

Education and the allocation of time of Iranian women¹

Djavad Salehi-Isfahani
Virginia Tech and the Brookings Institution
Sara Taghvatalab
Christopher Newport University

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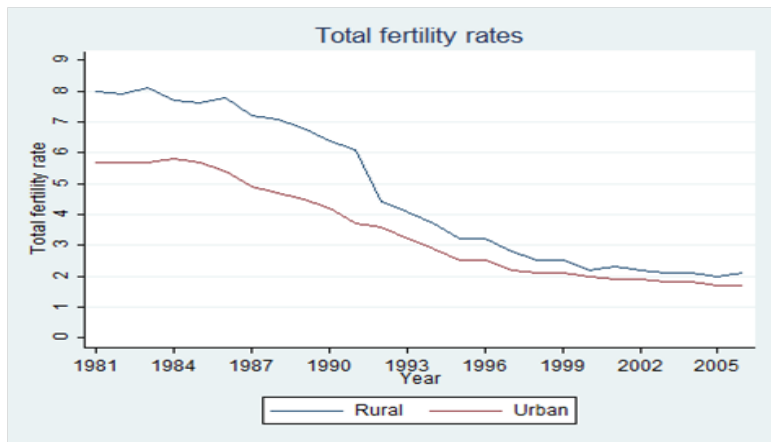
Outline

- 1 Introduction
- 2 Conceptual framework
- 3 Data
- 4 Patterns of time use
- 5 Empirical results
- 6 Conclusion

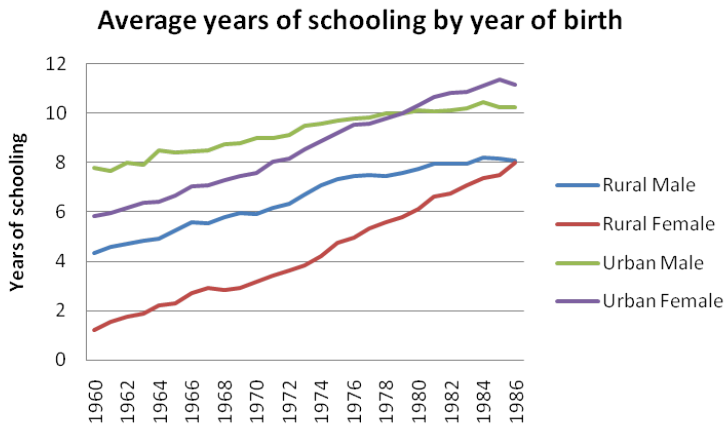
Time use of Iranian women: a puzzle

- Iranian women are more educated, have lower fertility, and have more time-saving household appliances than in the past ...
- but their labor force participation has not increased proportionately
- The same as in the rest of MENA
- World Bank flagship report 2004: "MENA gender paradox"

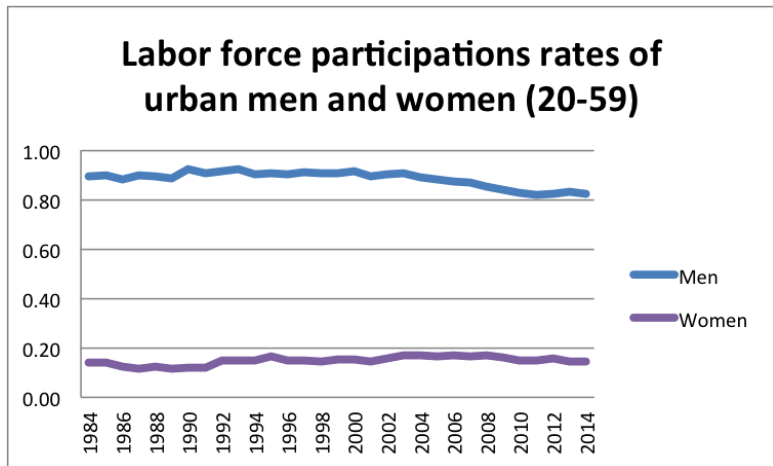
Rapid fertility decline in Iran



Rising education of Iranian women

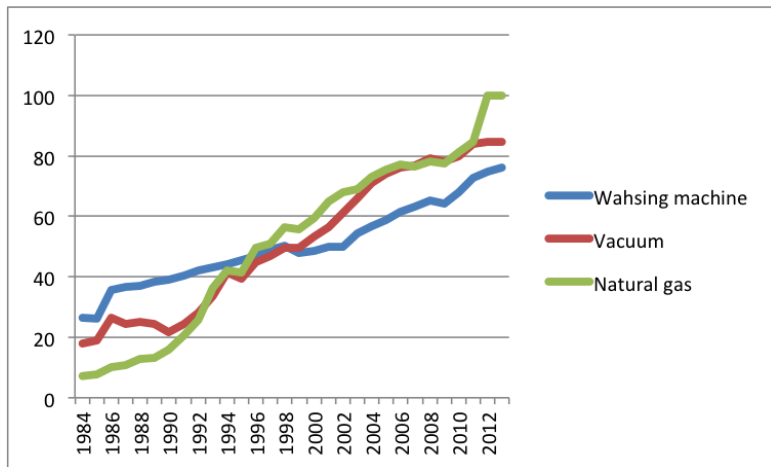


Change in labor force participation of Iranian women



Change in labor saving home appliances

Percent of urban households



Economic theory and women's time use

- Economic models of fertility (Becker and Lewis 1973) and time use (Becker 1965) suggest that with economic growth and rising education of women, fertility declines and demand for child education increases
 - Thus time reallocation may be from raising several children to educating a few (change in the type of activities with children), especially when school quality is low.
- Gronau (1977) integrates home production into household labor supply and shows that returns to home production affect labor supply of women
 - Child human capital is home production for most urban Iranian women
 - Marginal returns to child education at home may exceed returns to market work
 - Educated mothers are better teachers of their children and invest more in child human capital

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Home human capital production vs. market work

- In terms of its implications, attending to children's education is more similar to market work than domestic work
- It realizes the value of women's education
- Women's education contributes to accumulation of human capital and economic growth
- Child human capital is the most important household public good, and a source of value for women's education (Behrman, Rosenzweig and Foster 1997),
- Increased empowerment of women at home improves the allocation of household resources in the direction of human capital accumulation
- Women's role in child education increases their say in the allocation of household resources, how she is treated at home,

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A simple model of women's time allocation

- A one-period unitary household, modeled as mother's decision problem (husband's time allocation is fixed)
- allocate her time at home to invest in children L_h , and to work in the market L_m
- Women's education is predetermined
- Market wage is a function of women's education: $w = w(H)$ and returns to education in the labor market is positive and declining: $w'(H) > 0$ and $w''(H) < 0$
- Leisure and domestic work time are fixed

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Woman's (household's) time allocation problem

$$\max U = U(X_m, h) \quad (1)$$

$$s.t. \quad X_m + pE = w(H)L_m + v \quad (2)$$

$$h = g(HL_h, E) \quad (3)$$

$$T = L_m + L_h \quad (4)$$

- X_m : market goods consumption
- h : child human capital
- p and E : price and quantity of market-purchased education
- v : husband's and non-earned income
- L_m : market time
- L_h : childcare time

Production of child education

A function of the effective time mother spends in teaching her children, HL_h , and market-purchased schooling:

$$h = g(HL_h, E) \quad (5)$$

To simplify the algebra, we assume a particular shape for this function:

$$h = HL_h + E^\alpha, \quad (6)$$

First order conditions

$$\max_{E, L_h} U(w(H)(T - L_h) + v - pE, HL_h + E^\alpha) \quad (7)$$

The first order conditions are:

$$\frac{\partial U}{\partial L_h} = -U_1 w(H) + U_2 H = 0 \quad (8)$$

$$\frac{\partial U}{\partial E} = -U_1 p + U_2 \alpha E^{\alpha-1} = 0 \quad (9)$$

These conditions simplify into:

$$\frac{U_1}{U_2} = \frac{H}{w} = \frac{\alpha E^{\alpha-1}}{p} \quad (10)$$

$$\frac{p}{w} = \alpha \frac{E^{\alpha-1}}{H} \quad (11)$$

Demand for schooling and mother's time at home

Demand for schooling is:

$$E^* = \left(\frac{\alpha w(H)}{pH} \right)^{\frac{1}{1-\alpha}}$$

The effect of mother's education on demand for schooling is:

$$\frac{dE}{dH} = \frac{E}{H(1-\alpha)} \left(\frac{w'(H) \cdot H}{w(H)} - 1 \right)$$

- which is negative since $w(H)$ is concave \Rightarrow mother's education increases home teaching time
- If $w''(H) > 0$, high returns to education at high education levels induce mothers to supply more hours to the market, which enables them to buy more schooling. But it is still possible for $\frac{dL_h}{dH} > 0$ if the additional market time comes from leisure or domestic work rather than home schooling.

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Data

- Nationally representative time-use survey of urban household collected by the Statistical Center of Iran (SCI)
- Four rounds between fall 2008 and summer 2009, each round includes 3,220 households (33,757 individuals in total)
- All individuals 15 years and older surveyed
- 24-hour, full-time diary survey (with 15-minutes intervals)
- Activities coded based on International Classification of Activities for Time Use Statistics (ICATUS) into 15 main categories
- Includes demographic and household asset information

Sample summary statistics

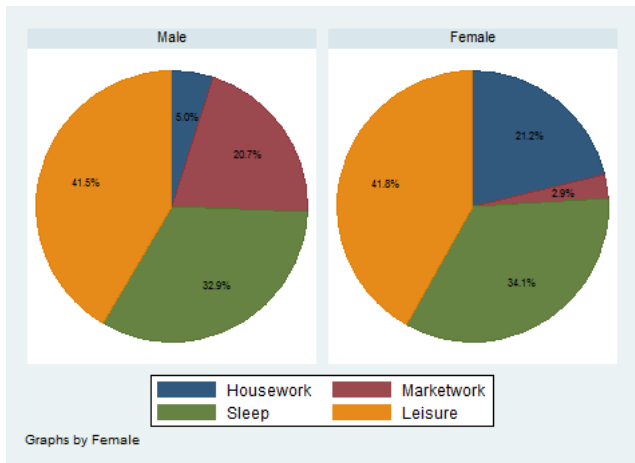
Married women 15-59 years old, with at least one child under age 18.

	Mean	Std. Dev.	Min	Max
Mother's age	35.94	8.14	16	59
Husband's age	41.04	9.07	21	90
Age difference of couple	5.10	4.83	-15	45
Mother's education years	7.97	4.62	0	23
Husband's education years	8.64	4.57	0	23
Education difference	0.67	3.70	-12	18
Household size	4.27	1.22	3	12
# children	2.22	1.16	1	10
# children <6	0.49	0.60	0	3
# children 6-11	0.54	0.65	0	4
# children 12-17	0.68	0.74	0	5
Presence of other adults	0.32	0.47	0	1
Summer	0.24	0.43	0	1
Weekend	0.16	0.37	0	1

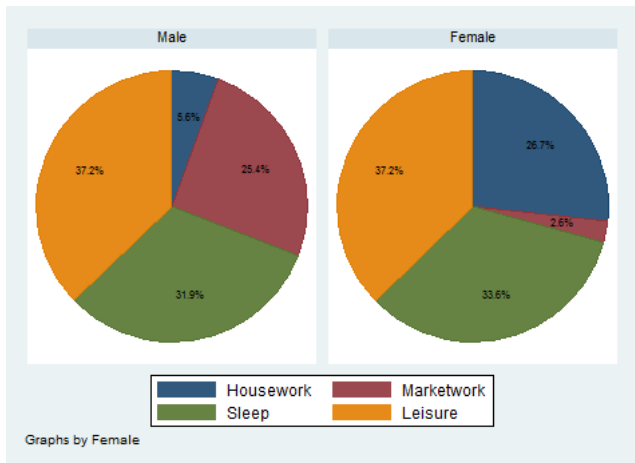
Defining categories of time use

- Child care: attending to the basic needs of children
- Child education: training and instruction of children, including recreational activities
- Domestic work: unpaid domestic services for final use of household members only and care of other household members but not children
- Market work: includes work at home and outside the home
- Leisure is determined as a residual

Differences in time allocation between all men and women (ages 15-59)



Differences in time allocation between married women (15-59 years old) and their husbands



Education and time use of married women with youngest child 0-5

	# children <18	Child care	Child edu	Domestic	Market	Leisure
Illiterate	3.00 (1.28)	0.89 (1.31)	0.20 (0.47)	6.13 (1.97)	0.31 (1.04)	16.47 (2.59)
Primary/middle school	2.04 (0.94)	1.06 (1.44)	0.32 (0.59)	5.91 (2.09)	0.36 (1.35)	16.35 (2.48)
High school	1.56 (0.72)	1.31 (1.60)	0.47 (0.75)	5.47 (2.12)	0.31 (1.27)	16.44 (2.67)
Associate degree	1.56 (0.72)	1.23 (1.63)	0.47 (0.70)	5.12 (2.22)	0.97 (2.36)	16.21 (2.72)
College and above	1.41 (0.57)	1.28 (1.65)	0.39 (0.62)	4.57 (2.35)	1.93 (3.28)	15.82 (2.98)
Total	1.86 (0.96)	1.16 (1.53)	0.37 (0.65)	5.57 (2.18)	0.59 (1.84)	16.31 (2.63)

Education and time use of married women with youngest child 6-17

	# children 6-17	Child care	Child edu	Domestic	Market	Leisure
Illiterate	1.77 (0.96)	0.15 (0.42)	0.07 (0.28)	6.13 (2.29)	0.60 (1.74)	17.06 (2.52)
Primary/middle school	1.61 (0.74)	0.27 (0.61)	0.20 (0.48)	6.20 (2.24)	0.36 (1.37)	16.97 (2.44)
High school	1.46 (0.63)	0.43 (0.82)	0.31 (0.68)	5.89 (2.29)	0.61 (2.01)	16.75 (2.59)
Associate degree	1.50 (0.60)	0.38 (0.80)	0.38 (0.63)	5.24 (2.33)	1.52 (2.72)	16.48 (2.62)
College and above	1.54 (0.57)	0.33 (0.62)	0.33 (0.57)	4.58 (2.33)	2.50 (3.24)	16.25 (2.95)
Total	1.60 (0.75)	0.29 (0.65)	0.22 (0.53)	5.95 (2.31)	0.68 (1.95)	16.86 (2.54)

Time allocation of married men by wife's education (youngest child 0-5)

	# children <18	Child care	Child edu	Domestic	Market	Leisure
Illiterate	3.00 (1.28)	0.05 (0.25)	0.11 (0.32)	1.10 (1.59)	6.32 (4.05)	16.41 (3.52)
Primary/middle school	2.04 (0.94)	0.08 (0.38)	0.13 (0.33)	1.06 (1.60)	7.12 (4.07)	15.60 (3.49)
High school	1.56 (0.72)	0.07 (0.31)	0.16 (0.38)	0.98 (1.52)	7.36 (4.09)	15.43 (3.63)
Associate degree	1.56 (0.72)	0.16 (0.66)	0.17 (0.37)	1.26 (1.68)	6.88 (3.97)	15.53 (3.32)
College and above	1.41 (0.57)	0.16 (0.59)	0.22 (0.43)	1.23 (1.57)	6.70 (3.76)	15.70 (3.27)
Total	1.86 (0.96)	0.09 (0.42)	0.15 (0.36)	1.08 (1.59)	7.05 (4.03)	15.62 (3.50)

Time allocation of married men by wife's education (youngest child 6-17)

	# children 6-17	Child care	Child edu	Domestic	Market	Leisure
Illiterate	1.76 (0.93)	0.03 (0.23)	0.06 (0.24)	1.30 (1.73)	5.43 (4.31)	17.19 (3.83)
Primary/middle school	1.61 (0.74)	0.03 (0.17)	0.08 (0.28)	1.23 (1.70)	6.20 (4.36)	16.46 (3.76)
High school	1.46 (0.63)	0.04 (0.18)	0.09 (0.31)	1.17 (1.68)	6.43 (4.25)	16.27 (3.72)
Associate degree	1.50 (0.60)	0.11 (0.60)	0.10 (0.35)	1.22 (1.67)	6.47 (3.99)	16.10 (3.38)
College and above	1.54 (0.57)	0.13 (0.45)	0.15 (0.40)	1.38 (1.69)	6.48 (3.99)	15.86 (3.36)
Total	1.60 (0.74)	0.05 (0.27)	0.08 (0.29)	1.24 (1.70)	6.14 (4.29)	16.49 (3.73)

Estimation

- Joint decisions for child time, market work, domestic work, and leisure
- Time spent on different activities adds up to a fixed total (24 hours) i.e. time spent in one activity is not available to be spent in another.
- We use the method of Seemingly Unrelated Regressions (**SUR**), and estimate a system of four linear time allocation equations

SUR regression equations

$$t_j = \beta_{0j} + \beta_{1j}X + \varepsilon_j$$

- t_j : hours per day mothers choose to spend in activity j
 - Activity j : basic childcare, child education, domestic work, and market work
- X : vector of explanatory variables including:
 - Demographic characteristics of the mothers: age and education
 - Household characteristics: couple's age and education difference, presence of other adults and a disabled member in the household, children's age and gender, and household wealth index.
 - Whether the diary day was in the summer

Time allocation of married women on weekdays

	Childcare	Child edu	Domestic	Market
Mother's education				
Primary or middle school	0.037 (0.053)	0.024 (0.026)	0.195 (0.102)	-0.039 (0.088)
High school	0.219** (0.067)	0.128** (0.032)	-0.175 (0.128)	0.181 (0.110)
Associate degree	0.165* (0.080)	0.174** (0.039)	-0.612** (0.155)	0.703** (0.133)
College or above	0.220* (0.090)	0.068 (0.043)	-1.352** (0.173)	1.982** (0.148)
Age	-0.100** (0.017)	0.018* (0.008)	0.141** (0.032)	0.068* (0.027)
R-squared	0.190	0.109	0.090	0.110
Observations	5321	5321	5321	5321

Time allocation of married women on weekdays (Cont.)

	Childcare	Child edu	Domestic	Market
Couple's age difference	-0.002 (0.004)	0.003 (0.002)	-0.013 (0.007)	-0.011 (0.006)
Couple's education years difference	0.005 (0.005)	-0.005* (0.002)	0.001 (0.009)	0.005 (0.008)
Presence of other literate adults		-0.098** (0.023)		
Presence of other adults	-0.042 (0.045)		0.120 (0.087)	-0.236** (0.075)
Presence of disabled	0.096 (0.093)	0.019 (0.045)	0.222 (0.178)	-0.095 (0.153)
Household wealth index	0.009 (0.012)	-0.001 (0.006)	-0.043 (0.022)	0.003 (0.019)

Time allocation of married women on weekdays (Cont.)

	Childcare	Child edu	Domestic	Market
# of children 0-5	0.500** (0.034)	0.011 (0.016)	0.050 (0.064)	-0.078 (0.055)
# of children 6-11	0.073** (0.027)	0.075** (0.013)	0.098 (0.052)	0.070 (0.045)
# of children 12-17	-0.025 (0.027)	-0.061** (0.013)	0.115* (0.052)	-0.057 (0.045)
Child gender ratio	0.119** (0.037)	0.008 (0.018)	0.052 (0.072)	0.016 (0.062)
Summer	-0.178** (0.035)	-0.203** (0.017)	-0.459** (0.068)	-0.174** (0.058)
Constant	2.418** (0.329)	0.028 (0.159)	3.495** (0.633)	-0.527 (0.544)

Time allocation of married women on weekend days

	Childcare	Child edu	Domestic	Market
Mother's education				
Primary or middle school	-0.018 (0.100)	0.073 (0.053)	-0.228 (0.233)	-0.051 (0.162)
High school	-0.041 (0.123)	0.140* (0.066)	-0.167 (0.288)	-0.044 (0.200)
Associate degree	-0.128 (0.148)	0.068 (0.079)	-1.033** (0.347)	0.756** (0.242)
College or above	0.215 (0.164)	0.103 (0.087)	-0.999** (0.383)	0.511 (0.267)
Age	-0.169** (0.032)	0.002 (0.017)	0.201** (0.076)	0.086 (0.053)
R-squared	0.260	0.118	0.104	0.071
Observations	1047	1047	1047	1047

Time allocation of married women on weekend days (Cont.)

	Childcare	Child edu	Domestic	Market
Couple's age difference	-0.001 (0.007)	-0.005 (0.004)	-0.027 (0.016)	-0.015 (0.011)
Couple's education years difference	-0.004 (0.009)	-0.008 (0.005)	0.028 (0.021)	-0.007 (0.015)
Presence of other literate adults		-0.034 (0.048)		
Presence of other adults	0.042 (0.085)		0.342 (0.200)	-0.025 (0.139)
Presence of disabled	-0.020 (0.172)	-0.024 (0.092)	0.353 (0.403)	0.119 (0.280)
Household wealth index	0.027 (0.022)	-0.008 (0.012)	-0.020 (0.051)	-0.001 (0.035)

Time allocation of married women on weekend days (Cont.)

	Childcare	Child edu	Domestic	Market
# of children 0-5	0.490** (0.061)	0.010 (0.033)	-0.119 (0.143)	-0.021 (0.100)
# of children 6-11	0.114* (0.052)	0.081** (0.028)	-0.177 (0.122)	0.091 (0.085)
# of children 12-17	-0.022 (0.052)	-0.035 (0.028)	0.156 (0.122)	0.009 (0.085)
Child gender ratio	0.134 (0.070)	-0.046 (0.037)	-0.083 (0.164)	-0.118 (0.114)
Summer	-0.009 (0.076)	-0.171** (0.041)	-0.509** (0.178)	-0.017 (0.124)
Constant	3.556** (0.637)	0.354 (0.341)	2.585 (1.492)	-0.564 (1.039)

Summary of findings

- Education affects the time allocation of married women but not their husbands. The traditional division of labor in household is not affected by women's education
- Positive and very similar impact of education on time spent in child care, child education, and market work and the opposite impact on time spent in domestic work

Policy implications

- More educated women spend more time with their children, which increases the human capital of the next generation.
 - "An educated but jobless mother plays an important role in the society because she raises more educated children" (Hashemi Rafsanjani, Hamshahi daily, Jan. 3, 1999)
- Education empowers women by changing their main role in the household from procreators to producers of human capital
- So, investment in public schools and daycare can increase women's labor force participation