_t = \beta_0 + \beta_1 \cdot \log(\text{GOLDP})_t + \beta_2 \cdot \text{WEDU}_t + \beta_3 \cdot \text{SGLOB}_t + \beta_4 \cdot \text{GDPCG}_t + e_t \quad (1)$$

where *DIVR* is the number of divorces per 1,000 population; *GOLDP* is real price of gold coin (in 1000 Rials); *WEDU* is female literacy rate; *SGLOB* is KOF index of social globalization and *GDPCG* is GDP per capita growth. β_s are the estimated coefficients, subscript *t* represents time and *e* is an error term. We used the logarithm of divorce rate and real value of gold coin for easier interpretation of the coefficient β_1 as elasticity.

We also estimated the model (1) by including unanticipated shocks to real price of gold coin rather than the level of real price of gold coin. The reason was that individuals might have rational expectations about gold price, and therefore the impact of dowry values (as a function of

price of gold coin) on divorce rate might be identified only through unanticipated shocks to gold coin price. We generated unexpected changes in gold coin price by regressing log(real gold coin price) on its one-year lag. The residual is re-scaled between 0 and 1 and then we used log (re-scaled residual scores +1) as a proxy for unanticipated level of gold coin prices.

Estimation Methods

To estimate the long-run relationship between the divorce rate and explanatory variables, we applied two cointegrating regressions: Fully Modified Least Squares (FMOLS, developed by Phillips and Hansen, 1990; Phillips, 1995) and Dynamic Least Squares (DOLS, developed by Saikkonen, 1992; Stock and Watson, 1993). Additionally, we employed Generalized Method of Moments (GMM, developed by Arellano and Bond, 1991) to estimate the effect of right hand side variables on divorce rate.

The FMOLS and DOLS estimators are among the most efficient methods that are used to estimate and test long-run relationships between variables. The main reason for utilizing the FMOLS and the DOLS was to account for the potential existence of the endogeneity problem in the model. For example, the macro datasets that we used in this study typically lack controls for household demographic and economic characteristics, and may suffer from omitted variables – one of the causes of endogeneity. In the presence of endogeneity, the standard ordinary least squares (OLS) produces biased and inconsistent estimates. In addition, when we ran the standard OLS to estimate the relationship between divorce rate and explanatory variables, we found that the residuals were serially correlated. Serial correlation violates the assumption of the OLS regression that disturbances are not correlated with other residuals. Therefore, in this study, the FMOLS and the DOLS methods were employed because they can correct for endogeneity in the regressors that arise due to cointegrating relationships and serial correlation in regressions. That is, these methods provide unbiased estimates of the coefficients (Phillips, 1995; Stock and Watson, 1993). As for the FMOLS and the DOLS estimations, a preliminary analysis on unit root and cointegration were carried out. We performed Augmented Dickey-Fuller (ADF) unit root test to determine the order of integration of the series (Dickey and Fuller 1981). The null hypothesis of the ADF test is that the series contains a unit root (or they are non-stationary). Presented in Table 2, the results of the unit root test suggest that the series contain unit root in their levels (except *GDPCG*) but are stationary in their first-differences, indicating that they are integrated at order one; $I(1)$. Given that all variables are $I(1)$ series, we proceed to test the presence of a long-run equilibrium relationship between the variables using Johansen's Trace and Max-Eigen statistics (Johansen, 1995). The null hypothesis of these tests is that there is no cointegration between variables. The Trace and Max-Eigen statistics indicate that a cointegration relationship exists between *DIVR* and its determinants¹⁵.

¹⁵ Results are available upon request.

Table 2 Augmented Dickey-Fuller (ADF) unit root test results

	Level (t-Statistic)	First difference (t-Statistic)
DIVR	-0.410	-4.183*
GOLDP	-0.985	-6.255**
WEDU	0.017	-4.405**
SGLOB	-3.096	-5.800**
GDPCG	-4.067*	-5.046**

Notes: *DIVR* is the number of divorces per 1,000 population; *GOLDP* is real price of gold coin (in 1000 Rials); *WEDU* is female literacy rate; *SGLOB* is KOF index of social globalization and *GDPCG* is GDP per capita growth. * $p < .05$. ** $p < .01$. Lag length is based on SIC. p -values are based on MacKinnon (1996) one-sided p -values. Trend and intercept are included in test equation.

Alongside the FMOLS and the DOLS estimations, we also apply the instrumental variables estimation method, GMM. The idea behind the instrumental variables estimators is to use instruments to eliminate the correlation between explanatory variables and the residuals (Wooldridge, 2009). If a major development in divorce rate shapes the demand and supply in the gold coin market or when one of the explanatory variables is measured with error then we may expect some correlation among such variables and residual. The standard approach to deal with such event is to use instrumental variable regression. We should find a set of instruments that are correlated with affected explanatory variable(s) in the model and uncorrelated with residual. GMM is one type of instrumental variable estimator. This estimator makes it possible to use internal instruments which are lag(s) of the affected variable (gold coin price). This is one of the advantages of GMM, especially when the economic theory does not guide us to find a valid external instrument. The lags of instrumented variables are highly correlated with the affected variables (i.e., they are strong instruments) and, at the same time, are not impacted by the dependent variable – thus meeting the validity condition. However, one should also note the potential problem of using too many lags of affected variables as instruments in GMM. According to Roodman (2007), too many instruments can overfit instrumented variables, failing to eliminate their endogenous components. As a result of such overfitting, we may have biased coefficient estimates toward those from uninstrumented estimators. We use one-year lag of real gold coin price as an instrument for this variable in GMM estimations.

Furthermore, we carried out an impulse response analysis on the basis of an unrestricted Vector Autoregressive (VAR) model to measure the direction, size and duration of divorce response to an unexpected positive change in gold coin prices in Iran. All variables in the VAR model are treated as endogenous, reducing our concern about an endogeneity problem. The results are shown in the Appendix.

As a final robustness check, we also looked at a similar analysis for the case of Egypt which is comparable with Iran in terms of country size, geographical location, religion and culture. Gold or gold coins are not a relevant factor to the *Mehrieh* in the case of Egypt. Rather, Egyptian common practice is for the husband to reach an agreement with the wife (or her father/family) about the monetary amount of the marriage contract. The basis of this monetary agreement is usually the demand of the wife’s family (sometimes based on what her relatives or friends also received). The amount is stated only in currency (e.g., “One Hundred Thousand Egyptian Pounds”) and is not based on gold value or any other commodity or real estate. Given this background, estimating the VAR model for Egypt and implementing the impulse response

analysis, the results show that response of divorce rate (per 1000 population) in Egypt to a positive shock in gold prices (and controlling for other variables as in the case of Iran), is not statistically significant¹⁶. Note that for the case of Iran, this response to a similar shock in gold prices was positive and statistically significant.

Results of Regressions

Table 3 presents the regression results. The long-run effect of the real price of gold coin on divorce rate in the post-revolution period was positive (increasing), highly statistically significant and robust across three estimation methods. A 1% increase in the real price of gold coin was associated with a long-run increase of 0.42% in divorce rate, controlling for other predictors of divorce rate in the FMOLS estimation. The effect increased slightly to 0.51% in the DOLS estimation, while it was 0.26% in GMM approach. This result supported the hypothesis that we put forward. Our finding also supported the claim (by Iranian media and observers) that the rising gold price has been one of the main determinants of high divorce rate in post-revolutionary Iran (e.g., Donya-e-Eqtasad, 2012; Tabnak, 2014). This result also confirmed that family instability in Iran can be explained, to some extent, by the concept of moral hazard and cost of divorce perspective.

Table 3 Estimation results with real price of gold coin (1980-2014)

	Dependent variable: log(Divorce rate)		
	FMOLS	DOLS	GMM
log(Gold coin price)	0.424** (3.97)	0.513** (6.05)	0.260* (2.51)
Female literacy	-0.010* (-2.67)	-0.021** (-4.30)	-0.01** (-3.07)
Social globalization	0.128** (9.94)	0.145** (8.21)	0.117** (11.83)
GDP per capita growth	1.01* (2.24)	1.645 [†] (1.96)	0.407 (1.54)
Adjusted R-squared	0.83	0.94	0.85
Cragg-Donald F stat			41.2
Prob. (J-statistic)			0.86

Notes: Dependent variable is the number of divorces per 1,000 population (in log); *Gold coin price* is real price of gold coin (in 1000 Rials and in log). Constant is included (not reported). Fully Modified Least Squares (FMOLS) specifications: Cointegrating equation deterministic: C; Additional regressor deterministic: @TREND @TREND^2; Long-run covariance estimate (Prewhitening with lags = 2 from AIC max lags = 3, Bartlett kernel, Newey-West fixed bandwidth = 4.0000). Dynamic Least Squares (DOLS) specifications: Cointegrating equation deterministic: C; Fixed leads and lags specification (lead=1, lag=1); White heteroskedasticity-consistent standard errors and covariance is used. Generalized Method of Moments (GMM): log (Gold coin price) is assumed to be endogenous and is instrumented by its one year lag. Standard errors and covariance computed using White weighting matrix. Prob(J-statistic) tests the null hypothesis that log(Gold coin price) is exogenous. [†] $p < .10$. * $p < .05$. ** $p < .01$. Robust *t* statistics based on White heteroskedasticity-consistent standard errors are presented in parentheses.

¹⁶ We thank our Egyptian colleagues- Ahmed Badreldin and Dalia Fadly (CNMS, University of Marburg) for information on *Mehrieh* in Egypt. The results of impulse response analysis for case of Egypt is available upon request.

In addition, we found that an increase in the social globalization index was associated with an increase in divorce rate across different estimation methods (Table 3). This result is in line with Naeimi (2011) and Golchin et al. (2012). Consistent with Farzanegan and Gholipour (2016), our results showed that women's education (*WEDU*) had a negative and significant relationship with divorce rate in the long-run. This finding was also in accord with the conclusions of a recent study by Schwartz and Han (2014) who showed that, in the US, the high risk of divorce in couples with more highly educated wives has decreased since the 1990s. Finally, the long-run effect of economic modernization as measured by increases in real income per capita on divorce rate was also positive and significant in the FMOLS and DOLS estimations.

In GMM model, the *p*-value of J-statistics showed that we could not reject the null hypothesis of exogeneity of log of gold coin price. More than 80% in variation of divorce rate in Iran since 1980 was explained by our model specification as shown by adjusted R-squared statistics.

Table 4 showed the results of the long-run effect of unexpected changes in gold coin prices on the divorce rate in Iran. Since the 1990s, the nominal gold prices have been rising steadily in Iran. Therefore, it may be likely that individuals expect dowry (*Mehrieh*) values to also increase, assuming that the amount of gold usually agreed upon at marriage does not change. The predicted or expected price of gold coin due to the available historical information may not have a shock effect, which is an important consideration in understanding family tension. Thus, the growing rate of divorce is better explained by the cyclical variation of gold coin prices. To capture the unexpected change in gold coin prices, which is not predicted by past information of gold coin prices, we used the residual of regression of log (real gold coin price) on its own lag. The calculated residual shows the part of variation in gold coin prices that cannot be explained by its own recent development. We rescaled the residual variable from 0 to 1 and take the logarithm of the rescaled residual plus one. Following this strategy to capture the unexpected variation in gold coin prices, we found qualitatively similar long-run effects on divorce rate in Iran. The unexpected change in gold coin price had a positive (increasing) effect on divorce rate, which was statistically significant in both FMOLS and DOLS methods. In GMM method, it kept its positive sign but was statistically insignificant. However, as we showed by probability of J-statistic, we could not reject the null hypothesis implying that log of unexpected change in gold coin price was exogenous. An unexpected 1% increase in real gold coin prices increased the divorce rate in the long-run by 0.52%, using the FMOLS approach. In DOLS, the effect was higher (1.13%) and statistical significance increased from 90% confidence interval in FMOLS to 99% confidence interval as well. As shown in Table 4, a significant portion of changes in divorce rate was explained by our specification as is shown by the adjusted R-squared indicator. The long-run effect of other control variables, such as women's education and social globalization, remained robust whereas GDP per capita growth did not show a significant pattern.

In sum, our findings suggested that, besides the traditional socio-economic determinants of divorce, marital dissolution in Iran could be partly explained in the long-run by the fluctuation

in monetary values of *Mehrieh*, which was driven by expected and unexpected changes in the real price of gold coin.

Table 4 Estimation results with unanticipated shocks to real price of gold coin (1980-2014)

	Dependent variable: log(Divorce rate)		
	FMOLS	DOLS	GMM
log(Gold coin price <i>shock</i>)	0.528 [†] (1.93)	1.131** (3.64)	0.747 (1.14)
Female literacy	-0.014* (-2.19)	-0.020** (-3.97)	-0.010* (-2.07)
Social globalization	0.134** (5.94)	0.131** (6.66)	0.113** (6.35)
GDP per capita growth	-0.111 (-0.14)	1.577 (1.55)	0.873 (1.51)
Adjusted R-squared	0.78	0.91	0.77
Cragg-Donald F stat			2.11
Prob(J-statistic)			0.24

Notes: Dependent variable is the number of divorces per 1,000 population (in log); *Gold coin price shock* is unexpected change in price of gold coin. It is the residual of regressing log(gold coin price) on log(gold coin price one-year lag). The residual is then re-scaled between 0 and 1 and we use then log of residual +1. Constant term is included (not reported). Fully Modified Least Squares (FMOLS) specifications: Cointegrating equation deterministics: C; Additional regressor deterministics: @TREND @TREND^2; Long-run covariance estimate (Prewhitening with lags = 1 from AIC maxlags = 3, Bartlett kernel, Newey-West fixed bandwidth = 4.0000). Dynamic Least Squares (DOLS) specifications: Cointegrating equation deterministics: C; Fixed leads and lags specification (lead=1, lag=1); White heteroskedasticity-consistent standard errors & covariance is used. Generalized Method of Moments (GMM): log (Gold coin price shock) is assumed to be endogenous and is instrumented by its one-year lag. Standard errors and covariance computed using White weighting matrix. Prob(J-statistic) tests the null hypothesis that log(Gold coin price shock) is exogenous. [†] $p < .10$. * $p < .05$. ** $p < .01$. Robust *t statistics* are presented in parentheses.

Conclusion

Iran has been experiencing a fast increase in the divorce rate since the early 1990s. The crude divorce rate (per 1000 persons) shows an increase from 0.51 in 1993 to 2 in 2015. In addition, the crude marriage rate is decreasing over time, from 12 in 2008 to 8 in 2015. According to the Euromonitor International (2018) database, Iran had the highest compound annual growth in crude divorce rate over 1990-2016 (4.12%) in the Middle East and North Africa region, followed by Saudi Arabia (3.47%) and Egypt (2.22%). Such significant developments in family dissolution in Iran has increased concerns among policy makers about the demographic indicators in forthcoming decades. The fertility rate (births per woman) in Iran shows a significant decrease from 4.8 in 1990 to 1.7 in 2015. Because Islam forbids extramarital sex, the drop of marriage and continuous increase of divorce rate are playing important roles in the reduction of fertility rate. The Iranian government expects a fall in the share of the working age population as a percentage of total population in subsequent years, due to the significant reduction of fertility rate in past years. In addition, the simulations show a rapid increase in old age dependency ratio (number of elderly people, beyond 64 years of age, as a share of those of working age, 15-64 years old) from 6.5% in 1990 to 35% in 2050 (World Bank, 2017). Such an

increase in the old age dependency ratio in Iran will be higher than the average of this figure for middle-income countries, the Middle East and North Africa region, and globally. Funding the pension system under such a condition is a challenging task for any government in Iran. Therefore, understanding the key factors in developing a family structure is highly relevant for policy makers.

The literature on Iran has studied the role of economic factors such as unemployment rate and housing prices on the development of marriage and divorce in Iran (Farzanegan and Gholipour, 2016; Gholipour and Farzanegan, 2015). In this study, we shed further light on the role of gold coin prices in the development of Iran's divorce rate. Gold coin is the main part of dowries (*Mehrieh*) in Iran. Increasing gold coin prices by decreasing the relative expected costs of separation can encourage a married woman to demand the agreed *Mehrieh* sooner, rather than later, from her partner. Such an environment can affect the structure of families by increasing relationship stress and within families' struggles. There is a significant correlation between gold coin price and divorce rate in Iran; authorities often mention this factor as one of the drivers of the increasing national divorce rate. In this study, we empirically examine the long-run relationship between price of gold coin and divorce rate over the period 1980-2014. Our empirical results show that increases in the real price of gold coin have a positive and significant long-run association with marital dissolution in post-revolutionary Iran, controlling for other key predictors of divorce rate. In other words, it can be concluded that increases in gold coin price as a main driver of the value of *Mehrieh* can amplify family tensions in the Islamic society of Iran.

Gold price in Iran is not only determined by international gold markets but also by national political and economic factors. For example, during higher political risks under international economic sanctions, economic agents showed a stronger tendency to convert their assets into gold and real estate (cf. Farzanegan, 2013). In addition, reducing banking interest rates in an inflationary economy in recent years, especially during the eight years of Ahmadinejad's presidency (2005-2013), coupled with the fragility of the stock market, has pushed economic agents to invest more in gold and real estate assets, which in turn increases prices in these two markets.

The findings of this research should be considered in light of its limitations, which point to some topics for future research. First, the present study used the macro datasets which typically lack controls for socio-demographic characteristics of troubled married couples (e.g., education, income, age, parents' wealth and religiosity) that are also important determinants of divorce rate. Although we applied efficient econometrics methods to minimize endogeneity issue due to the usage of macro data set, future research may conduct interviews with troubled married couples at family courts or use the secondary data from family courts to gain deeper insights the relationship between gold coin price and divorce decisions. Second, the present study only focuses on Iran. Future research may examine patterns of family dissolution in other Islamic countries which have also comparative traditions in their marriage contracts.

Appendix

The VAR model: Dynamic response of divorce to gold coin price shocks

The VAR provides a multivariate framework relating changes in a particular variable (e.g., divorce rates) to changes in its own lags and to changes in (the lags of) other variables (e.g., gold coin prices). The reduced form VAR model is presented as follows:

$$y_t = A_1 y_{t-1} + \dots + A_p y_{t-p} + B x_t + \varepsilon_t$$

where y_t is a vector of k endogenous variables; x_t is a vector of d exogenous variables; A_1, \dots, A_p and B are matrices of coefficients to be estimated; and ε_t is a vector of innovations. The variables are affecting each other with some optimum lags and therefore they are all treated as endogenous variables. While changes in macroeconomic conditions, such as the gold market, can influence family stability, the changes in divorce rate can also influence the former. Our endogenous variables in the VAR are logarithm of divorce rate, logarithm of gold coin prices, logarithm of women's education, social globalization index and GDP per capita growth. Descriptions of used variables are mentioned in the main body of the analysis. We also controlled for the war period with Iraq with a dummy variable.

Our aim is to apply impulse response function in order to simulate the response of divorce rate to a positive shock in gold coin prices in Iran. Farzanegan and Gholipour (2016) also used this method to study the response of divorce rate to positive shocks in housing prices of Iran. To estimate response of divorce rate in Iran to positive shocks to gold coin prices, we apply the generalized impulse-response function (IRF) on the basis of our estimated unrestricted VAR model. The IRF shows the direction, size, and statistical significance of responses following an initial shock to gold coin prices. It is important to check for stability and residual autocorrelation of the estimated VAR model before using IRF tool. We use two years as the optimum lag in estimation of the VAR model on the basis of different lag order selection indicators as are shown in Table A1.

Table A1 Optimum lag length

VAR Lag Order Selection Criteria					
Endogenous variables: log(divorce rate); log(gold coin price); log(women education); social globalization index; GDP per capita growth					
Exogenous variables: constant term; Iraq-Iran war dummy					
Lag	LR	FPE	AIC	SC	HQ
0	NA	0.00	6.09	6.56	6.24
1	262.98	0.00	-3.67	-2.04	-3.15
2	59.43	0.00	-5.31	-2.51	-4.41

Note: Bold numbers indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5 percent level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion.

The next step is to check the stability of the estimated VAR model. In the case of instability of the estimated VAR, we cannot rely on the confidence intervals of simulated responses in IRF analysis (Farzanegan and Krieger, 2017; Lütkepohl, 1991). Table A2 shows that our estimated VAR is stable. In other words, the influence of a shock on all variables decreases over time.

Table A2 Stability of VAR model

Roots of Characteristic Polynomial	
Lag specification: 1 2	
Root	Modulus
0.982497 - 0.124760i	0.99
0.982497 + 0.124760i	0.99
0.426932 - 0.573920i	0.72
0.426932 + 0.573920i	0.72
0.651196 - 0.222367i	0.69
0.651196 + 0.222367i	0.69
-0.147803 - 0.608096i	0.63
-0.147803 + 0.608096i	0.63
-0.32	0.32
-0.25	0.25
No root lies outside the unit circle.	
VAR satisfies the stability condition.	

In addition, we need to check the residual autocorrelation of the estimated VAR model. The null hypothesis implies “no serial correlation at a specific order of lag”. In case of rejection of null hypothesis, we have to revise our VAR specification or use a higher lag lengths. Table A3 shows the residual serial correlation test results which does not show a concern in our case.

Table A3 Residual serial correlation

VAR Residual Serial Correlation LM Tests		
Null Hypothesis: no serial correlation at lag order h		
Lags	LM-Stat	Prob.
1	38.03	0.05
2	26.30	0.39
3	20.58	0.72

The ordering of variables in the estimated VAR model can be also important for subsequent IRF analysis. We follow Pesaran and Shin (1998) and use the Generalized IRF, which is not sensible to specific ordering of variables in the VAR. Figure A1 shows the IRF results. We can see that an unexpected positive change in gold coin prices leads to an increasing response of divorce rate following initial shocks. The positive response of divorce reaches its

peak point within three years after shock. The response is statistically significant for the first three years following shock. A one standard deviation increase in log (gold coin prices) leads to 0.06 unit increase in log (divorce rate) within the three years. This is equivalent to 6% increase in divorce rate as a response to positive shock in gold coin prices, controlling for other channels such as women’s education, social globalization and economic growth.

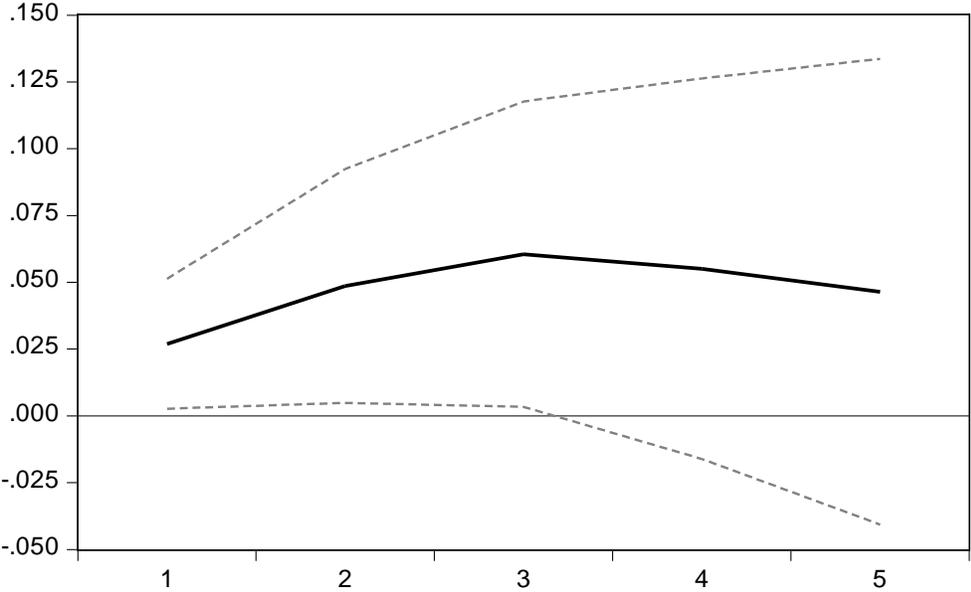


Fig A1. Response of log (divorce rate) to log (gold coin price) positive shock

Note: The dotted lines represent ± 2 standard deviation (at 95% confidence intervals). The deviation from the baseline scenario of no shocks is on the vertical axis; the periods (years) after the shock are on the horizontal axis. The vertical axis shows the magnitude of the responses.

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