Gender, Education, Family Structure, And The Allocation Of Labor In Iran

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GENDER, EDUCATION, FAMILY STRUCTURE, AND THE ALLOCATION OF LABOR IN IRAN

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The gender gap in labor force participation (LFP) in Iran is much larger than most other countries, but it has been declining. Also, the composition of women's employment has been shifting towards professional and entrepreneurial positions, especially in the private sector. Analyzing the forces behind these patterns is important from a policy perspective and for predicting the future trends in the Iranian labor market. Understanding the case of Iran has also implications for other economies, especially those in the Middle East and North Africa, which have similar labor market conditions. Using a large sample derived from Iran's 2006 census and employing IV Probit and multinomial Logit models, we examine the role of education and other individual and family characteristics in LFP and employment of Iranian men and women aged 25−54. We find that about 60% of the rise in female LFP rate between 1986 and 2006 can be attributed to the decline in fertility. The expansion of education, on the other hand, accounts for about 10% of the rise. The limited role of education is partly due to the limited range of jobs that are available for educated women, hence intensifying competition among them and reducing the returns to their education. Alleviating this jobs constraint may allow the role of education to rise two to three times. In addition, part of the fertility effect can be attributed to female education, which has played an important role in lowering the number of children ever born. Since fertility is unlikely to decline further, female education could become the main driving force in the continued rise of women's LFP. We also find that women who join the labor market as a result of tertiary education, especially at the graduate level, have a much higher chance of joining the private sector, especially as employers and self-employed, than the average person in their cohort. Contrary to the common perception, the association between education and public employment is stronger for men than for women. These findings imply that tertiary education, especially at the graduate level, may help address the important policy challenges that Iran and other MENA countries in alleviating unemployment, diversifying the economy, and empowering women.

Keywords: Gender; education; fertility; marriage; labor force participation; employment.

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1. Introduction

As in most other countries in the Middle East and North Africa (MENA), the gender gap in labor force participation (LFP) in Iran is quite notable.[a] While for Iranian men the LFP rate is within the range common around the world, for Iranian women it is much lower than the rates typically observed elsewhere outside MENA. A number of hypotheses have been put forward in the literature to explain this phenomenon. In particular, the prevalence of conservative attitudes towards gender roles, especially among urban middle classes, seems to be the preferred explanation among researchers in the field. The rise of oil rents and incomes after the 1950s and the concomitant increase in the average number of surviving children per family may have contributed to the low and declining female LFP, at least until the 1980s (Karshenas 2001, Moghadam 2005, Ross 2008). Since 1980, the socially restrictive policies of the Islamic Republic have been viewed by many observers as the primary impediments to the rise in LFP rate among women (Moghadam 2000, 2004). However, pointing to the considerable role of economic disruptions and structural changes in Iran since 1980, some scholars have questioned the significance of the Islamic Republic's social policies as impediments for female LFP beyond the early years of the 1979 Revolution (Bahramitash and Esfahani 2009). In fact, there are visible signs of expansion in women's role in the economy during the past two decades, along with rapid increases in their educational attainments and declines in fertility and family size. These changes are taking deeper root as the demographic transition changes the relations within the family, between spouses as well as between parents and children, making it possible for families to invest more intensively in the education and well-being of the next generation. Understanding the factors behind Iranian women's labor market experience is important because the trends in education and family structure are continuing and could bring about major changes in Iran's economic and social environment.

There have been a number of attempts to assess the role of education and family structure in women's LFP and employment in Iran. However, most of these studies are essentially qualitative or use simple statistical approaches that do not discern and measure the effects of various factors (e.g. Alizadeh 2000, Mehran 2003, Mehryar *et al.*, 2004, Rostami Povey 2005, Rezai-Rashti and James 2009, Bahramitash and Esfahani 2009, 2011). The studies that rely on quantitative methods are quite limited. Salehi-Isfahani (2005) analyzes the determinants of LFP and paid employment, using a Probit method and a sample survey of about 6,000 observations in 2001. Salehi-Isfahani and Marku (2006) use a pseudo-panel based on annual household surveys during 1984−2004 to identify the age, cohort, and period effects on female LFP. Majbouri (2010) employs a short panel with about 16,000 observations during 1992−1995 to examine the impact of economic stability in that period on LFP. In this paper, we make an attempt to use a recent large, census-based dataset and a

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[a]For extensive recent surveys and discussions of the gender-related inequities in LFP and employment, see *The Economist* (2011), Chioda (2011), and World Bank (2012).

more comprehensive model to identify some of the key determinants of LFP and employment types in Iran. We also go beyond the previous work and carry out a test of exogeneity of educational attainment in LFP and employment outcomes in Iran.

Our focus is on the role of gender, education, and family structure in the choice among various options inside and outside the labor market. Discerning the role of education and fertility is of particular interest because these variables can be shaped by policy and have been underlined in the literature as important mechanisms for Iranian women to overcome the impediments to their participation in the labor market and beyond (Bahramitash and Esfahani 2011). These effects need to be examined carefully to assess the magnitude of each and separate them from the roles played by other factors. For education in particular, the case for a large positive effect on LFP is far from clear. Theoretically, to the extent that education raises income as well as the opportunity cost of nonmarket activities, its net impact on LFP may be ambiguous (Bloom *et al.* 2009). In addition, as education expands, its returns in the labor market may decline, thus discouraging labor market participation by women, who tend to have rather elastic labor supplies. Empirically, this ambiguity can be observed in the case of adult men, for whom the correlation between schooling and LFP is often negligible, with or without controls for simultaneity. Also, the cross-country study by Bloom *et al.* (2009) suggests that conditional on fertility, education may not be a significant determinant of women's LFP. Indeed, in recent decades, female LFP rate has been stagnant or declining in many countries despite significant expansion in female education (Chioda 2011, World Bank 2012). This phenomenon has been well documented for the United State, where the LFP of women with at least high school diploma, especially those with college education, has declined.[b] Another notable example is Turkey, where the female LFP rate has precipitously dropped from around 77% in 1955 to 24.3% in 2007 (Tansel 2001, World Bank 2009). A similar trend existed in Iran between the 1950s and 1980s (see Table 1).

The declining female LFP in some developing countries may, of course, be reflecting the downward segment of the "U-curve" commonly attributed to the modernization process, whereby LFP declines as traditional female skills and roles become obsolete and rises back when women acquire new skills (see Sec. 2 for a review of this topic). The decline may also be seen as a consequence of rising incomes in conservative societies where women's participation in the labor market is discouraged. Such norms are less likely to hold back uneducated women from poorer families, who badly need the money. So, LFP rates tend to be high when the incomes are very low and the absolute majority of families are in bad economic conditions. However, as education and incomes rise, more families can afford to observe the conservative norms and, as a result, the LFP rate of women declines. The trend may

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[b]See, for example, Aaronson *et al.* (2006), and especially Lawrence Katz's comments on that paper (Burtless and Katz 2006, p. 147).

Table 1. Labor force and LFP and unemployment rates in Iran population aged 20 years and over.

Census year	1956	1966	1976	1986	1996	2006
Labor force (Millions)	5.05	5.93	7.91	10.71	14.07	21.28
Female						
Urban	0.14	0.22	0.38	0.61	1.02	2.33
Rural	0.28	0.41	0.57	0.33	0.58	0.83
Male						
Urban	1.47	2.10	3.38	5.57	7.85	12.53
Rural	3.16	3.20	3.58	4.20	4.62	5.59
Labor force participation rate (Percent)						
Female						
Urban	9.5	10.3	10.8	10.0	11.1	15.2
Rural	8.7	12.3	14.8	7.4	11.1	12.9
Male						
Urban	93.6	88.0	86.9	86.3	82.2	79.4
Rural	96.1	91.0	93.6	91.0	88.4	85.4
Unemployment rate (Percent)						
Female						
Urban	0.7	2.5	4.6	21.1	8.8	19.7
Rural	0.2	10.7	25.8	11.3	8.9	21.2
Male						
Urban	4.0	4.6	3.5	11.5	7.1	8.5
Rural	1.2	10.4	11.1	7.9	6.2	10.6

Source: Statistical center of Iran. Available at http://www.amar.org.ir.

eventually be reversed if rising education or other developments change the social attitudes towards gender (World Bank 2012, Bahramitash and Esfahani 2011). In such situations, which seem to be the case in Iran, it is important to ask: Which factors are driving the outcome, what role each factor plays, and what are the prospects of the process continuing?

Besides potentially affecting LFP, education is likely to shape the types of employment that an individual may seek and find. A great deal of employment in Iran, especially for young women in rural areas, used to be unpaid family jobs. Education seems to be enabling young Iranians to move away from such positions. However, there is a concern that this may only be swelling the ranks of the unemployed. Does education simply raise the probability of unemployment as it reduces unpaid family work or homemaking? Is the expansion of education in Iran mainly a path to public employment, rather than providing the students with skills needed in the private sector, especially those that enable them to become entrepreneurs and employers? How does education affect occupational outcomes (e.g. self-employment versus employee in the private or public sector)?

In addition to education, a host of other variables affect labor market outcomes for individuals. Marriage, fertility, and household size, especially the presence of

children and elderly in the household, are often considered as key factors that shape individuals' incentives and opportunities to seek employment. For women in traditional societies, these factors are often found to act as impediments. To what extent is this the case in Iran today? How does the impact of these variables vary by gender? Do the age structure and gender composition of children or adults in the family influence the outcome? Do these effects vary in rural versus urban areas? How do marriage and family structure interact with education in shaping labor market outcomes?

The answers to the above questions are important because they can shed light on Iran's labor market and its prospects in the coming decades. In this study, we make an attempt to address them. We use a multinomial Logit model to relate education, family structure, and other characteristics of each individual to the probability of different options each adult faces in terms of participation in the labor market and types of employment he/she may seek. Our dataset, obtained from the website of the Statistical Center of Iran, www.amar.org.ir/nofoos1385/, has relatively detailed information about each individual in a large sample (2% of the country's entire population, or about 1.4 million people, surveyed as part of the 2006 national census). This feature of the dataset enables us to explore a host of issues and control for a variety of factors. However, the dataset has a limitation in that it is cross-sectional, which prevents us from controlling the effects of unobserved individual characteristics. Nevertheless, we use it for our study because it is still quite informative and, besides, there is no panel dataset for Iran with sufficient length that can be employed for our purposes. We try to compensate for this limitation of the dataset by controlling for many different factors and by taking account of potential estimation biases. We also identify an exogenous variable in the data set — rural versus urban birthplace — that can serve as a good instrument for female tertiary education. We use this instrumental variable to test the exogeneity of tertiary education as a determinant of female LFP and employment probabilities. The results support the exogeneity assumption, giving credence to our estimates of the impact of education on labor market outcomes based on a multinomial Logit model, where instrumenting is not practical.

Our empirical analysis is based on the sample of 25−54 age groups in order to focus on the cohorts that are largely beyond school age and before retirement. We carried out the exercise for different cohorts with five and ten year intervals and found that the effects of the main variables of interest are similar across these age groups once we control for the life-cycle rise and decline of participation in various activities through a quadratic age term. For the sake of parsimony, here we present only the results of regressions based on the entire group.

Our estimates indicate that by 2006, education had come to have a tangible impact on the LFP and employment rates of women 25−54 years of age, but not of men in that age range. We find that, controlling for a host of other factors including per capita schooling at general and higher levels in the local district, women with elementary education are on average 11% less likely to participate in the labor force

than those with no education. But, higher degrees tend to raise the LFP rate. High School Education raises the probability of LFP by more than 10% and university education by another 15%. The individual effect of tertiary education, however, does not fully translate into a higher LFP rate for the female population as a whole because of counteracting general equilibrium effects. We find that as female tertiary education in a district rises, the probabilities of LFP and employment for each working-age woman in the district fall. We argue that this is likely to be due to the limited range of available jobs preferred by educated women. As higher education expands, competition for those jobs intensifies, causing their expected payoffs to fall and, thus, discouraging women's LFP. This effect is indeed strong and seems to have wiped out about two-thirds of the impact of tertiary education on the female LFP rate.

The impact of education on the probability of LFP is slightly larger than the impact on employment, raising the chances of unemployment by about 1% for secondary and 2% for tertiary degrees, when compared to women holding elementary degrees. The general equilibrium effect does not seem to be playing a role in the female unemployment rate. For men in the 25−54 age-group, the average impact of middle and high school degrees is close to zero and an undergraduate education tends to lower the probability of LFP and employment by about 2%, also lowering the chances of unemployment by about 1%. Only graduate education compensates for that and raises men's average probability of LFP by 2% and employment by 7% relative to elementary education or less, lowering unemployment probability by 5%. Interestingly, the general equilibrium effects of tertiary education for men seem to entail positive externalities, thus reinforcing their increased LFP and employment and reduced unemployment rates.

Within employment categories, education drives both men and women towards public employment in significant ways. But, contrary to the common perception that the public sector is a more important absorber of educated women than men, the marginal impact of education on men's probability of public employment is significantly larger than the impact for women. For example, compared to an elementary degree, a high school degree raises the probability of ending up in the public sector by about 10% for women and by 16% for men. An undergraduate degree raises that probability by about 20% for women and 37% for men! The shift for men is largely due to outflow from self-employment and (to lesser extents) from private-sector and unpaid-family positions. For women, the probability of private employment tends to rise with tertiary education, along with their overall chances of being employed. Their self-employment also rises sharply with graduate education. The main origin of these shifts is homemaking, with some flow out of unpaid family work as well. Homemaking for women and self-employment for men seem to serve similar roles as reservation options. Finally, the employer status for both men and women is associated with greater education, especially at the graduate level.

Our empirical analysis takes account of a number of other determinants of LFP and employment besides education. We find that marriage is associated with a

significant reduction in LFP probability for women (by about 8.5% on average for the sample), but an increase for men (about 7%). Being married is also associated with lower chances of being unemployed, especially for men. As a result, the probability of employment declines by about 7% for women and increases by 13% for men. The positive effect of marriage on employment for men is largely concentrated in the public sector and, to a lesser extent, self-employment positions. For women, the reduction in the employment rate is distributed almost evenly across the employer, self-employed, and public and private employee positions. Interestingly, these reductions tend to be smaller for women with undergraduate degrees and are completely reversed for those with graduate education. For men, the only such significant effect is the lower probability of self-employment for married men with undergraduate education.

Residing in rural areas marginally increases the chances of LFP and employment (in the form of unpaid family work) for both men and women, giving rise to a greater unemployment risk there than in urban areas.

Since the opportunities and constraints in the locality where an individual lives are likely to shape her/his choices, it is important to take them into account. In principle, a good way to address this concern is to employ fixed effects. However, implementing fixed effects in a multinomial Logit framework is currently not a manageable task. We address this problem by including a series of district-level indicators that reflect key aspects of labor market conditions in the district for each individual in the sample. When included in the regressions, these variables show statistical significance and offer interesting insights, but they do not change the main results obtained for individual and household characteristics.

The rest of this paper is organized as follows. In Sec. 2, we briefly review some highlights of the literature on gender and LFP. Section 3 offers an overview of the patterns of labor allocation in Iran. Section 4 provides some evidence in support of exogeneity of education in the LFP decision. Section 5 presents the results of the multinomial Logit analysis and Sec. 6 examines some extensions. Section 7 concludes.

2. The Literature on Gender and LFP

The most widely used framework for the analysis of the gender gap in LFP is the so-called "U-curve" hypothesis that suggests a nonlinear relationship between female LFP rate and the modernization process (Boserup 1970, Scott and Tilly 1975, Psacharopoulos and Tzannatos 1989, Rau and Wazienski 1999, Lincove 2008, World Bank 2012). This view posits that in traditional societies, women participate extensively in economic activities as part of the family. They lack education, but possess skills that make them productive in those tasks. In the early stage of industrialization, the emerging economic activities require new skills that are initially acquired by men. As a result, women's opportunities to participate in the production process shrink and they are forced to stay home. Rising income opportunities for men

also contribute to this division of labor (Goldin 2006). In later stages, as educational and fertility-control possibilities expand, women gain new abilities to participate in the labor market and offer an alternative to male labor. At the same time, the participation of women in the labor force gives firms an option to lower their employment costs. Attitudes toward the employment of women change gradually and the discriminatory practices in the labor market diminish (Boserup 1970, Psacharopoulos and Tzannatos 1989, Forsythe *et al.* 2000, Goldin 2006).[c]

The U-curve hypothesis offers a plausible explanation for a broad pattern of female LFP rate in most countries. However, it does not explain the long persistence of low LFP rates in some countries and the significant variations in LFP across countries at similar development levels (Forsythe *et al.* 2000, Morrisson and Jütting 2005, World Bank 2012). These phenomena are often explained by specific labor market conditions, such as demographics, socioeconomic characteristics of the population, culture, and government policy (Hijab 2001, Gündüz-Hoşgör and Smits 2008, Chioda 2011).[d]

Earlier studies of female LFP (e.g. Mincer 1962, Heckman 1980, Hausman 1981, Moffitt 1984) focused on the impact of marriage. Later studies added the role of childbearing (e.g. Cain 1966, Heckman 1974, Schultz 1990, Klerman and Leibowitz 1994). Keane and Wolpin (2002) went further and developed a dynamic, simultaneous model of women's labor supply, schooling, marriage, and fertility decisions.[e] Empirical application of such models requires calibration and simulation methods, which have gained popularity in recent years. However, their results remain dependent on a host of assumptions that are difficult to test separately. Studies of LFP that rely on regression analysis for measurement and hypothesis testing need to address the simultaneity issue with instrumental variables or structural estimation methods. Many studies have managed to identify appropriate instrumental variables and offer useful and plausible results. Other studies, however, simplify the task by assuming weak exogeneity for education or family structure, which has proven reasonably accurate in some contexts (see, for example, Bratti 2003, Connelly *et al.*, 2006, Bloom *et al.* 2009).

Among socioeconomic factors examined in empirical studies, besides marriage and child-rearing, education is often considered as determinant of female labor supply.

[c]An alternative view of the gender gap in the LFP pattern is the "constancy" hypothesis, which claims that female LFP does not change much during the industrialization process, but it is not recorded properly in the early stages, hence generating the observed U-curve. In other words, the curvilinear pattern is a statistical artifact, not a real trend in women's participation in the production process (Robinson 2005). While this might be the case, the phenomenon and its variations still need to be explained.

[d]The U-curve hypothesis can be viewed as an outgrowth of the classic modernization theory, which relates the female LFP directly to the modernization process and emphasizes the "emancipation hypothesis". In that view, the changes brought about by modernization (especially changes in occupational structure, education, fertility, and urbanization) creates opportunities for women to seek paid work and eventually get equal rights with men in the labor market (Inglehart and Norris 2003). However, that view cannot explain the initial decline in female LFP as modernization takes off (Gündüz-Hoşgör and Smits 2008).

[e]This literature is quite vast, with numerous empirical applications to different countries and time periods. A number of contributions are noted in the text.

The dominant view is that by raising the potential for earning higher income and social status through labor market participation, education increases the opportunity cost of homemaking for women. However, as pointed out in the introduction, the effect does not seem to be universal and has been hard to detect at the aggregate level (Bloom *et al.* 2009). It seems to be strong in countries that have reached the rising segment of the modernization U-curve, where attitudes have changed and technological and economic developments transform the nature of jobs, offering new positions that women can attain through higher education. At such a stage, educational opportunities also contribute to reduced fertility, which in turn has a significant positive impact on female LFP and on investment in children.[f] Spierings and Smits (2007), for example, conclude that higher education is an important factor in women's LFP in five MENA countries — Egypt, Jordan, Morocco, Syria, and Tunisia. Tansel (2001) and Gündüz-Hoşgör and Smits (2008) confirm this for the case of Turkey.[g] Duryea *et al.* (2001) examine 18 countries in Latin America and the Caribbean during the 1990s and conclude that the increase in female schooling accounts for about 30% of the overall increase in female LFP rates, with the remaining 70% originating from other factors that have increased participation rates at given levels of education. Such effects, of course, are not uniform across countries and need to be explored in specific contexts (Chioda 2011, World Bank 2012).

The inverse relationship between fertility and the female LFP rate has proven to be empirically significant and robust (Bloom *et al.* 2009, World Bank 2012). However, as in the case of education, there is concern over the simultaneity of fertility and LFP decisions; e.g. lower fertility and higher education and LFP may all originate from cultural factors that encourage greater career-orientation among women (Evans 1988). Nevertheless, when there are adequate controls for simultaneity and other factors, researchers usually find that exogenous fertility shocks have strong impacts on female LFP. Herr and Wolfram (2009), for instance, find that the birth of a child has a profound impact on the decision of women to exit the labor market, even among the highly educated. Bloom *et al.* (2009) confirm the impact of child-bearing on LFP using cross-country panel data. The details and the magnitude of the effect, however, seem to vary across institutional and cultural environments.

Studies of the impacts of education and fertility on LFP typically find that education works partly through fertility besides its other direct and indirect effects. In the case of Iran, for instance, Mehryar and Aghajani (2002) and Abbasi-Shavazi *et al.* (2008) examine the impact of women's education on fertility and find it to be very significant: About one-third of fertility decline may be attributable to the expansion in female education. However, the education and fertility effects on LFP

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[f]The link between education and fertility is complex and the total effect of education can act through several channels. For example, education can influence fertility through the opportunity cost of time, age of marriage, and timing of births, among many other effects. For recent studies of these points see Bloom *et al.* (2009) and Isen and Stevenson (2010).

[g]For a survey and overview focused on MENA countries, see Salehi-Isfahani (2006). Also see, among many others, Assaad and Zouari (2003) and Gündüz-Hoşgör and Smits (2006).

may exist separately and act simultaneously. In Ghana, for example, Sackey (2005) finds that female schooling matters in both urban and rural localities and both primary and post-primary schooling levels exert a significant positive impact on women's LFP and a strong negative effect on fertility.

Education may also have externality and general equilibrium effects. An interesting line of inquiry has tried to measure these externalities along with the individual returns. For example, Duflo (2001, 2004) combines micro data with regional variation in school construction in Indonesia to measure the impact of education on LFP, wage rate, and incomes in a general equilibrium setting. She finds that a general rise in educational attainment does have a depressing effect on wages, but the net effect on LFP is positive. Also, Acemoglu and Angrist (2000) estimate human capital externalities exploiting individual-level differences in schooling together with statewide differences in average schooling. They find positive, but quite small, external effects. Finally, Acemoglu *et al.* (2004) estimate the general equilibrium consequences of increased female labor supply on male and female wages during the 1940s in the United States and find negative effects.

It is important to note that increased educational attainment of women does not necessarily improve their relative position in the labor market. While women with higher education have higher expected returns and tend to participate more in the labor market, the gender gaps in wages and unemployment sometimes increase with education (Bertrand *et al.* 2009, Evertsson *et al.* 2009). A variety of factors may be responsible for such patterns. One notable factor is occupational segregation, which is often associated with higher salaries among male-dominated occupations. Also, women tend to face discrimination and greater likelihood of careers disruptions, which tend to flatten their salary profiles and dampen their job opportunities. Their tendency to opt for homemaking and child-rearing much more readily than men also makes their labor supply elastic and may lower the opportunity costs of job search, hence raising their unemployment rates and rendering their LFP more pro-cyclical Addison (1993).

A number of studies emphasize the role of structural adjustment measures and market-oriented reforms on women's relative position in the economy (e.g. Assaad and Arntz 2005, Beneria 2003, Afshar and Dennis 1995). Some of these reforms, especially those that encourage labor intensive exports, tend to raise women's LFP and employment, but in other liberalization attempts, the net impact appears to be negative. For example, Assaad and Arntz (2005) find that under the structural adjustment program in Egypt, gender gaps in access to wage and salary employment and in earnings widened during 1988−1998, largely due to women's more limited geographical mobility.

The low LFP rates of women in MENA countries have posed a puzzle that a number of scholars have tried to address. High fertility, low education, Islam, culture, and oil income have been the factors most often examined in the literature (Karshenas 2001, Moghadam 2005, Ross 2008). Since education has risen and fertility has dropped sharply in the past few decades, oil, Islam and culture have come

to be viewed as the main culprits. In his cross-country econometric study, Ross (2008) argues that oil rather than Islam has been the main factor. His evidence regarding the absence of an effect by the share of Muslims in a country's population is plausible. However, the role of culture cannot be ruled out since the MENA dummy in his regressions remains relatively large and statistically significance. Moreover, even the impact of oil revenues, which Ross (2008) proposes as the main cause of the low female LFP rate, is contingent on cultural factors that shape the division of labor by gender. To see this point, it is important to note that the existence of large oil revenues does not by itself reduce LFP. In fact, it may even increase LFP if capturing a share of the revenues requires some form of employment. The argument that oil rents reduce female LFP requires critical assumptions, such as the following pair: (i) Rising family incomes resulting from oil rents raise the value of nonmarket activities relative to market participation; (ii) The society's norms ensure that nonmarket activities (especially homemaking) are assigned to women. In this sense, it seems that oil revenues may have exacerbated the role of traditional norms rather than acting as a separate force that keeps women's LFP low. This further implies that this oil effect may diminish as norms change through education or other factors.

Finally, there are a number of other factors that have been examined in the literature as determinants of female LFP. A prime example is the role of household appliances ("Engines of Liberation") in enabling women to participate in the labor market (Coen-Pirani *et al.* 2010, Cavalcanti and Tavares 2008). Given the limitations of our dataset, we will not attempt to deal with such factors here. Our study focuses mainly on education and family structure. We start our analysis in the following section with an overview of the labor market situation in Iran since mid-1950s.

3. Gender and Labor Allocation in Iran: An Overview of the Census Sample

The dataset that we will be using in our analysis is based on Iran's 2006 population census. It consists of 2% of the households who had been randomly selected by the Statistical Center of Iran to fill in a long form along with the standard census short form. Randomization had been done at the rural and urban areas of each district, with low population areas being oversampled to ensure minimal observations for them. The raw data generated by the long form has been compiled for research purposes as two related files. One file offers information on individuals and the other shows the household characteristics. The files also include sampling weights, which we employ in our statistical analysis to correct for problems posed by oversampling in the low population areas. In the rest of this section, we provide an overview of the sample, after reviewing the trends in the labor supply in Iran since 1950s.

Iran's labor force grew quite rapidly in the second half of 20th century. In the 50 years from 1956 and 2006, the labor force aged 20 years and older grew 4.2 times from about 5 million to over 21 million (see Table 1). As in many other countries, the

Table 2.   Educational attainment of the population.

Census year	1956	1966	1976	1986	1996	2006
Literacy rate (Percent in population 10 years and over)						
Female	7.3	16.5	31.0	47.6	71.7	79.5
Male	22.2	39.0	53.2	68.0	83.3	88.5
Share of 10+ year population with high school degree						
Female	0.2	1.1	2.9	7.0	12.1	16.8
Male	0.5	3.2	7.2	15.6	22.7	24.2
Share of 20+ year population with tertiary degree						
Female	0.04	0.3	1.0	1.5	3.4	8.3
Male	0.6	1.6	2.7	3.9	6.8	11.3

Source: Statistical center of Iran. Available at http://www.amar.org.ir.

growth rate was much faster for women compared to men (on average, 4.1% versus 2.8% per year), with the difference being larger and the growth rate being higher in urban areas, where female labor force grew close to 17 times in that period. However, until recently this was largely due to population growth since urban women's LFP rate had remained relatively flat and low until the late 1990s. In rural areas, where female labor force and LFP rate were higher in the 1960s and 1970s, there was a sharp drop in female labor force, where the LFP rate for women 20 years and older almost halved in the 1980s. This was largely due to the disruption in internal and external trade during the war with Iraq, which significantly reduced the production of carpets and handicraft, where many rural women were employed as unpaid family workers (Bahramitash and Esfahani 2009). Ever since, the female LFP rate has risen, but it has been associated with high unemployment rates (Table 1). It appears that the patriarchal traditions that have kept Iranian women in their role as mothers and housewives are weakening, but many obstacles remain. For men, the LFP rates have followed a secular decline, largely due to expansions in education and social security, which have changed the LFP incentives for the young and the elderly.[h]

Starting from very low levels in the 1950s, educational attainment of the population, especially that of women, increased significantly during the subsequent five decades (Table 2). Interestingly, for men this has been associated with a decline in the LFP rate, while for women the two variables have moved in the same direction in recent years. Increased engagement in education has certainly reduced the LFP rates for younger people. However, the decline in men's LFP can also be observed among older cohorts, which seems to be due to the expansion of social security and insurance options. For women, social barriers to LFP seem to be declining, possibly as a result

[h]It is possible that the trend may also be partly due to an increase in informal economic activities that do not get captured in census data. This issue may be important in the case of women as well (Moghadam 2009), implying that the actual rise in their LFP and employment rates might be faster than reflected in census statistics. For a survey of studies of informality and its rise in Iran, see Bagheri *et al.* (2002).

Table 3.   Labor allocation of population aged 25−54 years old, 2006.

Labor market and non-market statuses	Percent of each gender's population in each status	
	Female	Male
Employer	0.5	7.5
Self-employed	2.8	33.2
Public employee	6.7	22.2
Private employee	2.9	23.0
Unpaid worker	1.1	0.5
Unemployed	2.1	5.9
Student	2.2	1.1
Pensioner/nonactive income earner	2.9	3.8
Homemaker	76.4	0.1
Other	2.4	2.7
Total	100.0	100.0
Labor force participation rate (Percent of population)	16.4	92.1
Unemployment rate (Percent of labor force)	13.8	6.9

Source: 2006 census 2% sample survey, statistical center of Iran. Available at http://www.amar.org.ir.

of their increased educational attainments, among other factors. In this paper, we explore the role that education may have played in LFP of men and women in some detail.

A further glimpse of the structure of Iranian labor market is offered in Table 3, which presents the distribution of the population sample aged 25−54 across various activities in 2006. The table shows that for women in this age group, the LFP rate is 16.1% and the unemployment rate, 13.3%. More than three-quarters of the women in the sample are homemakers and about 2−3% are in each of the following categories: students, pensioner/nonactive income earners, and "others" (the residual group). Among those with jobs, the largest group is Public Employees and the smallest is Employers. The rest are equally distributed between Self-Employed and Private Employee positions. For men, self-employment is the most common position, with public and private employment coming second with almost equal shares. Employer and unemployed positions follow. The overall LFP rate of men in the age group is 92.3%, with an unemployment rate of 7.0%.

Table 4 shows further characteristics of the population in our sample and their pattern of LFP. About 85% of the group is married, with men being in married status slightly more than women. About 28% reside in rural areas, with the percentage being somewhat higher for women compared to men. In terms of educational attainment, the largest subgroup is those who hold elementary degrees (28% of the population) followed by those with a high school degree or with no education (22% each). For men, the largest educational group is high school graduates (27%), while those with no education are just over 10%. About 12% of women and 16% of men hold bachelor degrees. Graduate degree holders are 0.3% of women and 0.7% of men.

Table 4. LFP and the characteristics of population aged 25−54 years old, 2006. (Percentages, using sampling weights.)

Category	Share of population		LFP rate		Share of population studying or in labor force	
	Female	Male	Female	Male	Female	Male
Married	84.5	85.9	12.9	93.7	14.3	94.0
With two or more children in the household	38.0	36.2	12.1	95.2	13.4	95.6
With four or more children in the household	4.4	4.0	7.3	93.2	8.1	94.1
Rural residents	28.3	27.4	12.8	93.8	14.0	94.4
Highest educational level attained or being attained						
No education	22.2	10.1	7.2	88.2	7.2	88.2
Elementary	28.1	23.4	8.2	92.9	9.7	93.0
Middle school	15.4	22.3	8.1	93.7	9.1	93.8
High school	22.0	27.6	17.6	93.3	19.7	93.9
Undergraduate	11.9	15.9	60.6	90.1	69.6	94.9
Graduate	0.3	0.7	73.4	87.6	88.4	96.6
Total population	100.0	100.0	16.4	92.1	18.5	93.1

Source: 2006 census 2% sample survey, statistical center of Iran. Available at http://www.amar.org.ir. n. a. Not Applicable.

Table 4 shows that the LFP rate rises very fast with educational attainment among women, while displaying little variation among men. There is some drop in the LFP rate for men with higher education. However, this seems to be entirely due to the rising share of students among those with higher educational attainment. If students are added to those participating in the labor market, then their share in total male population rises with education (see the last column of Table 4). For women, this share rises much faster than for men. In Sec. 5, we will examine in more detail the choice between study and LFP and show the tendency of those with higher degrees to continue as students for longer years. The LFP rate is noticeably lower for women who are married, have more children, or live in rural areas. For men with these characteristics, only the ones with two children or more tend to have somewhat higher LFP rates.

For the key characteristics of the households under consideration, we turn to Table 5. The average household size is about 4.2 with a standard deviation of 1.7. There is an average of 1.1 child under 15 years of age per family, with about 43% of them under six years (the average number of children ever born to a woman in the 25−54 age range — not reported in the table — is about 2.5). The number of individuals over 55 in the households is on average 0.25, with in 0.11 of them being female. We are interested in the role of older individuals as well as the children in the household because of the care they may need or the support they may offer, which may affect LFP participation of household members. Since women's role in these respects may be different from men's, we also look at women's share among adults and elderly in the household.

Table 5. Characteristics of households with members aged 25−54 years old, 2006. (Percent of population, using sampling weights.)

Variable	Mean	Std. Dev.
Household size	4.18	1.72
Children in the household under six years old	0.48	0.67
Children in the household between 7 and 15 years old	0.63	0.85
Number of household members over 55	0.25	0.55
Number of female household members over 55	0.11	0.32
Share of women among household adults over 21	0.49	0.18

Source: 2006 census 2% sample survey, statistical center of Iran. Available at http://www.amar.org.ir.

Table 6 summarizes the averages and the standard deviations of the district-level indicators used in our analysis. We form these indicators as weighted averages of individual and household characteristics for the observations in each district, using sampling weights. There are many more variables of this kind that can be calculated and added to the analysis. However, those variables do not seem to add much to the

Table 6. District-level characteristics of population, 2006. (Percent of reference population, using sampling weights.)

District-level variables	Mean	Std. Dev.
Urbanization rate (for the sample of all age groups)	0.52	0.11
Average household size in the district (for the sample of all age groups)	4.94	0.65
Activities, positions, and education of women aged 25−54 *in the district*:		
LFP rate	0.157	0.081
Unemployment rate	0.152	0.126
Share of self-employed among the employed in the group	0.246	0.123
Share of public employees among the employed in the group	0.454	0.178
Share of private employees among the employed in the group	0.133	0.095
Share of unpaid family workers in the group	0.107	0.133
Share of students in the group	0.017	0.009
Share of pensioner/nonactive income earner in the group	0.027	0.013
Share of homemakers in the group	0.762	0.078
Per capita years of primary and secondary schooling	5.927	1.735
Per capita years of tertiary education	0.333	0.213
Activities, positions, and education of men aged 25−54 *in the district*:		
LFP rate	0.927	0.027
Unemployment rate	0.080	0.066
Share of self-employed among the employed in the group	0.454	0.117
Share of public employees among the employed in the group	0.228	0.081
Share of private employees among the employed in the group	0.231	0.083
Share of unpaid family workers in the group	0.009	0.010
Share of students in the group	0.008	0.006
Share of pensioner/nonactive income earner in the group	0.031	0.017
Share of homemakers in the group	0.001	0.001
Per capita years of primary and secondary schooling	7.723	1.141
Per capita years of tertiary education	0.501	0.235

Source: 2006 census 2% sample survey, statistical center of Iran.

explanatory power of the model. So, for the sake of parsimony, we keep the list relatively short. The first two variables in Table 6 — Urbanization (the share of urban population in the district) and Household Size — are calculated for the entire sample. All other district-level variables reflect the average labor allocation and are calculated separately for the 25−54 age group of each gender. There are 336 districts in Iran with an average of 1,588 observations per district (ranging from 166 to 31,267, with a median of 1,257).

4. Education and LFP: A Test of the Exogeneity Hypothesis

Assessing the impact of education on LFP is complicated by the potential existence of unobserved factors correlated with both variables, such as innate individual ability, which may bias the estimates. Cross-sectional datasets typically offer few possibilities for addressing this simultaneity problem. However, there is an exogenous variable in our dataset, indicator of rural versus urban birthplace, which seems to be a good instrument for higher educational attainment among women.[i] A rural birthplace tends to reduce a child's chances of attaining higher levels of education because children born in rural areas are likely to remain there at least for their elementary education. Lack of access to good quality schools in rural areas of Iran, means that children, especially girls, growing up there were less likely to develop strong educational foundations and to pass the substantial hurdles in reaching tertiary education levels. However, the impact of rural birthplace on the decision to participate in the labor market is less clear. Being born in a rural area and spending one's early childhood there may affect LPF through acquired skills, but it is unlikely to directly shape the innate abilities that determine LFP. As a result, if we control for acquired skills, LFP should not be correlated with the indicator of Rural Birthplace (one if the individual is born in a rural area, zero otherwise). If we use educational attainment as a proxy for acquired skills, this claim can be tested using a multivariate test of means. For example, in our sample of women aged 25−54 with completed bachelors' degree, the LFP rate for those born in rural areas is 67.8%, compared to 68.5% for those born in urban areas. Wilks' lambda F-test of equality of these rates returns a p-value of 0.28, which shows that the equality of LFP rates between the two groups cannot be rejected. The p-value for other high education levels is even larger.[j] We further confirm this result in our regression analysis below. Given these we find it plausible to use the "Rural Birthplace" indicator as an instrument for higher education in determining LFP among women aged 25−54 years. We concentrate on tertiary education because the adverse impact of Rural

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[i]The census data contain this information in the form of two questions. The first one records whether the respondent lives in rural or urban areas. The second one asks whether the subject has been born in the same place, in another village, or in another town/city. Combining the two responses, one can determine whether the respondent has been born in a rural or an urban area.

[j]All other multivariate tests of means yield the same result.

Birthplace may not show up with sufficient strength in secondary education, which entails far fewer barriers than the tertiary level does. The exercise focuses on women because education is not an important driver of men's LFP.

The equation that we estimate is specified as follows:

$$\text{Prob}(\text{LPF}_i = 1 | \text{HE}_i, x_i) = \Phi(\alpha + \beta \cdot \text{HE}_i + \gamma \cdot x_i + \varepsilon_i), \tag{1}$$

where LFP_i is a dichotomous variable for individual i (one for those in the labor force and zero otherwise), HE_i is the measure of higher education, and x_i is a vector of control variables. Φ is the standard normal distribution, (α, β, γ) is a vector of parameters, and ε_i is an error term.

Estimating the impact of higher education on LFP requires a Probit model with instrumental variables. However, in applying this method, we face a difficulty. Educational attainment information in our dataset is a discrete indicator of the levels of education, while the IV Probit model requires that the instrumented regressors be continuous. To deal with this problem, we construct a measure of the "Years of Higher Education" by setting HE_i equal to zero for individuals with no higher education and equal to the expected years of education corresponding to each educational level. We treat this variable as "roughly" continuous. To ensure the robustness of the results with respect to method of construction of the higher education variables, we constructed alternative indicators such as rank orders of educational levels. The end results proved rather resilient to a wide range of such specifications.[k]

LFP is determined by a host of factors other than education. We leave out most such variables to avoid potential endogeneity problems that they may introduce. However, we include in x_i a set of age-group dummies and the district-level female LFP rate, as a key indicator of socio-economic environment in which the individual lives. The age-group dummies define cohorts in five-year intervals, with the 25−29 years-old cohort serving as the base group. The five-year grouping helps keep the number of parameters to be estimated low, while allowing for variations in the effect of age in a flexible manner. Our key results are essentially unchanged if we use a quadratic function of age, rather than cohort dummies. We use such a function in Sec. 5 to help lower the number of parameters to be estimated.

Table 7 presents the estimation results for the LFP model. The first column shows an OLS regression of HE_i on Rural Birthplace, age-group dummies, and the district-level Female LFP Rate. The results verify that Rural Birthplace is indeed negatively and strongly correlated with the Years of Higher Education. The second column is the Probit regression of LPF on HE_i, Rural Birthplace, and x_i. The insignificant coefficient of Rural Birthplace in this regression is consistent with the argument that location of birth is unlikely to have a direct influence on LFP. Using this result, we

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[k]In an earlier version of this paper, we used a scaling based on the Probit regression of LFP on educational level dummies, similar to the multinomial Logit model discussed in the next section. Our conclusions were not different.

Table 7. Female education, LFP, and employment: Testing the exogeneity of higher education. (Probit and IV Probit regressions with sampling weights.)[†]

Dependent variable:	Years of higher education	LFP	LFP	Employed	Employed
Estimation method	OLS	Probit[‡]	IV Probit[‡]	Probit[‡]	IV Probit[‡]
Right-hand-side variables:					
Years of higher education	—	0.0852***	0.0772***	0.0718***	0.0695***
	—	(0.0009)	(0.0027)	(0.0007)	(0.0026)
Rural birthplace	−0.467***	0.0004	—	−0.00104	—
	(0.0057)	(0.0018)	—	(0.0016)	—
Age group 30−34	−0.113***	−0.0068***	−0.00635***	0.0218***	0.0199***
	(0.0105)	(0.0025)	(0.0024)	(0.0026)	(0.0023)
Age group 35−39	−0.261***	−0.0109***	−0.0104***	0.0305***	0.0276***
	(0.0103)	(0.0025)	(0.0029)	(0.0028)	(0.0024)
Age group 40−44	−0.385***	−0.0214***	−0.0207***	0.0224***	0.0208***
	(0.010)	(0.0026)	(0.003)	(0.0029)	(0.0027)
Age group 45−49	−0.450***	−0.0387***	−0.0387***	0.0055*	0.0061*
	(0.0096)	(0.0027)	(0.0035)	(0.003)	(0.0031)
Age group 50−54	−0.491***	−0.0749***	−0.0835***	−0.0337***	−0.0336***
	(0.0095)	(0.0025)	(0.0042)	(0.0028)	(0.0037)
Female LFP rate	1.961***	0.750***	0.687***	0.715***	0.667***
(District average)	(0.0417)	(0.0117)	(0.0168)	(0.0111)	(0.0162)
Constant	0.540***	—	—	—	—
	(0.0091)	—	—	—	—
ρ (Correlation coefficient of first and second stage error terms)	—	—	0.0043	—	−0.0134
Wald test of exogeneity, *p-value*	—	—	*0.8289*	—	*0.523*
Number of observations	259,642	259,642	259,642	259,642	259,642
R^2/Pseudo R^2	0.075	0.1852	—	0.1756	—

[†]The numbers in parentheses are robust standard errors.
[‡]Reported estimates are sample-average marginal effects.
*10% significance level.
**5% significance level.
***1% significance level.

run the IV Probit estimate of the LFP model, with Rural Birthplace serving as an instrument for HE_i (see column 3).[1] Note that the estimated coefficients of the right-hand-side variables decline somewhat when the IV method is used (compare columns 2 and 3). For the education variable, this is consistent with the view that the Probit estimates may be biased upward due to simultaneity. However, the size of the bias seems to be rather small. Indeed, the Wald test of exogeneity of the Years of Higher Education shows that this hypothesis cannot be rejected at any notable level of statistical significance (see the *p*-value reported in the lower part of Table 7). Also, the correlation coefficient of first and second stage error terms is very small, suggesting that HE_i does not contain components beyond the instrument that are important in the determination of LFP and could cause simultaneity. The last two

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[1]For all our estimations, we use the Stata program. The command we use for this regression is IV Probit.

columns of Table 7 repeat the exercise with an indicator of being Employed (one if the subject has a job and zero otherwise). Again, Rural Birthplace seems to be a suitable instrument for the Years of Higher Education. As in the case of LFP, the measured bias is quite small and weak exogeneity cannot be rejected. This is not an unusual result. Bratti (2003), for example, obtains a similar result in his study of the effect of education on fertility and LFP among Italian women.

The estimates of our IV Probit model of LFP and education show that compared to those with secondary education or lower, women in the $25-54$ age-group who earn an undergraduate degree are about 31% more likely to participate in the labor force and about 28% more likely to hold a job (without the IV correction, these probabilities would have been 34% and 29%, due to the small upward biases discussed above). The finding also means that tertiary education is not of adequate help for women to move out of the unemployment pool; rather, it raises the likelihood that they end up being unemployed by about 3%. It should be pointed out that these estimates focus on the individual impact of educational attainment, treating the educational attainment in the district as given. We will discuss the general equilibrium effects of education in Sec. 6.

Our estimates of the impact of education on female LFP are lower than the corresponding marginal probabilities found by Salehi-Isfahani (2005). He applies a Probit model to a 2001 household survey and finds that women with tertiary education are 42% more likely to participate in the labor market than those with secondary education. The difference seems to be partly due to the upward bias in the simple Probit regression and partly due to sample differences.

The age-group dummies are all highly significant in the regressions and indicate that after age 30, LFP declines increasingly with age.[m] For being Employed, on the other hand, the probability rises up to the age range $35-39$ years and then starts to decline at an accelerating rate.[n] It should be kept in mind that due to the cross-section nature of our regressions, the coefficients of age variables reflect life-cycle as well as cohort effects. In this sense, their predictive power for the future pattern of LFP is limited since the pattern may be different for different cohorts. For example, the employment rate of the cohort currently $25-29$ years may peak at a somewhat different age than that experienced by those currently $35-39$ years old.

The district-level female LPF and employment rates have positive and strong effects on the probabilities of LFP and being Employed, showing the significance of the socio-economic environment in which women live. The estimates indicate that a 1% increase in the rate of female LFP in a district is associated with about 0.68% increase in the probability that a woman with a given set of characteristics in that district will participate in the labor market or will be employed. We will see in the next section that accounting for other district characteristics does not change this result by much.

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[m]When a quadratic function of age is used instead of age-group dummies, the LFP peak turns out to be at age 30.
[n]Using a quadratic function of age shows that the peak occurs at age 37.

In the next section, we introduce dichotomous indicators for each level of education to avoid the potential indexing problem that may afflict the Years of Higher Education indicator. We also introduce a host of additional explanatory variables into the model and differentiate among various job options as well as positions outside the labor force. These additional features come at the cost of abandoning the attempt to address the potential simultaneity biases in the coefficients of some of the right-hand side variables. However, as in the case of education, the extent of bias due to endogeneity may be small. Indeed, many studies of the relationships between these variables and LFP in other countries find that the weak exogeneity hypothesis cannot be rejected (Bratti 2003, Connelly *et al.* 2006). Nevertheless, the results should be treated with caution, interpreting them mainly as associations rather than causations.

5. Education, Family Structure, and the Job Market

To delve deeper into the relationship between education, family structure, and labor allocation in Iran, for each individual aged 25−54, we consider five employment positions — Employer, Self-Employed, Public Employee, Private Employee, and Unpaid Family Worker — and five nonemployment possibilities — Unemployed, Student, Pensioner/Nonactive Income Earner, Homemaker, and Other. We refer to these options as "status" or "position" and show it with variable Status_i, which takes values j from the set of these 10 status alternatives. We use a multinomial Logit framework to analyze the determinants of the odds of realization of each status. The equation that we estimate in this section is:

$$\text{Prob}(\text{Status}_i = j | E_{ik}, y_i) = \exp(\pi_i + \Sigma_k \beta_{jk} \cdot E_{ik} + \gamma_j \cdot y_i + \varepsilon_{ij}), \qquad (2)$$

where E_{ik} indicates whether individual i has attained educational level k, y_i is a set of control variables for individual i, including individual, household, and locality characteristics, β_{jk} and γ_j are parameter sets, and π_i is a proportionality factor equaling $-\ln[\Sigma_j \exp(\Sigma_k \beta_{jk} \cdot E_{ik} + \gamma_j \cdot y_i)]$.

A key assumption underlying this model is that the relative odds of each two statuses, say i and j, are independent of all other alternatives. It is possible that this assumption may not be plausible in some situations. For example, if private and public sector jobs are perfect substitutes, a change in the attractiveness of private sector jobs may affect the odds of self-employment versus public sector positions. One solution to this problem is to group alternatives into categories that are closely related to each other and to assume that choices are first made among categories, before deciding on a specific alternative within the preferred category. For example, a woman may first decide whether to work outside the home or not and then choose between various employment options. Such a nested multinomial model requires a model of the way in which alternatives are grouped together. However, the theoretical possibilities for such a hierarchical structure are quite numerous and identifying their parameters and selecting among them is computationally extremely

demanding. For these reasons, in the present paper we treat all labor alternatives symmetrically and employ the multinomial Logit model as an approximate representation of the actual labor allocation. Although the model is not exact, it can still produce useful information about the ways in which the characteristics and the environment of each individual shape the allocation of her/his labor.

To measure educational attainment, here we use a more flexible method than the Years of Higher Education employed in the previous section. We consider six education levels — No Education, Elementary, Middle School, High School, Undergraduate, Graduate — and create a dummy, E_{ik}, for individual i with educational level k. This allows the role of year of education to vary across educational levels. We lump together all those who have worked towards a degree with those holding the degree in order to avoid dealing with too many minor categories. This does not have much impact on the results because the number of those with incomplete degrees is relatively small. We use the largest group, those with Elementary education, as the base and compare the labor market experiences of all others with them.

To account for the role of family structure, we start with a dummy for Married status and the log of Household Size.[o] Being married is expected to lower LFP participation for women, but may raise it for men. In the next section, we explore the interaction of Married status with the education indicators to see how the effect varies among groups with different educational attainments. For the sake of parsimony, we lump the widowed, divorced, and never-married groups together as an "unmarried" group. We did experiment with the inclusion of separate dummies for these categories, but the differences among them were not statistically significant.

The presence and multiplicity of children in the household are often considered as impediments for women's LFP, but the impact on men's economic activity is less clear. We include on the right-hand side of the regressions for women the log of one plus the Number of Children Ever Born, which is available only for women. This variable includes the children who are no longer part of the household, ensuring that the history of child-bearing is taken into account, at least minimally. Since younger children tend to need more attention at home and may further reduce female LFP, we add two other variables to the right-hand side: The log of one plus the Number of Children under six in the Household and the log of one plus the Number of Children 7−15 Years Old in the Household. The presence of elderly in the household may also affect the labor decisions of working age men and women, though the direction of impact depends on the balance of the care they require versus the support they provide to other adults in the household. To allow for this effect, we use the log of one plus the Number of Household Members over 55. Since men and women in the household may play different roles in the labor choices of each member, we include in our analysis the log of one plus the Number of Female Household Members over 55 and the Share of Women among Household Adults over 21. In addition to these

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[o]We use the log of variables such as household size and the number of children because it produces better fit to the data than the variables themselves do without transformation.

variables, we experimented with a number of other indicators of household structure. However, none of them changed the results or added new insights.

The characteristics of the location where one lives should also matter in the decision to work and the kinds of jobs might be found. To deal with this issue, we first add a Rural Resident dummy to the regression to account for the first-order differences between rural and urban areas in terms of employment opportunities and social constraints. In the next section, we discuss the use of interaction terms to explore how the relationship between education and labor allocation may vary between the two areas. In that section, we also examine the role of other interactive terms as well as district characteristics. We treat the inclusion of those variables as an extension because they do not in any tangible way change the results concerning individual and household characteristics, which are the focus of our analysis in this section.

The results of our basic multinomial Logit regressions are reported in Table 8. Part 1 focuses on nonemployment position for each individual and Part 2 shows the results for employment options. In Table 9, we show the aggregated effects of each right-hand-side variable on the probabilities of LFP and being Employed. Since the latter table offers a more aggregate view, we start there and then come back to Table 8. The first two rows of Table 9 capture the fact that the probabilities of LFP and Employed positions have an inverted-U relationship with age. However, the peak LFP and employment ages for women turn out to be 40 and 42, respectively, which are higher than what one finds using a quadratic age function in the model of Sec. 3 (ages 30 and 37, respectively). For men, the peak ages are much lower, 27 and 33, respectively. Interestingly, these figures are also lower than the peak ages of 36 and 38 that one finds if the model of Sec. 3 with a quadratic age function is estimated for men.[P] This pattern is notable because it highlights the fact that the decline of LFP among women in their 30s is largely due to their role in the family. Once we control for that factor, participation keeps rising with age for another decade. On the other hand, for the men in their 30s, the family role raises their participation. As a result, controlling for that role lowers their peak LFP age.

The difference in the LFP profiles of men and women implies that changes in the age structure of the population may have played a role in the narrowing of the gender gap in the LFP rate. In particular, the share of the cohort aged 35−44 in the total population has risen by about five percentage points between 1986 and 2006. If all other factors, including the participation rate of each gender at each age, had remained constant, the rise in the change in the age structure would have brought the LFP rate of women closer to that of men. However, the effect would have been relatively small: About 0.2 percentage points.

Age tends to reduce the probability of unemployment, but the effect is statistically significant only for men (see Table 8, Part 1). For young women, homemaking

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[P]Majbouri (2010), who also uses a quadratic expression for age in an LFP equation, finds the peak age for both men and women to be around 35 years.

Table 8a. Education, gender and allocation of labor. Part 1: Nonemployment options (Marginal probabilities based on multinomial logit regressions with sampling weights.)†

	Nonemployment options									
	Unemployed		Student		Pensioner/Nonactive income earner		Homemaker		Other	
Dependent variable:										
Gender	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
Right-hand-side variables:										
Age in decades	−0.0022 (0.0057)	−0.0604*** (0.007)	−0.0727*** (0.0054)	−0.0629*** (0.0042)	0.0152*** (0.0049)	0.0032 (0.0067)	−0.131*** (0.0113)	−0.001 (0.0011)	−0.0616*** (0.0042)	−0.0461*** (0.0045)
Age in decades squared	−0.0012 (0.0008)	0.005*** (0.0009)	0.0075*** (0.0007)	0.0074*** (0.0006)	0.0015** (0.0006)	0.0059*** (0.0008)	0.0142*** (0.0015)	0.0001 (0.0001)	0.0081*** (0.0006)	0.0064*** (0.0006)
Log(Household size)	0.0121*** (0.0009)	0.0164*** (0.0014)	0.0088*** (0.0012)	0.0038*** (0.0006)	−0.0151*** (0.001)	−0.001 (0.0013)	−0.0033 (0.0028)	0.0002 (0.0002)	0.0179*** (0.001)	0.0116*** (0.001)
Log(1+ Number of children ever born)	−0.0174*** (0.0011)	n.a. n.a.	0.011*** (0.0012)	n.a. n.a.	0.0099*** (0.0008)	n.a. n.a.	0.0334*** (0.0023)	n.a. n.a.	−0.0178*** (0.0009)	n.a. n.a.
Log(1+ Number of children under six years old in the household)	−0.0009 (0.0012)	−0.0019 (0.0015)	−0.0165*** (0.0014)	−0.0008 (0.001)	0.0024* (0.0013)	−0.0139*** (0.0015)	0.0225*** (0.0027)	0.0002 (0.0002)	−0.0074*** (0.0013)	−0.0034*** (0.0011)
Log(1+ Number of children 7–15 years old in the household)	−0.0057*** (0.001)	−0.002 (0.0014)	0.0011 (0.0011)	0.0019** (0.0008)	0.0033*** (0.001)	−0.0103*** (0.0011)	−0.00843*** (0.0024)	−0.0001 (0.0002)	−0.007*** (0.001)	−0.0031*** (0.0009)
Log(1+ Number of household members over 55)	0.0032** (0.0013)	0.0285*** (0.0026)	0.0008 (0.0017)	−0.0008 (0.001)	−0.0059*** (0.0018)	−0.035*** (0.0059)	0.0025 (0.0042)	0.0001 (0.0004)	0.0087*** (0.0014)	0.012*** (0.0018)
Log(1+ Number of female household members over 55)	−0.0009 (0.0017)	−0.0127*** (0.0033)	−0.0023 (0.0023)	0.0036** (0.0015)	−0.0188*** (0.0028)	0.0305*** (0.0067)	0.0277*** (0.0062)	0.0005 (0.0005)	0.0007 (0.0017)	0.0003 (0.0022)

H. S. Esfahani & P. Shajari

Table 8a. (*Continued*)

Dependent variable:	Nonemployment options									
	Unemployed		Student		Pensioner/Nonactive income earner		Homemaker		Other	
Gender	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
Share of women among household adults over 21	0.0127*** (0.0023)	0.0055* (0.0033)	0.0075*** (0.0028)	−0.0085*** (0.0015)	0.0714*** (0.0026)	0.0024 (0.0034)	−0.233*** (0.0066)	0.0008 (0.0006)	0.0193*** (0.0023)	0.0019 (0.0023)
No education	0.0374*** (0.0018)	0.0556*** (0.0018)	−0.366*** (0.0059)	−0.127*** (0.0031)	0.0058*** (0.0011)	0.0032** (0.0014)	0.209*** (0.0055)	0.0007*** (0.0002)	0.0377*** (0.0012)	0.0293*** (0.0011)
Middle school education	0.0064*** (0.0012)	−0.0002 (0.0015)	−0.0137*** (0.0015)	−0.0036* (0.0019)	0.0014 (0.0014)	0.0107*** (0.0013)	−0.0098*** (0.0032)	−0.0008*** (0.0002)	−0.0008 (0.0011)	−0.0077*** (0.0011)
High school education	0.0114*** (0.001)	−0.0071*** (0.0015)	−0.0093*** (0.0011)	0.0078*** (0.0015)	0.0124*** (0.0012)	0.0049*** (0.0013)	−0.108*** (0.0029)	−0.001*** (0.0002)	−0.00315*** (0.001)	−0.015*** (0.0011)
Undergraduate education	0.0207*** (0.0009)	−0.0052*** (0.0018)	0.0192*** (0.0009)	0.0279*** (0.0015)	0.0308*** (0.0014)	0.0119*** (0.0014)	−0.29*** (0.0036)	−0.0015*** (0.0004)	−0.0098*** (0.0012)	−0.0146*** (0.0014)
Graduate education	0.0206*** (0.0054)	−0.0482*** (0.0138)	0.0518*** (0.0034)	0.043*** (0.002)	−0.0109 (0.0196)	−0.0422*** (0.0115)	−0.32*** (0.0264)	−0.0216*** (0.0017)	−0.001 (0.0107)	−0.0122 (0.0074)
Married	−0.0175*** (0.0012)	−0.0609*** (0.0016)	−0.016*** (0.0012)	−0.0101*** (0.0008)	−0.0389*** (0.0011)	−0.011*** (0.0023)	0.175*** (0.0028)	−0.0018*** (0.0003)	−0.0363*** (0.0014)	−0.0447*** (0.0013)
Rural resident	0.0021*** (0.001)	0.0143*** (0.001)	−0.005*** (0.0009)	−0.0001 (0.0006)	0.00120 (0.0008)	−0.013*** (0.001)	−0.0226*** (0.002)	−0.0006*** (0.0002)	−0.0008 (0.0007)	−0.003*** (0.0007)
Number of observations	*251,990*	*256,051*	*251,990*	*256,051*	*251,990*	*256,051*	*251,990*	*256,051*	*251,990*	*256,051*

†The numbers in parentheses are robust standard errors.
*10% significance level.
**5% significance level.
***1% significance level.
n.a. Not applicable.

Table 8b. Education, gender and allocation of labor. Part 2: Employment options (Marginal probabilities based on multinomial logit regressions with sampling weights.)†

	Employment options									
Dependent variable:	Employer		Self-employed		Public employee		Private employee		Unpaid worker	
Gender	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
Right-hand-side variables:										
Age in decades	0.0085***	0.0319***	0.0219***	−0.0475***	0.197***	0.263***	0.0333***	−0.0674***	−0.0083***	−0.0131***
	(0.0025)	(0.0093)	(0.0052)	(0.0147)	(0.0079)	(0.0137)	(0.0062)	(0.0147)	(0.0026)	(0.0027)
Age in decades squared	−0.001***	−0.0012*	−0.0031***	0.0078***	−0.0219***	−0.0313***	−0.0051***	−0.0004	0.0009***	0.0011***
	(0.0003)	(0.0012)	(0.0007)	(0.0019)	(0.0011)	(0.0018)	(0.0009)	(0.0019)	(0.0003)	(0.0004)
Log(Household size)	0.0002	−0.0087***	−0.0061***	−0.0269***	−0.0119***	0.0343***	−0.0054***	−0.0351***	0.003***	0.0054***
	(0.0006)	(0.0023)	(0.0013)	(0.0036)	(0.002)	(0.0034)	(0.0014)	(0.0035)	(0.0007)	(0.0004)
Log(1+ Number of children ever born)	−0.0007	n.a.	−0.0002	n.a.	−0.0109***	n.a.	−0.0065***	n.a.	−0.0009*	n.a.
	(0.0005)	n.a.	(0.001)	n.a.	(0.0018)	n.a.	(0.0012)	n.a.	(0.0005)	n.a.
Log(1+ Number of children under six years old in the household)	−0.0015**	0.002	−0.0015	0.0226***	0.0192***	−0.0012	−0.0135***	−0.0027	−0.0028***	−0.0009**
	(0.0006)	(0.002)	(0.0012)	(0.0031)	(0.0018)	(0.0028)	(0.0016)	(0.003)	(0.0006)	(0.0004)
Log(1+ Number of children 7–15 years old in the household)	0.0005	−0.0014	0.0035***	0.0128***	0.0135***	0.0092***	−0.0008	−0.0065**	0.0001	−0.0005
	(0.0006)	(0.0019)	(0.0011)	(0.00301)	(0.0017)	(0.0027)	(0.0014)	(0.003)	(0.0005)	(0.0004)
Log(1+ Number of household members over 55)	0.001	−0.0045	−0.0004	0.0542***	−0.018***	−0.0778***	0.0041*	0.0179**	0.0041***	0.0054***
	(0.0009)	(0.006)	(0.002)	(0.0087)	(0.0033)	(0.0082)	(0.0023)	(0.0078)	(0.0009)	(0.0007)
Log(1+ Number of female household members over 55)	−0.0039***	0.0036	−0.0012	0.0001	0.0149***	0.034***	−0.013***	−0.0594***	−0.0033**	−0.0006
	(0.0014)	(0.0075)	(0.0028)	(0.011)	(0.0045)	(0.0105)	(0.003)	(0.0103)	(0.0013)	(0.0008)

Table 8b. (Continued)

Dependent variable:	Employer		Self-employed		Public employee		Private employee		Unpaid worker	
Gender	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
Share of women among household adults over 21	0.0069*** (0.0015)	−0.0039 (0.0049)	0.0429*** (0.003)	0.0184** (0.0077)	0.0265*** (0.005)	0.0224*** (0.0072)	0.0458*** (0.0034)	−0.0368*** (0.007)	−0.0003 (0.0015)	−0.0024*** (0.0009)
No education	0.0039*** (0.0007)	−0.0148*** (0.0026)	0.0090*** (0.0011)	0.0318*** (0.0037)	0.0239*** (0.0059)	−0.0464*** (0.0053)	0.0364*** (0.002)	0.067*** (0.0038)	0.0032*** (0.0005)	0.0003 (0.0005)
Middle school education	0.0008 (0.0007)	0.0041** (0.0019)	−0.0029** (0.0012)	−0.0227*** (0.0029)	0.0307*** (0.0036)	0.0541*** (0.0033)	−0.0043** (0.0019)	−0.0327*** (0.0029)	−0.008*** (0.0008)	−0.0011*** (0.0004)
High school education	0.0023*** (0.0006)	0.0071*** (0.0018)	−0.0003 (0.0011)	−0.0833*** (0.0029)	0.0974*** (0.0029)	0.163*** (0.0029)	0.0083*** (0.0014)	−0.0742*** (0.0029)	−0.0107*** (0.0011)	−0.0027*** (0.0004)
Undergraduate education	0.0061*** (0.0005)	0.00003 (0.0023)	0.0012 (0.0017)	−0.331*** (0.005)	0.199*** (0.0028)	0.369*** (0.0027)	0.0313*** (0.0013)	−0.0532*** (0.0038)	−0.0081*** (0.0023)	−0.0041*** (0.0007)
Graduate education	0.0187*** (0.0013)	0.0437*** (0.0075)	0.0848*** (0.0061)	−0.181*** (0.0209)	0.219*** (0.0073)	0.316*** (0.0104)	0.0608*** (0.0054)	−0.0976*** (0.0186)	−0.124*** (0.0032)	0.0012 (0.0041)
Married	−0.0022*** (0.0007)	0.0126*** (0.0029)	−0.0168*** (0.0014)	0.0378*** (0.0045)	−0.028*** (0.0022)	0.0727*** (0.004)	−0.0175*** (0.0016)	0.0091** (0.004)	−0.0022*** (0.0007)	−0.0035*** (0.0005)
Rural resident	−0.0007 (0.0005)	−0.0309*** (0.0015)	0.0123*** (0.0008)	0.119*** (0.002)	−0.0013 (0.0016)	−0.054*** (0.0022)	−0.0078*** (0.0011)	−0.0395*** (0.0021)	0.0226*** (0.0007)	0.0073*** (0.0004)
Number of observations	251,990	256,051	251,990	256,051	251,990	256,051	251,990	256,051	251,990	256,051

†The numbers in parentheses are robust standard errors.
*10% significance level.
**5% significance level.
***1% significance level.
n.a. Not applicable.

Table 9. Education, family structure, and allocation of labor LFP and employment probabilities. (Marginal probabilities based on multinomial logit regressions with sampling weights.)

Dependent variable:	LFP		Employed	
Gender	Female	Male	Female	Male
Right-hand-side variables:				
Age in decades	0.250	0.107	0.252	0.167
Age in decades squared	−0.031	−0.020	−0.030	−0.025
Log(Household size)	−0.008	−0.015	−0.020	−0.031
Log(1+ Number of children ever born)	−0.037	n.a.	−0.019	n.a.
Log(1+ Number of children under six years old in the household)	−0.001	0.018	0.000	0.020
Log(1+ Number of children 7−15 years old in the household)	0.011	0.012	0.017	0.014
Log(1+ Number of household members over 55)	−0.006	0.024	−0.009	−0.005
Log(1+ Number of female household members over 55)	−0.007	−0.035	−0.006	−0.022
Share of women among household adults over 21	0.134	0.003	0.122	−0.002
No education	0.114	0.093	0.076	0.038
Middle school education	0.023	0.001	0.016	0.002
High school education	0.108	0.003	0.097	0.010
Undergraduate education	0.250	−0.024	0.230	−0.019
Graduate education	0.280	0.034	0.259	0.082
Married	−0.084	0.068	−0.067	0.129
Rural resident	0.027	0.016	0.025	0.002

n.a. Not applicable.

rather than unemployment seems to be the fallback option when they do not have employment. Women with higher ages tend to move away from homemaking until age of about 46.

Being married is associated with substantially lower probabilities of LFP, employment and unemployment for women; a decrease of 8.4% for LFP, 6.7% for employment, and 1.8% for unemployment. For men, on the other hand, the associations of marriage with LFP and employment are strongly positive (an increase of 6.8% for LFP and 13% for employment), with the probability of unemployment dropping by 6.1%. These large effects are, of course, likely to be bidirectional. For example, given the traditional setting of the Iranian society, men with jobs are more likely to be accepted as husbands and women without jobs may opt for marriage more easily. Nevertheless, it is interesting to observe and quantify the pattern of associations.

Household size is associated with reduced probabilities of LFP and employment and increased probability of Unemployed and Student statuses, all by small amounts. An increase in family size from two to four people is associated with lower LFP and employment probabilities of about 0.5−1.5% for women and somewhat

more (1−2%) for men.[q] Given the country-wide reduction in family size from about 5.1 to 4.3 during 1986−2006, this factor does not seem to explain much of the past rise in female LFP.

The Number of Children Ever Born is inversely related to female LFP and employment probabilities (by about 4% and 2%, respectively, when the number of children goes from zero to two).[r] The likelihood of being Unemployed also declines, while Homemaking becomes more probable. This is somewhat mitigated when children grow above six years of age. These effects seem to explain a significant part of the recent changes in LFP in Iran because the average country-wide number of children ever born to a woman declined from about seven in 1986 to about two in 2006. Assuming no change in behavior across cohorts, our estimates imply that this fertility decline could be responsible for 3.6 percentage point increase in LFP, which is about 60% of the actual increase during those two decades. The effect on employment is 1.8 percentage points, implying a rise in unemployment. For men, the presence of children aged less than 15 in the household tends to increase the probability of LFP and employment.

The number of household members over 55 has generally negative effects on LFP and employment for both men and women, especially if the elderly are women. However, when the Share of Women among Household Adults over 21 rises, the LFP and employment likelihood for each woman in the household rises and homemaking decline tangibly (by about 5% when an adult woman is added to a family with two adults).

Living in rural areas is associated with about 2.5% increase in LFP, employment, and unemployment probabilities for women, with a decrease of similar magnitude in Homemaker position (see Table 8, Part 1, and Table 9). This may be because compared to their urban counterparts, rural women can participate in the labor market in more flexible ways, with fewer working hours and less commute time. Also, for taking care of home activities (domestic chores, childrearing, etc.), rural women are likely to be in a better position to get support from their extended family and neighborhood. These are, indeed, what Hashimoto and Miyagawa (2008) find for the case of Japan (the estimates of our extended model discussed below also offer support for this view). Since the share of women living in rural areas has declined from 35% to 26% during 1986−2006, this effect may explain part of the rise in LFP, but a very small one (less than 4% of the increase). For men, the effects are in the same directions, but even smaller.

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[q]The unemployment probability tends to rise with Household Size by the same amounts that LFP and employment decline. A possible explanation of this pattern is that belonging to a larger household, given the numbers of children and elderly, means that the working age adult lacks good job opportunities and remains dependent on the family. As we will see below, Household Size is associated with increased unpaid family work and public employment and reduced chance of serving as Employer, Self-Employed, or Private Employee.

[r]These figures are somewhat lower that the estimates that Salehi-Isfahani finds for similar variables in his regressions.

Turning to the effects of education dummies, the first eye-catching result in Table 8, Part 1, and in Table 9 is that compared to those with Elementary Education (our base case), individuals with No Education have higher LFP, employment, and unemployment rates. The effect is stronger for women compared to men, especially when we take into account that the average probability of being unemployed for women is about 35% of that for men (2.1% for women versus 5.9% for men, as shown in Table 3).[s] This effect is also notable because it may partly explain the decline of LFP among Iranian men and the flatness of LFP among Iranian women over the past five decades. As literacy and elementary education have expanded, participation in the labor market has tended to diminish. For men, further expansion of secondary and tertiary education, except at the graduate level, does not seem to have reversed this negative effect of education. In fact, Undergraduate Education may have somewhat reduced LFP and employment probabilities for them. For women, on the other hand, education beyond Elementary has had tangible and rising consequences for labor market participation. A middle school degree seems to raise the probabilities of LFP and employment for women in our sample by an average of about 2% compared to women with an elementary education. A high school diploma raises this probability by an additional 8%, an undergraduate degree by 15% more, and graduate education by a further 3% (i.e. an overall increase of 28% over the average LFP probability of women with elementary education). These estimates are in the same range as the effects we found in Sec. 4, though somewhat lower, which could be due to the large number of controls used in the present exercise. In any case, these marginal probabilities are sizable, especially when compared with the average odds of LFP and employment for women: For a randomly selected woman, extending her education from elementary to undergraduate education raises her probability of LFP by 1.55 times the average odds. A graduate degree increases this ratio to 1.74. The corresponding ratios for the marginal probability effects on employment are 1.63 and 1.85. Based on our marginal effect estimates, assuming similarity in the age-profile of cohorts, the changes in the composition of population and educational attainments altogether can explain 1.8 percentage point increase in female between 1986 and 2006. This is rather large: About one-third of the total rise in female LFP during those 20 years. However, this estimate does not take account of the general equilibrium effects of educational expansion. As we will see in the next section, the latter effects may have wiped out two-thirds of the direct effects of education on female LFP and employment. Thus, the expansion of tertiary education is likely to account for only about 10% of the rise in the overall LPF rate among women aged 25−54 years since mid-1980s.

Consistent with our IV Probit estimation, the multinomial estimates show that employment chances for women do not rise as fast as LFP when educational attainment rises. As a result, their likelihood of unemployment rises by about 1% for

[s]These probabilities are based on shares of population in each status, which is different from the unemployment rate. Women's unemployment rate is higher than men's because their LFP rate is much lower.

high school diploma holders and about 2% for university graduates.[t] For men, increased education tends to lower the risk of unemployment, especially at the graduate level.

Education facilitates LFP for many women by taking them away from home-making. In fact, educational attainment seems to induce more departures from homemaking than those who join the labor force. Those with higher education tend to continue longer in the Student status. They also tend to join the Pensioner/Nonactive Income Earner group more often, except those with graduate education. This is also the case for men.

Perhaps one of the most interesting results of our multinomial Logit exercise is the estimation of the impact of education on the shifts among employment categories (see Table 8, Part 2). Increased education is strongly correlated with a shift among employed men from Private Employee and especially Self-Employed categories towards Public Employee positions. The probability of joining the public sector peaks for men after they attain Undergraduate Education at about 37% above the odds for those with Elementary Education. This is 1.66 times higher than the average odds of being a Public Employee for men. Education also channels women towards public employment, though the marginal probability peaks at 22% for those with graduate versus elementary education. This is still quite large for women because on average they have odds of 6.7% to become Public Employee. Interestingly, public sector positions for educated women do not come at the cost of self-employment and private sector jobs. Indeed, their likelihood of joining the private sector tends to rise after High School Education, and their Self-Employment jumps with Graduate Education. The reason for this pattern is largely the role that homemaking plays as the reserve option for women. For men, self-employment seems to play the same role. A second reserve pool for women is Unpaid Family Worker status, which they leave as a result of education, though mainly at the university and graduate levels.

Educational attainment tends to draw both men and women to serve as employers. However, the effects are relatively small for men, especially compared to the average odds of becoming an Employer. For women, although the marginal effects have small magnitudes, they are rather large relative to the share of female population that serves as Employer, especially for those attaining Graduate Education (by 3.7 times). In other words, tertiary education serves as an important vehicle for women to become entrepreneurs.

It is worth noting that the differential impact of education on public versus private sector positions is much larger for men than for women. This is particularly notable because there is a perception in some countries that educated women are disposed to seek public sector employment much more than educated men do. Our

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[t]Salehi-Isfahani (2005) finds that the marginal probability of paid employment in response to educational improvement is much larger than that those of LFP, hence reducing the combined pool of the unemployed and unpaid family workers. According to our estimates, the total pool would not decline with education, except at the graduate level.

results show that the opposite is true in Iran: At the margin, education is associated with much greater chances of public sector employment for men than for women.

Marriage, which discourages female LFP and encourages male LFP, seems to play those roles across the board among employment categories. However, for men, being married is strongly associated with public employment. Household size, which is negatively correlated with employment, also has a positive association with public employment for men. It is also associated with increased probability of Unpaid Family Worker status for both men and women. The Number of Children Ever Born tends to reduce the chances of employment for women, especially as Private Employees when the children are younger. The number of elderly members in the household is associated with lower public employment, but higher likelihood of private and self-employment for men. In households with relatively more female adult members, women are more likely to have jobs, especially as Self-Employed, Private Employees, and Employers. Other aspects of family structure do not seem to impact women's likelihood of reaching Employer position. Rural Residence is systematically associated with more self-employment for men and unpaid family jobs for women, at the cost of Public and Private Employee options.

Finally, age up to early 40s has a clear association with women's move from Homemaker, Student, and Unpaid Family Worker positions toward gainful employment options. Reaching Employer positions is particularly sensitive to age in the case of women. After age 45, Pensioner status becomes an important option besides homemaking. For men, age helps them move from Student, Unemployed, and Unpaid Family Worker towards gainful employment, and within the employment options, Private Employee to Public Employee and Employer positions. There is a similar move out of Self-Employment position among younger cohorts, but it is reversed for those above age 30.

6. Socio-Economic Circumstances and Labor Allocation

In this section, we extend the above model to examine the role of socio-economic circumstances on labor allocation in Iran. Table 10 summarizes the results of this exercise by focusing on the effects on LFP and employment probabilities. The full estimation results and the associate detailed discussions, which we do not present here to save space, are available from the authors as an appendix.

Our first set of results concerns the impacts of marriage and rural residence on the role of education in labor allocation.[u] We assess these effects by introducing a series of interactive terms between education levels, marriage, and rural residence. The interaction terms of marriage and education indicators in Table 10 show that the negative effects of marriage on women's LFP and employment are not mitigated by

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[u]In addition to the role of marriage and rural conditions, we considered a number of other factors that might condition the education−labor allocation relationship. However, we did not find significant and meaningful results.

Table 10. Education, family structure, and allocation of labor LFP and employment probabilities. (Marginal probabilities based on multinomial logit regressions with sampling weights.)

Dependent variable:	LFP		Employed	
Gender:	Female	Male	Female	Male
Right-hand-side variables:				
Age in decades	0.246	0.116	0.252	0.158
Age in decades squared	−0.031	−0.021	−0.030	−0.024
Log(Household size)	0.000	−0.015	−0.011	−0.027
Log(1+ Number of children ever born)	−0.036	n.a.	−0.020	n.a.
Log(1+ Number of children under six years old in the household)	−0.002	0.022	−0.001	0.032
Log(1+ Number of children 7−15 years old in the household)	0.008	0.013	0.014	0.020
Log(1+ Number of household members over 55)	−0.007	0.017	−0.011	−0.012
Log(1+ Number of female household members over 55)	−0.009	−0.029	−0.007	−0.013
Share of women among household adults over 21	0.125	0.001	0.113	−0.007
No education	0.150	0.044	0.102	0.013
Middle school education	0.022	0.011	0.015	0.009
High school education	0.114	0.018	0.103	0.026
Undergraduate education	0.246	0.007	0.227	0.007
Graduate education	0.197	0.031	0.174	0.068
Married	−0.104	0.063	−0.084	0.122
Married interacted with:				
No education	0.095	0.043	0.071	0.027
Middle school education	0.006	−0.009	0.005	−0.005
High school education	−0.004	−0.017	−0.003	−0.009
Undergraduate education	0.008	−0.033	0.002	−0.011
Graduate education	0.129	0.000	0.143	−0.003
Rural resident	−0.011	−0.001	−0.013	0.007
Rural residence interacted with:				
Married	0.025	0.017	0.026	0.001
No education	0.070	−0.005	0.058	0.000
Middle school education	0.014	−0.008	0.020	−0.008
High school education	−0.017	−0.005	−0.012	−0.015
Undergraduate education	−0.034	−0.012	−0.028	−0.032
Graduate education	−0.547	0.470	−0.562	0.470
District-level variables:				
Urbanization	0.018	0.013	0.018	−0.007
Large city	−0.016	−0.003	−0.014	−0.002
Average log(Household size)	−0.003	0.001	−0.002	0.003
LFP rate[‡]	0.843	0.643	0.691	0.450
Unemployment rate[‡]	−0.053	−0.015	−0.137	−0.435
Share of self-employed among total employed[‡]	0.146	0.029	0.141	−0.087
Share of public employees among total employed[‡]	0.092	−0.008	0.092	−0.148
Share of private employees among total employed[‡]	0.150	0.021	0.161	−0.040
Share of unpaid family workers among total employed[‡]	0.077	0.024	0.075	0.252
Share of students in population[‡]	−0.129	0.154	−0.069	−0.010
Share of pensioners in population[‡]	0.252	−0.094	0.116	−0.363
Share of homemakers in population[‡]	0.242	0.506	0.157	−0.130
Per capita years of primary and secondary schooling[‡]	−0.002	0.004	−0.003	0.004
Per capita years of tertiary education[‡]	−0.056	0.010	−0.050	0.023

[‡]Gender-specific, for age group 25−54.

n.a. Not applicable.

education, except at the graduate level which seems to help women overcome the disadvantages of marriage in the labor market.

The coefficients of interactive terms of Rural with Married and lower-level education dummies are both positive and relatively large, while the opposite is the case for the interactions with the secondary and tertiary education dummies. These observations show that the overall positive effect of Rural in our base regression is due to the better work opportunities in rural areas for married and less educated women. This is consistent with the hypothesis that the ease of obtaining support for household chores and the more flexible jobs are key reasons for higher female LFP in rural areas (Hashimoto and Miyagawa 2008). However, rural jobs are mostly low-skill and informal, dampening the LFP and employment opportunities for the more educated women, except in the public sector. The same is largely true about men's labor market experience (see Table 10). For women in rural areas, increased education reduces private and self-employment options, especially at the graduate level.

The rest of our results are about the role of district-level socio-economic condition in labor allocation. Urbanization (share of population of a district living in urban areas) seems to raise female LFP and employment, but the effect gets mostly cancelled out in metropolitan areas (represented by Large City dummy indicator for the seven Iranian cities with a population of one million or more). A possible explanation for this outcome is that more urbanized districts offer a greater variety of jobs for those living in them, especially for more educated women, but this advantage is wiped out by the high commute costs in metropolitan area, as Hashimoto and Miyagawa (2008) had found in the case of Japan. It is, of course, likely that other factors are also involved. For example, in large cities, where per capita incomes are higher and expectations are different, cultural inhibitions may discourage women to take on self-employment or unpaid family work.

District-level LFP and unemployment rates, which are key indicators of local labor market conditions, (measured separately for each gender in the 25−54 years age range), have strong and predictable effects: District-level LFP rate is associated with higher the probability of LPF by each individual and unemployment rate discourages it (Table 10).

Finally, we turn to the role of the educational achievements in districts. For this purpose, we use two variables: "Per Capita Years of Primary and Secondary Schooling" and "Per Capita Years of Tertiary Education". The first measures the amount of general education in the district, while the second one focuses on higher education attainment. The results reported in Table 10 suggest that increased general education in a locality has little impact on the odds of LFP and employment for either men or women. For women, an increase in general education also raises the chances of unemployment.

The impact of the district-level tertiary education on women labor allocation is notable: It has a clear negative impact on LFP and employment of women (Table 10). More detailed results on labor allocation (not reported in the tables here) show that tertiary education shifts the probability distribution of women's labor

away from Self-Employed and Private and Public Employee towards Homemaker and, to a lesser extent, Unpaid Family Worker positions. A possible explanation for this outcome is that educated women may be competing for limited sets of jobs. So, as the supply of educated women in the district rises, a greater percentage of them get discouraged and stay home. To explore this possibility further, we ran additional multinomial Logit regressions that included an interactive term between tertiary education at the district-level with a dummy indicator of the individual's tertiary education.[v] The results showed that among women with higher education, the competition is particularly pronounced in getting government jobs. The impact of increased tertiary education on the chances of obtaining Self-Employed and Private Employee positions affects all women competing for those jobs. For men, the situation is somewhat different: The overall impact of increased district-level tertiary education on male LFP and employment probability is positive, though rather small. This is because, unlike the case of women, the odds of private and self-employment rise with tertiary education. These results are consistent with Duflo (2004) finding that increased supply of education depresses wages.[w] This effect can in turn lower LFP for women because their labor supply is relatively wage elastic. In the case of men, whose labor supply is not elastic, the increased competition for the limited number of government jobs available reduces the chances of each worker of finding a place there. As a result, they shift more toward private sector jobs that have more flexible supplies.

To assess the size of the negative effect of a general increase in female education, let us consider a 1% increase in the population share of women with tertiary education. If on average each one of these women gets four additional years of schooling, the per capita years of tertiary education among women goes up by 0.04 (or 12% of the female per capita tertiary education shown in Table 6). This reduces LFP probability of each woman by 0.2%, which may seem small, compared to the 15% jump in the LFP rates of women who attain tertiary education. However, the overall effect is actually large because it applies to all women. One way to see this is to note that between 1986 and 2006, the share of women with tertiary degrees has increased by about 6% of the population, which implies a dampening effect of about 1.2% on the aggregate female LFP rate. This is about two-thirds of the direct effects of women's achievements in higher education.

An important observation regarding the adverse general equilibrium effect of female education is that it is likely to have been smaller if the economy had been expanding faster and the types of jobs available for educated women had been less limited. Indeed, labor force surveys since the 2006 census show that the female LFP rate initially increased by one percentage point as the economy grew fast during 2007

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[v]The results are very similar to those presented in Table 10 in other respects. To save space, we do not present those results in detail. They are available from the authors.

[w]The result is also consistent with the negative general equilibrium effects of increased female labor supply ob wages found by Acemoglu *et al.* (2004).

and most of 2008, but then started to decline when the economy began to stagnate in the late 2008, dropping by about two percentage points by summer of 2011.

7. Conclusion

Iranian women's participation in the labor market has been quite low compared to men, and the gender gap in this respect has been much wider in Iran compared to most other economies outside the MENA region. This situation has started to change in the past two decades and female LFP has been on the rise. In this paper, using IV Probit and multinomial Logit models and a large sample from the 2006 census, we have examined the micro-level roles of education, family structure, and local market conditions in the structure of LFP and employment of Iranian men and women aged 25−54.

We find that reduced fertility has been by far the most significant factor in the rise of female LFP rate in Iran. Education has also played a role, though its large effects at the individual level have been partly eroded by educated women's competition for a limited range of jobs, especially in the public sector. However, female education seems to offer additional benefits beyond its direct impact on the LFP rate. Education has played an important role in reducing fertility, thus indirectly driving up LFP among women. Moreover, our multinomial Logit estimation shows that women who join the labor market as a result of graduate education have a two−four times above average propensity to join the ranks of employers, self-employed, and private sector employees. For undergraduate degree holders, the tendency of ending up in the public sector is disproportionately high, but the propensity to become employers is still above average. This feature of higher education, especially the expanding role of women as employers, may create opportunities for new private jobs that can more easily absorb women into the labor market and partly mitigate the adverse general equilibrium effects caused by past limitations.

Men's educational attainment does not have much impact on their LFP propensity, but it is correlated with a shift among employed men from private employee and especially self-employed positions towards public employment. However, since public sector jobs are limited for men, as they are for women, the competition effect counteracts with this tendency. Still, contrary to the common perceptions, the association between education and public employment is stronger for men than for women.

Besides education, we examined the roles of many other household and district characteristics. Urbanization tends to raise LFP and employment for women, though living in a large city reverses that advantage. Given the level of urbanization, living in rural areas is associated with small increases in LFP, employment, and unemployment probabilities, with the effects being stronger for women than for men. Unlike their impacts on female LFP, marriage and the number of children are associated with higher LFP and unemployment rates for men.

While most factors influencing women's labor market choices cause them to move between homemaking and various employment options, for men the effects are by

and large movements between self-employment and other options, especially public sector employment. In other words, self-employment seems to be the reservation option for men, the same role that homemaking plays for women.

An important policy implication of these findings is that tertiary education, especially at the graduate level, may play an important role for women to break the barriers against the expansion of their roles in the economy, especially as entrepreneurs and private sector leaders. This latter effect is particularly important because it could help address at least three important policy challenges: alleviating unemployment, diversifying the economy, and empowering women (World Bank 2007). Given the currency appreciation in countries with large foreign exchange inflows, as in most MENA countries, these challenges cannot be addressed by encouraging labor-intensive export industries, which has proven successful in many developing countries. In countries with resource rents or large capital inflows, the better option is to invest in greater human capital and gain competitiveness at higher-end services and products. Female higher education can play a central role in this regard in Iran and other MENA countries in at least two ways: (i) It enables more women to become entrepreneurs and contribute to job creation and diversification in the economy. (ii) It can help train professionals who are able to contribute to the solution of complex problems facing women in the economy. Of course, to achieve these goals effectively, the higher education system needs to be focused on producing professionals with business and technical skills rather than degree holders. Finally, growth enhancing policies in general could create more job opportunities for women and positively interact with the effects of education, expanding possibilities for them to participate creatively in the economy.

Acknowledgments

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