Education, Childbearing, and Female Labor Market Participation:Evidence from Lebanon

Mandana Hajj and Ugo Panizza

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Abstract

The objective of this paper is the investigation of the determinants of labor market participation for a sample of young Lebanese women. It was observed that female labor market participation in Lebanon is extremely low. While the paper reproduces the standard result that education is an important determinant of female labor market participation, it finds that, once one uses an instrumental variables estimator to control for the endogeneity of fertility, the correlation between labor market and childbearing completely disappears. After showing that education alone cannot explain the low labor market participation of Lebanese women, the paper tests the role of cultural factors and examines whether religion plays a role in determining labor market participation. Contrary to what is often believed, no significant relationship was found between religion and female participation.

التعليم، إنجاب الأطفال ومشاركة المرأة في سوق العمل: أدله ووقائع من لبنان

مندانا حاج
أوغو بانيزا

ملخص

إن الهدف من هذه الورقة هو استقصاء محددات المشاركة في سوق العمل لعينه من النساء الشابات من لبنان. وقد لوحظ أن مساهمة المرأة في سوق العمل في لبنان متدنية جداً. فبينما تعيد الورقة استخراج النتيجة القياسية التي تقول بأهمية محدد مشاركة المرأة في سوق العمل، فإنها توجد أن المرء عندما يستخدم متغيرات مقدرة لضبط النماء الداخلي للخصوبة فإن العلاقة بين سوق العمل وإنجاب الأطفال تختفي تماماً. وبعد تبيان أن التعليم وحده لا يفسر انخفاض مساهمة المرأة اللبنانية في سوق العمل، تقوم الورقة باختبار دور عناصر الثقافة، وتدقق في ما إذا كان الدين يلعب دوراً في تحديد المساهمة في سوق العمل. وعلى عكس ما يعتقد في الغالب، لم توجد أية علاقة جوهرية بين الدين ومساهمة المرأة.

* Hajj is from the Department of Environmental Health, Faculty of Health Sciences, American University of Beirut. Panizza is connected with the Research Department, Inter-American Development Bank. This paper was prepared for "Enhancing Links between Education and Labour Markets in Arab Countries" organized by the Arab Planning Institute. The authors would like to thank Suzanne Duryea, conference participants and especially Dr Belkacem Laabas for his helpful comments and suggestions. The usual caveats apply. This paper does not necessarily reflect the views of the Inter-American Development Bank. This paper is dedicated to Yvonne Zrein, mother of five: four girls and 1 boy (the youngest).

Introduction

The objective of this paper is to study the economic and cultural determinants of female labor market participation in Lebanon. In particular, other than estimating standard labor market participation equations and focusing on the impact of education and fertility, we also test whether cultural factors play a role in determining labor market participation of young Lebanese women. To proxy for cultural factors, we focus on religion because, for a long time social scientists have been interested in the relationship between religion and socio-economic outcomes. (The classical work on this topic is Weber [1905]. For more recent work, see Iannaccone [1998] and Glaeser and Sacerdote [2001]). Furthermore, if one thinks that women's ability to participate in the labor market is correlated with personal freedom, our approach also allows us to test whether the data bear the claim, often heard in the popular media, that some religions are more conducive to protect women's rights than others. Within this context, Lebanon, with its 18 officially recognized religious sects and its deep religious cleavages, is a natural laboratory for studying the relationship between religion and female labor market participation.[(1)]

The paper has two interesting and novel results. Firstly, it shows that once one controls for the fact that fertility is both a cause and effect of female labor market participation (i.e., fertility is endogenous with respect to female labor participation), there is no significant relationship between fertility and labor market participation of young Lebanese women. Secondly, the paper shows that there is no significant correlation between religious affiliation and female labor market participation.

The paper relates to the vast literature aimed at testing the determinants of female labor supply (see Goldin [1990] for a survey of developed countries and Sirageldin et al., [1990] for a survey of developing countries). Other relevant literature dealing with fertility and labor market participation decisions of Lebanese women include Zurayk (1977) and Saxena and Aoun (1997).[(2)] The latter two studies focus on the causal link that goes from labor market participation to fertility, while in this paper, we focus on the causal link that goes from fertility to labor market participation. Al-Qudsi (1998) provides a study of the fertility to labor supply link for women in four Arab countries (Jordan, Kuwait, Oman, and West Bank and Gaza). Contrary to what is found in this paper, Al-Qudsi finds a strong causal link between fertility and labor supply. This paper is also related to Khlat, Deeb, and Courbage (1997) who study the relationship between social and religious status and fertility in Greater Beirut and Chamie (1977) who studies the relationship between religion and fertility in Lebanon.

On the methodological side, this paper borrows from the work of Angrist and Evans (1998) who are able to establish a causal relationship from fertility to labor market participation by using parental preferences for mixed gender children as an instrument for fertility. It should be pointed out, however, that we find that Lebanese households, rather than having preferences for mixed gender children, tend to exhibit strong preferences for boys. Therefore, we use this preference for boys as an instrument in trying to determine a causal relationship from fertility to labor market participation.

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(1) Please note that while we would like to study both labor market participation decision and labor supply (i.e., number of hours worked), we are limited to the former because the household survey we used in this research does not have information on number of hours worked.

(2) Another related study by Zurayk (1979) studies the determinants of fertility in rural Lebanon.

Female Labor Market Participation in Lebanon

This section compares female labor market participation in Lebanon with female labor market participation in a set of low- and middle-income countries. While we would have liked to compare Lebanon with a set of other Middle Eastern countries, data availability limits us to only one other Middle Eastern country, i.e. Egypt.[3] In particular, Table 1 describes female labor market participation, average years of education, and number of children for women aged 18-35 years in a sample of 17 Latin American countries plus Egypt and Lebanon.[4] To proxy for a country's level of development, Table 1 also presents information on GDP per capita (measured for 1997 in PPP-adjusted US dollar).

Table 1. Education, Fertility, and Labor Market Participation of Married Women Aged 18-35

Country.	Average years of education	Average number of children	Women with jobs (%)	GDP per capita (PPP adjusted, 1997 USD)
Argentina	10.52	2.07	43	12354
Bolivia	6.46	2.81	52	2310
Brazil	6.83	1.95	49	7060
Chile	10.75	1.90	39	8711
Colombia	7.65	2.24	45	6116
Costa Rica	8.00	2.18	34	7090
Ecuador	8.62	2.51	54	3274
El Salvador	6.58	2.46	46	4149
Guatemala	3.78	3.42	40	3542
Honduras	5.72	3.03	43	2472
Mexico	7.94	2.49	39	7841
Nicaragua	5.50	3.08	40	2204
Panama	9.68	2.30	36	5475
Paraguay	7.37	2.82	48	4630
Peru	8.16	2.70	66	4669
Uruguay	10.32	1.83	61	8838
Venezuela	8.55	2.52	44	6213
Egypt	3.31	2.95	12	3143
Lebanon	**8.7**	**2.43**	9	**4304**

Source: Authors' calculations based on household survey data

Table 1 shows that while female labor market participation is extremely low in Lebanon (the lowest at 9%), this is not the case for education nor fertility. In fact, once the level of development is controlled, Lebanon has a rather high level of female education, i.e. higher than those of countries that have an income per capita twice that of Lebanon (Figure 1, Panel A). Figure 1, Panel B also illustrates that Lebanon has a level of fertility that is below what its income would predict.

[3] We focus on women aged 18-35 who were coded either as household head or spouse of the household head.

[4] We chose Latin American countries as bases for comparison for two reasons. Firstly, this region has average levels of income per capita similar to income per capita in Lebanon. The second reason is data availability. In particular, the calculations of Table 1 and Figure 1 require household survey data that are not easily available for a large number of countries but available to us for Latin American countries. It is to be noted that we use women aged 18-35 because this sample allows us to use the Angrist and Evans (1998) estimator. Looking at labor market participation for all women, one gets a higher figure (approximately 30%) but this is still an extremely low figure. In fact, out of 171 countries for which the World Bank has data on female labor market participation, Lebanon is ranked 159th.

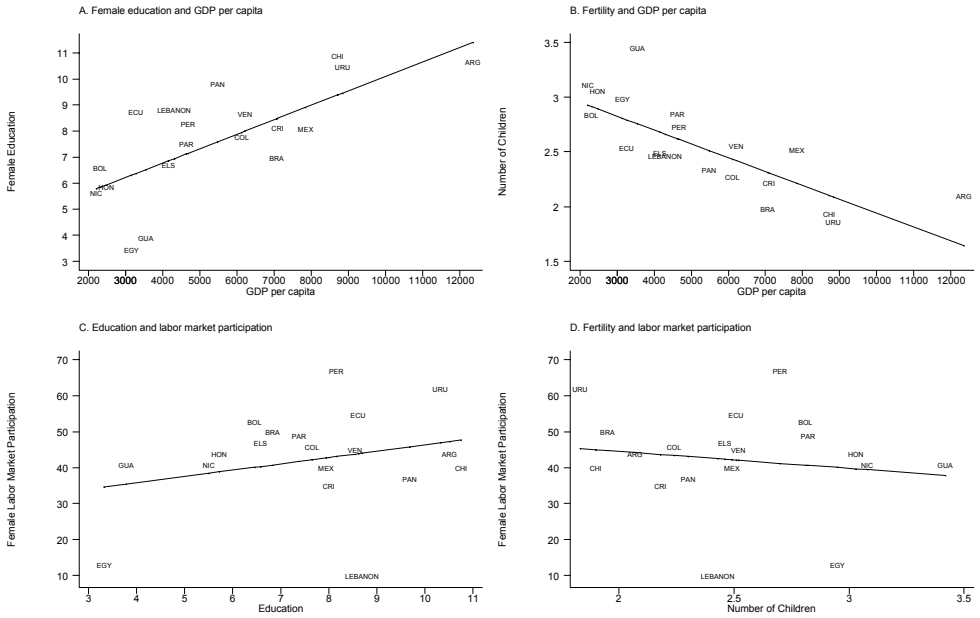

Figure 1: Education, Fertility and Labor Market Participation
Source: Authors' calculations based on the Lebanese Population and Housing Survey data.

At the same time, neither education nor fertility can explain the extremely low labor market participation of Lebanese women (Figure 1, Panels C and D). So, what is it that determines Lebanon's low female participation? Figure 1 suggests a possible explanation. The only other outlier in the sample is Egypt, a country that, like Lebanon, has levels of female participation that are much lower than what would be predicted by its level of education or fertility.(5) Given that Egypt is the only other Middle Eastern country in the sample, it may be that cultural factors could play a role in determining female labor market participation.

When Lebanon and Egypt are compared with Latin America, the first cultural difference that comes to mind is religion. In fact, while Latin America is a Catholic continent, Egypt and Lebanon have large Muslim majorities, i.e. more than 80% and more than 60%, respectively. A simple comparison of Egypt and Lebanon suggests that religion may not be the answer because Egypt has a larger Muslim population with higher labor market participation than Lebanon. This is especially after controlling for the fact that Egypt has higher fertility and lower education than Lebanon. Having said this however, available cross-country data do not allow us to investigate this hypothesis in depth. Fortunately, we can exploit religion differentials in Lebanon to investigate the problem at the household level.

The Data

This paper's estimations are based on data from the Lebanese Population and Housing Survey (PHS) conducted by the Ministry of Social Affairs for the period March 1994-September 1996. The PHS is a nationally representative survey that covered 61,580 households and 290,000 individuals (almost 10% of the total population. N.B. The

(5) However, Egypt has higher female labor market participation, higher fertility and lower education than Lebanon and therefore it is less of an outlier.

Palestinian camps were excluded from the survey). For reasons that will be evident later, we focus on young women aged 18 to 35 who are classified as household head or spouse of the household head and have children younger than 19 years. The procedure used starts by dropping all individuals who are not classified as household head, spouse of the head, or child of the head.[6] Next, we drop all households for which the spouse of the head (or the head in female-headed households) is younger than 18 or older than 35 and all households that have children older than 18. Finally, we drop all households that have missing observations in one of the variables of interest. These filters lead us to a sample of 19,056 observations. Summary statistics for the variables used in the empirical analysis are reported in Table 2.

Table 2: Summary Statistics

Variable	N=19056*	%	Std. Dev.	Min	Max	Mean
Working	1753	9.2	28.91	0	100	
Labor Force	1923	10.09	30.12	0	100	
Age			4.3	18	35	28.95
Education			5.4	0	19	8.7
Husband's Age			6.2	18	68	35.12
Husband's Education			5.38	0	21	8.96
Married	18675	98	0.15	0	1	
Number of Children			1.64	0	10	2.43
At least One Child	16769	88	0.33	0	1	
More than One Child	13530	71	0.45	0	1	
More than 2 Children	8385	44	0.5	0	1	
Urban	15245	80	0.4	0	1	
Domestic Help	2287	12	0.32	0	1	
Muslim	9988	69	0.44	0	1	

***** Except for Muslim where the sample size is 14476. Women *working* or in the *labor force* are coded as 100, women not working or outside the labor force are coded as 0. In all other cases, a 0-1 coding was used. Authors' calculations based on PHS data.

We define as WORKING all women who are employed and work outside the house. Participation in the labor market (LABFORCE) includes all women who either are employed or indicated to the interviewer that they were looking for a job in the weeks before the interview. We assign a value of 0 to women who are not employed (or outside the labor force) and a value of 1 to women who are employed (or participate in the labor force).[7] Besides showing the limited labor market participation of young Lebanese women, Table 2 also reports a substantial age differential (more than 6 years) between husbands and wives, and shows that women are not less educated than their husbands. Furthermore, 98% of women in the sample are married and have, on the average, 2.4 children. More than 88% of women in the sample have at least 1 child, 71% more than 1 child and 44% more than 2 children. Eighty percent of households live in urban areas and more than 12% of households have some sort of live-in domestic help (defined as having a live-in maid or having the children's grandmother living in the house). Finally, we use El-Khoury's and Panizza's (2001) classification of religious groups in Lebanon to identify the religion of the household head.[8] As El-Khoury and Panizza are not able to classify all Lebanese households (for

[6] While it is standard practice to classify the oldest individual in the family as household head, in some households, it was found out that the oldest individual, rather than being the actual head of the family, is the parent of the *de facto* head. This problem was dealt with by classifying all individuals older than 65 living with a married child as parent of the head; and the married child as the head of the family.

[7] The coding 0-100 has been chosen so that the regression results may be easily interpreted in terms of percentage points.

[8] In particular, we use their RELIGION1 definition. It should be pointed out that El-Khoury and Panizza's classification does not provide a perfect matching between households and religion and should be interpreted as predominant religion in the area of origin of the household head.

instance they could not classify the city of Beirut), the religion variable only covers 14,476 households and with a 69% share of Muslims and 31% Christians. It is likely to under-report Christian households). This matches with the data for the 1996 National Parliamentary elections in which 38% of electors were Christian and 62% Muslim.[9]

Basic Regression Results

This section tests a model of labor market participation for young Lebanese women. The empirical specification comes from a standard labor participation model; in particular, we adopt the following specification:

$$PART_i = \beta_0 + \beta_1 ED_i + \beta_2 NCHILD_i + \beta_3 AGE_i + \beta_4 MARRIED_i + \beta_5 URBAN_i + \beta_6 ED\_H_i + \beta_7 AGE\_H_i + u_i$$

PART is a dummy that takes value 1 if individual *i* participates in the labor market. We measure participation in the labor market in two different ways. Firstly, we use a variable that captures whether the individual has been working in the weeks before the interviews (*Working*). Secondly, we use a variable to capture all individuals that are in the labor force (i.e., either working or actively looking for a job) in the weeks prior to the interview (*Labforce*). This variable takes value 1 if the individual has been working or looking for a job in the weeks before the interview. *ED* is a variable that measures the individual's level of education (years of education). It is introduced to capture the idea that individuals with a higher level of education are more likely to command a wage that is higher than their reservation wage and hence more likely to enter the labor force (Heckman, 1979; Killingsworth and Heckman, 1986). Therefore, we expect a positive correlation between *ED* and *PART*. *NCHILD* is a variable that captures the household's number of children. T his variable also comes from a standard labor supply model in which children increase mothers' reservation wage and negatively affect labor supply (Gronau, 1973). *AGE* measures individual's age and it is a standard variable introduced to capture labor market partcipation over the lifecycle. As we are focusing on young women, we do not expect any significant effect of the age variable. *MARRIED* is a dummy that takes value 1 if the woman is married. As married women are likely to have other sources of support other than their own wage (i.e., their husband's wage), we expect a negative relationship between *MARRIED* and labor market participation. *URBAN* is a dummy that takes value 1 if the household resides in an urban area, and it is included to capture the idea that women residing in rural areas may have less work opportunity. So, a positive coefficient is expected. Finally, in a sample that only includes married women, we include a variable measuring husband's education (ED_H) and age (AGE_H). The effect of husband's education is ambiguous because we have three possible effects: (a) an income effect; (b) a matching effect; and (c) a cultural effect. The income effect is associated with the fact that women with more educated husbands will tend to have higher household income and hence higher reservation wage and lower labor market participation. The matching effect is related to the fact that more educated husbands may tend to marry more skilled women and that by commanding a higher wage, are more likely to participate in the labor market. The cultural effect is associated with the fact that more educated husbands may be more willing to accept the idea that their wives work outside the house.

Before moving on to estimate Equation 1, it is important to decide what kind of statistical model may be used in the estimations. On the one hand, since the dependent variable can only take two values, it is standard practice to use either a Probit or Logit regression. On the other hand, many recent papers (e.g. Angrist and Evans, 1998) have been

[9] Kamal (1999) "The 1996 Lebanese Parliamentary Elections, Indicators and Results" (in Arabic), Mokhtarat, Beirut, Lebanon, January 1999.

estimating equations similar to Equation 1 using a simple linear probability model (i.e., an OLS model with a dichotomous dependent variable).

There are at least two advantages in using a linear probability model. Firstly, the set up is more general because it does not impose any restriction on the structure of the errors. Secondly, it allows straightforward instrumental variables estimates that are sometimes problematic with Probit (and Logit) models. We start by estimating both a Probit and a linear probability model and, after showing that the two models yield similar results, we focus on a linear probability model.

Table 3. Basic Regression Results

	(1) OLS	(2) PROBIT	(3) OLS	(4) PROBIT	(5) OLS	(6) OLS	(7) OLS	(8) OLS
			All Women				Married Women	
	Working	Working	Labforce	Labforce	Working	Labforce	Working	Labforce
NCHIL	-2.392	-2.500	-2.591	-2.700	-2.451	-2.651	-2.408	-2.606
	(13.86)***	(479.49)***	(14.55)***	(496.89)***	(14.13)***	(14.82)***	(14.23)***	(14.89)***
EDUC	0.909	0.700	0.932	0.800	-0.180	-0.193	-0.527	-0.494
	(20.73)***	(690.15)***	(20.53)***	(687.00)***	(1.45)	(1.50)	(3.90)***	(3.51)***
$EDUC^2$					0.060	0.062	0.066	0.065
					(8.35)***	(8.38)***	(8.77)***	(8.34)***
AGE	0.854	0.700	0.940	0.800	0.767	0.851	0.799	0.894
	(16.06)***	(534.39)***	(16.98)***	(565.02)***	(14.40)***	(15.34)***	(12.33)***	(13.29)***
MARRIED	-37.950	-25.600	-42.042	-30.300	-37.470	-41.546		
	(15.11)***	(476.49)***	(16.97)***	(518.91)***	(14.93)***	(16.81)***		
URBAN	-0.362	0.003	0.021	0.007	-0.058	0.334	-0.343	-0.001
	(0.80)	(18.39)***	(0.05)	(42.40)***	(0.13)	(0.72)	(0.77)	(0.00)
EDUC_HUS							0.394	0.357
							(2.84)***	(2.46)**
ED_HUS^2							-0.002	0.001
							(0.26)	(0.07)
AGE_HUS							-0.026	-0.037
							(0.59)	(0.82)
Constant	19.873		22.245		25.033	27.571	-13.126	-14.588
	(6.73)***		(7.51)***		(8.45)***	(9.30)***	(8.69)***	(9.38)***
Observations	18942	18942	18942	18942	18942	18942	18526	18526
R-squared	0.12		0.12		0.12	0.13	0.08	0.08

Robust t-statistics in parentheses
*Significant at 10%
** Significant at 5%
*** Significant at 1%

Columns 1 and 2 of Table 3 present estimates for the *working* dependent variable using OLS and Probit respectively.[10] The results are similar and indicate that 1 extra year of education is associated with approximately a percentage point increase in female labor market participation and that each extra child is associated with approximately a 2.5 percentage point decrease in female labor participation. We find a positive correlation between AGE and labor market participation and that single women are significantly more likely to participate in the labor market than their married counterparts. Finally, we find no significant impact associated with living in an urban area (the effect is statistically significant but very small in the Probit regressions). Columns 3 and 4 show that substituting the *Working* index of labor market participation with the *Labforce* index does not affect the results. Given that the OLS and Probit results are almost identical, from this point on, we will keep using a linear probability model.

[10] All the standard errors reported in parentheses are heteroscedasticity-adjusted with White's weights.

Next, we introduce the square of years of education (ED^2 and ED_H^2) to test for possible non-linearities in the relationship between education and labor market participation (Columns 5 and 6).[11] A convex relationship between education and female labor market participation is observed. In particular, we find that at first, labor market participation decreases with education and is minimized at 1.5 years of education. From this point on, participation starts increasing with education and we find that for women with 8.7 years of education (the mean value in the sample), each extra year of education is associated with a 3 percentage point increase in the probability of participating in the labor market.

As most theoretical models of household production focus on married couples, Columns 7 and 8 report estimates of female labor market participation for a sample of married women. This reduces the sample by approximately 400 observations to 18,526 observations where we also control for husband's characteristics.[12] The sample of married women produces results similar to the sample that includes all women. However, a much smaller impact of education is observed. In particular, we find labor market participation is minimized at 4 years of education and that for women with an average level of education, each extra year of schooling is associated with a half percentage point increase in labor market participation. By augmenting the regressions with husband's characteristics, we find no significant impact of husband's age on female labor market participation, but find a positive and significant impact of husband's education on female labor market participation. This last result seems to suggest that the matching and cultural effects dominate the income effect.

Finally, we run a simulation to test the effect of increasing female access to tertiary education on labor market participation. The simulation of Figure 2 shows that even if 100% of Lebanese women were to obtain a university degree (from a current level of approximately 11%), female labor market participation of Lebanese women would still remain well below 20%. While these are only partial equilibrium results, they suggest that education is not the only answer to increasing female labor market participation in Lebanon.

Instrumental Variables (IV) Estimates

Estimation of Equation 1 with OLS is problematic because education and fertility could be endogenous with respect to labor market participation. Hence the point estimates of Table 3 may exaggerate their effect over labor market participation. Reverse causality from labor market participation to education is not a serious problem because Lebanon is a traditional society and Lebanese teenagers and college students cannot finance their education by accessing the credit market. Therefore, education is still very much a parental choice that can be considered exogenous with respect to labor market participation (unless parents make the explicit choice of only supporting education of their brightest kids). Endogeneity of fertility is a much more important issue because labor market participation and fertility are likely to be jointly determined (Schultz, 1981). In particular, while labor economists often treat fertility as an explanatory variable in labor market participation regression and consequently assume that causality goes from fertility to labor market participation, demographers often use labor force attachment to explain fertility. Angrist and Evans (1998) point out that simple labor market participation and fertility regressions are unlikely to provide a causal interpretation of the links between fertility and labor market participation. If one wants to explore the link that extends from fertility to labor market participation (i.e., the objective of this paper), it is necessary to identify an instrument for fertility, that is a variable that affects fertility but has *no direct effect* on labor market participation.

[11] We also tested for higher order polynomials but found that they were not statistically significant.

[12] There is strong evidence for the fact that Arab women cease to work at marriage and never return to work (Zurayk and Saadeh, 1995).

Angrist and Evans (1998) address the issue of reverse causality from labor market participation to fertility using IV estimates that exploit parental preferences for a mixed sibling-sex composition. Their argument goes as follows: (a) In order to estimate the causal effect from fertility to labor market participation, it is necessary to find a variable that affects fertility but does not directly affect labor market participation and that it is not affected by labor market participation. (b) It has been found that parents tend to have preference for a given gender composition of their children. (c) The gender composition of young children does not affect labor market participation. Older children's gender composition could affect labor market participation because girls tend to help at home more than boys do. Furthermore, the gender of the children is completely random and therefore is not affected by labor market participation. (d) Therefore, gender composition may be used as an instrument for fertility and assist in establishing a casual relationship between fertility and labor market participation.

In particular, Angrist and Evans (1998) observe that parents who have children of the same sex are more likely to have another child. Therefore, they generate a dummy variable that takes value 1 if the first 2 children have the same gender and use it as an instrument for further childbearing for women with at least 2 children.

In this paper, we apply the IV methodology described above. It has been found that in the case of Lebanon, the sibling-sex instrument is a particularly strong predictor of fertility. While Angrist and Evans are only able to apply their instrument to families with 2 or more children, the strong preference of Lebanese households for male children and the higher fertility of Lebanese households allow us to apply the instruments to households with 1 or more children, 2 or more children and 3 or more children.

At this point, it should be clear why we focus on young women aged 18-35 with children younger than 19. Very few women younger than 18 have 2 children, and children older than 18 are more likely to have moved out of the household and therefore considering families with older children may generate a biased sample. However, if we are willing to drop women with children older than 18, we also need to drop women who are likely to have children older than 18. For this reason women older than 35 have been excluded.

Gender Preferences of Lebanese Households

This section examines gender preferences of Lebanese households that have at least 1 child. A first indication of preference for boys comes from the first part of Table 4. In particular, Column 3 shows that 80% of households with at least 1 child whose first child is a boy, had another child and 82% of households with at least 1 child whose first child is a girl had another child. This difference indicates a preference for boys (2%) and is highly significant. The difference was not significant for the sample of US households studied by Angrist and Evans (1998) who, therefore, could not perform IV estimates with households with less than 2 children. The preference for boys, however, becomes much stronger in households with 2 or more children and households with 3 or more children. In the former group, 61% of households with 2 boys have another child and 69% of households with 2 girls have another child. The difference (8%) is higher than the difference between households with same sex children and mixed gender children (4%), indicating that in the case of Lebanon, preferences for boys are much stronger than preferences for mixed gender. In the group of households with at least 3 children, 49% of households who have 3 boys have another child but 63% of households who have 3 girls have another child, a 14% difference. Also in this case, preferences for boys are stronger than preferences for mixed gender (14% versus 6%). It should also be pointed out that the relatively high fertility of Lebanese women allows us to work with a relatively large sample of 8,500 households and to study, as a

separate group, the labor market participation decision of women in households with at least 3 children.

Table 4 also allows us to study whether cultural factors (proxied by religion) are associated with preferences for male children. The first part of the table seems to indicate that Muslim households (especially Sunni) tend to value boys more than their Christian counterpart. The difference between the increase in fertility of households with 1 boy and households with 1 girl is 0.5% (and not significant) for Christian households and 2.7% (and significant) for Muslim households (2.9% for Sunni). However, the picture changes for households with 2 or more children. In this case, preferences for boys of Christian households are twice as stronger as preferences for boys of Muslim households (11 versus 7% in households with at least 2 children and 24 versus 12% in households with at least 3 children). These are important differences and suggest that religion should be included in the estimation of labor market participation.

Fertility and Labor Market Participation of Young Lebanese Women

We are now ready to use children gender preferences as an instrument for fertility in the determination of female labor market participation. In particular, we estimate the effect on labor market participation related to having at least 1 extra child in households with at least 1 child, households with at least 2 children, and households with at least 3 children.

Adopting the same IV strategy of Angrist and Evans (1998), we use the two stages least squares to estimate the following:

$$CHILD_i = a_0 + a_1' W_i + a_2 S_{1,i} + a_3 S_{2,i} + b_1 ABOYS_i + b_2 AGIRLS_i + \varepsilon_i$$

$$PART_i = \alpha_0 + \alpha_1 W_i + \alpha_2 S_{1,i} + \alpha_3 S_{2,i} + \alpha_1 CHILD_i + u_i$$

Equation 2 is the first stage regression determining whether the household decides to have an extra child. Equation 3 is the second stage regression determining the impact of 1 extra child and other exogenous factors on female labor market participation.

CHILD is a variable that takes value 1 when a household has at least 1 child more than the minimum number of children considered in each group (the groups are households with at least 1 child, at least 2 children, and at least 3 children). W is a matrix of controls that includes *ED, AGE, ED_H, AGE_H*, and *URBAN*. S_1 is a variable that takes value 1 when the first child is a girl. S_2 is a variable that takes value 1 when the second child is a girl. Finally, ABOYS is a variable that takes value 1 when the first 2 (or 3) children are boys and AGIRLS is a variable that takes value 1 when the first 2 (or 3) children are girls.

When we estimate the system for households with at least 1 child, *CHILD* should be interpreted as having 2 children or more (in this case $a_3 = b_1 = b_2 = \alpha_2 = \alpha_3 = 0$). When we estimate the system for households with at least 2 children, *CHILD* should be interpreted as having 3 children or more (in this case $a_3 = \alpha_3 = 0$). When we estimate the system for households with at least 3 children, *CHILD* should be interpreted as having 4 children or more.

Table 4. Gender Preferences and Fertility

	All		Christian		Muslim		Maronite		Shiaa		Sunni	
Sex of first child in families with 1 child or more	Fraction of sample	Fraction with another child	Fraction of sample	Fraction with another child	Fraction of sample	Fraction with another child	Fraction of sample	Fraction with another child	Fraction of sample	Fraction with another child	Fraction of sample	Fraction with another child
1 boy	0.517	0.8	0.512	0.770	0.517	0.818	0.524	0.755	0.512	0.826	0.518	0.822
		[0.004]		[0.010]		[0.006]		[0.015]		[0.008]		[0.008]
1 girl	0.483	0.82	0.488	0.775	0.483	0.845	0.476	0.77	0.488	0.845	0.482	0.851
		[0.004]		[0.010]		[0.005]		[0.015]		[0.008]		[0.007]
Difference		-0.02*		-0.005		-0.027*		-0.015		-0.019		-0.029*
		[0.006]		[0.014]		[0.008]		[0.021]		[0.011]		[0.011]
Sex of first 2 children in families with 2 children or more	Fraction of sample	Fraction with another child	Fraction of sample	Fraction with another child	Fraction of sample	Fraction with another child	Fraction of sample	Fraction with another child	Fraction of sample	Fraction with another child	Fraction of sample	Fraction with another child
Mixed	0.5021	0.608	0.494	0.508	0.503	0.67	0.499	0.514	0.509	0.672	0.498	0.689
		[0.006]		[0.014]		[0.007]		[0.02]		[0.011]		[0.010]
Same sex	0.4979	0.646	0.506	0.567	0.497	0.70	0.501	0.583	0.491	0.71	0.502	0.72
		[0.006]		[0.014]		[0.007]		[0.02]		[0.011]		[0.010]
Difference		-0.038*		-0.059*		-0.034*		-0.069*		-0.039*		-0.03*
		[0.008]		[0.020]		[0.010]		[0.028]		[0.016]		[0.015]
2 girls	0.2369	0.69	0.239	0.626	0.240	0.741	0.23	0.643	0.242	0.75	0.24	0.752
		[0.008]		[0.020]		[0.011]		[0.028]		[0.015]		[0.014]
2 boys	0.261	0.607	0.267	0.514	0.256	0.668	0.27	0.53	0.248	0.672	0.262	0.688
		[0.008]		[0.019]		[0.010]		[0.027]		[0.016]		[0.015]
Difference		-0.084*		-0.112*		-0.074*		-0.11*		-0.078*		-0.06*
		[0.01]		[0.027]		[0.015]		[0.039]		[0.022]		[0.02]
Sex of first 3 children in families with 3 children or more	Fraction of sample	Fraction with another child	Fraction of sample	Fraction with another child	Fraction of sample	Fraction with another child	Fraction of sample	Fraction with another child	Fraction of sample	Fraction with another child	Fraction of sample	Fraction with another child
Mixed	0.248	0.494	0.737	0.366	0.756	0.558	0.75	0.35	0.749	0.544	0.764	0.584
		[0.006]		[0.015]		[0.008]		[0.02]		[0.011]		[0.011]
Same Sex	0.752	0.558	0.263	0.429	0.244	0.624	0.25	0.37	0.251	0.617	0.236	0.647
		[0.011]		[0.026]		[0.014]		[0.04]		[0.019]		[0.019]
Difference		-0.064*		-0.063*		-0.066*		-0.017*		-0.07*		-0.063*
		[0.013]		[0.029]		[0.016]		[0.042]		[0.023]		[0.022]
3 girls	0.12	0.631	0.136	0.546	0.117	0.688	0.127	0.455	0.124	0.693	0.11	0.698
		[0.015]		[0.036]		[0.019]		[0.048]		[0.027]		[0.0265]
3 boys	0.129	0.491	0.128	0.306	0.127	0.566	0.124	0.028	0.127	0.542	0.127	0.602
		[0.015]		[0.034]		[0.019]		[0.05]		[0.029]		[0.0263]
Difference		-0.139*		-0.24*		-0.122*		-0.175*		-0.151*		-0.095*
		[0.022]		[0.005]		[0.027]		[0.07]		[0.039]		[0.038]

Standard errors in brackets.
*Significant at 5% confidence level

Table 5 presents results for first stage estimates. It supports the findings of Table 4 and shows that the instruments are rather powerful and always significantly associated with fertility. Even controlling for other factors, we find that in households with at least 1 child, having a girl is associated with a 2% percentage point increase in the probability of additional childbearing. Having 2 girls is associated with a 9% percentage point increase and having 3 girls is associated with an 11 percentage point increase in the probability of additional childbearing.

Table 5. First Stage Regressions

	(1)	(2)	(3)
	More than 1 child	More than 2 children	More than 3 children
Sex Child 1	0.017	-0.010	0.028
	(2.80)***	(0.90)	(2.17)**
Sex Child 2			0.032
			(2.47)**
2 Girls		0.087	
		(7.69)***	
2 Boys		-0.000	
		(0.02)	
3 Girls			0.108
			(5.67)***
3 Boys			0.027
			(1.40)
EDUC	-0.004	-0.024	-0.036
	(1.91)*	(8.74)***	(9.96)***
$EDUC^2$	-0.000	0.000	0.001
	(2.17)**	(1.92)*	(3.59)***
AGE	0.029	0.031	0.029
	(27.81)***	(23.89)***	(15.19)***
URBAN	-0.036	-0.084	-0.105
	(5.35)***	(9.42)***	(8.84)***
EDUC_HUS	-0.008	-0.006	0.001
	(3.69)***	(2.22)**	(0.20)
$EDUC\_HUS^2$	0.000	0.000	-0.000
	(2.22)**	f(0.03)	(1.39)
AGE_HUS	0.007	0.009	0.006
	(10.61)***	(10.66)***	(5.03)***
Constant	-0.154	-0.370	-0.365
	(5.73)***	(10.43)***	(6.61)***
Observations	16678	13540	8504
R-squared	0.16	0.17	0.14

Robust t-statistics in parentheses
*Significant at 10%
** Significant at 5%
*** Significant at 1%

Second stage results are presented in Table 6. All regressions yield a consistent message, i.e. the effect of fertility on labor market participation disappears when we control for the endogeneity of fertility. In OLS regressions, we obtain a negative and significant effect of additional childbearing. The effect ranges between 2 (in the sample of households with at least 3 children) and 7 percentage points (in the sample of households with at least 1 child). Once converted into per-child unit, these estimates correspond to a 3 percentage point decrease in labor market participation for each extra child, not too different from estimates of Table 3 that yield a 2.5 percentage point decrease in labor market participation for each extra child.[13]

[13] Please note that the coefficient of Tables 5-7 should be interpreted as the effect of having more than *x* children. This does not correspond exactly to the effect of having 1 extra child but to the effect of having at least 1 extra child (it could be more than 1). For example, in the case of households with 1 child, the coefficient tells us the effect of having at least 1 extra child (so having at least 2 children). However, households could have more than 1 extra child, so in order to convert the coefficient into a per-child unit, we need to divide it by the average number of children of households with at least 1 child. To convert the estimates of Tables 5-7 into per-child units, we divide them by 1.76 (the average number of children in households with at least 1 child is 2.76), 1.18 (the average number of children in households with at least two children is 3.18), and 0.85 (the average number of children in households with at least 3 children is 3.85).

Table 6. IV Regressions

	(1) OLS	(2) OLS	(3) IV	(4) IV	(5) OLS	(6) OLS	(7) IV	(8) IV	(9) OLS	(10) OLS	(11) IV	(12) IV
	Households with at least 1 child				Households with at least 2 children				Households with at least 3 children			
	Working	Labforce	Working	Labforce	Working	Labforce	Working	Labforce	Working	Labforce	Working	Labforce
Extra Child	-6.491	-6.898	4.380	6.279	-4.484	-5.182	3.713	1.168	-1.869	-2.102	-0.871	2.306
	(9.80)***	(10.05)***	(0.18)	(0.25)	(8.73)***	(9.64)***	(0.52)	(0.16)	(4.02)***	(4.32)***	(0.13)	(0.31)
EDUC	-0.351	-0.296	-0.307	-0.241	-0.471	-0.460	-0.271	-0.305	-0.629	-0.595	-0.593	-0.437
	(2.64)***	(2.13)**	(1.84)*	(1.38)	(3.48)***	(3.24)***	(1.26)	(1.35)	(4.26)***	(3.85)***	(2.08)**	(1.43)
$EDUC^2$	0.061	0.059	0.063	0.062	0.061	0.061	0.059	0.059	0.060	0.058	0.060	0.055
	(8.04)***	(7.57)***	(6.72)***	(6.36)***	(7.82)***	(7.53)***	(7.37)***	(7.16)***	(6.95)***	(6.46)***	(6.21)***	(5.47)***
AGE	0.671	0.739	0.358	0.361	0.698	0.771	0.441	0.572	0.401	0.473	0.372	0.344
	(10.74)***	(11.34)***	(0.51)	(0.49)	(9.93)***	(10.50)***	(1.90)*	(2.38)**	(5.51)***	(6.11)***	(1.77)*	(1.53)
URBAN	-0.043	0.319	0.350	0.796	-0.278	-0.046	0.417	0.493	0.287	0.263	0.391	0.724
	(0.10)	(0.70)	(0.36)	(0.78)	(0.61)	(0.10)	(0.55)	(0.62)	(0.61)	(0.53)	(0.45)	(0.77)
ED_HUS	0.409	0.392	0.499	0.500	0.263	0.265	0.318	0.307	0.064	0.079	0.063	0.075
	(2.97)***	(2.72)***	(2.08)**	(1.98)**	(1.89)*	(1.83)*	(2.15)**	(2.01)**	(0.42)	(0.50)	(0.42)	(0.48)
ED_HUS^2	-0.004	-0.003	-0.007	-0.006	-0.001	-0.001	-0.001	-0.001	0.006	0.007	0.006	0.008
	(0.64)	(0.40)	(0.77)	(0.63)	(0.17)	(0.12)	(0.18)	(0.13)	(0.77)	(0.81)	(0.79)	(0.93)
AGE_HUS	0.009	-0.003	-0.067	-0.095	0.059	0.057	-0.018	-0.002	0.178	0.176	0.172	0.152
	(0.19)	(0.05)	(0.39)	(0.53)	(1.19)	(1.11)	(0.20)	(0.03)	(3.07)***	(2.97)***	(2.30)**	(1.95)*
Sex child 1					0.438	0.544	0.177	0.341	0.470	0.667	0.424	0.464
					(1.03)	(1.22)	(0.36)	(0.66)	(1.01)	(1.37)	(0.75)	(0.78)
Sex child 2									0.439	0.616	0.389	0.396
									(0.93)	(1.25)	(0.70)	(0.67)
Constant	-13.526	-14.655	-11.930	-12.720	-18.011	-19.358	-14.961	-16.995	-15.918	-18.022	-15.528	-16.299
	(8.85)***	(9.26)***	(3.10)***	(3.18)***	(9.85)***	(10.17)***	(4.40)***	(4.83)***	(6.98)***	(7.55)***	(4.28)***	(4.26)***
Observations	16678	16678	16678	16678	13540	13540	13540	13540	8504	8504	8504	8504
R-squared	0.07	0.07	0.05	0.04	0.07	0.07	0.05	0.06	0.05	0.05	0.05	0.04

Robust t-statistics in parentheses
*Significant at 10%
**Significant at 5%
***Significant at 1%

The results, however, change strikingly when we allow fertility to be endogenously determined. In fact, the IV estimates of Table 6 show no significant correlation between fertility and labor market participation. With respect to OLS, IV estimates yield somewhat stronger effects of education especially for the sample of households with at least 2 children. In households with at least 2 children, we find that for women with average education, each extra year of schooling is associated with a 2.1 percentage point increase in labor market participation (2 percentage points in households with at least 1 child and half a percentage point in households with at least 3 children).

The results for fertility are puzzling. In fact, while we expected that controlling for the endogeneity of fertility would attenuate the impact of this variable on labor market participation, we did not expect it to become insignificant. One possible explanation for this result could be that the gender-preference instrument is weak or not well chosen (Browning, 1992). However, we do not think that this is the case, in particular, since the first stage estimates of Table 5 suggest that our instruments are rather powerful. Furthermore, by using similar instruments, Angrist and Evans (1998) still find a significant impact of fertility on female labor market participation. The difference between the estimates for the US obtained by Angrist and Evans and estimates for Lebanon described in this paper, probably lie in the availability of cheap domestic help that, other things being equal, considerably lower reservation wage. A Lebanese household may hire a live-in maid for as little as US$120 a month, a cost that is affordable to most middle-class families. Therefore, unlike those existing in the US, child care costs do not impose a limit to female labor market participation in Lebanon.[14]

Religion and Female Labor Market Participation

The previous discussion shows that standard factors such as education and fertility could not fully explain the low labor market participation of Lebanese women. This section recognizes that a woman's decision to stay out of the labor market may not be completely due to her own choice. In fact, women may be prevented from participating in the labor market for lack of work opportunity (i.e., employers are not willing to hire women) or because they are prevented from participating by their husbands or parents. Women's limited ability to participate in the labor market is often considered a violation of gender parity. Also, as popular media (especially western media) often present certain religions as more conductive to women's rights than other religions, it is interesting to test whether there are significant differences in female labor market participation across Lebanese religious groups. As previously pointed out, given Lebanon's deep religious fragmentation, it is an ideal testing ground for the relationship between religion and socio-economic outcomes.

Table 7 presents IV estimates of Equations 2 and 3 augmented with a dummy that takes value 1 if the household head is Muslim and takes value 0 if the household head is Christian. A positive and significant coefficient would indicate that Muslim women are more likely to participate in the labor market than their Christian counterparts and a negative coefficient would mean the opposite. Table 8 shows that the coefficient oscillates between being positive and negative but it is never statistically significant indicating that, other things being equal, there is no significant difference between labor market participation of Muslim and Christian women.

[14] Table 2 shows that 12% of households have some sort of live-in domestic help (either a live-in maid or a live-in grandmother). It is also possible to show that there is a significant correlation between female labor market participation and the availability of domestic help (of course this is just a correlation because domestic help availability is likely to be endogenous).

Table 7. Female Labor Market Participation and Religion (IV estimates)

	(1)	(2)	(3)	(4)	(5)	(6)
	Households with at least 1 child		Households with at least 2 children		Households with at least 3 children	
	Working	Working	Working	Working	Working	Working
Extra Child	17.806	21.700	3.507	2.738	-2.854	-2.324
	(0.65)	(0.83)	(0.41)	(0.31)	(0.36)	(0.32)
Sex child 1			0.393	0.416	0.595	0.575
			(0.68)	(0.72)	(0.91)	(0.90)
Sex child 2					0.286	0.256
					(0.44)	(0.41)
EDUC	-0.259	-0.299	-0.235	-0.281	-0.666	-0.634
	(1.28)	(1.69)*	(0.97)	(1.29)	(2.03)**	(2.20)**
$EDUC^2$	0.068	0.071	0.057	0.058	0.063	0.063
	(6.02)***	(5.90)***	(6.39)***	(6.57)***	(5.75)***	(5.91)***
AGE	-0.076	-0.206	0.410	0.424	0.409	0.398
	(0.09)	(0.26)	(1.43)	(1.38)	(1.65)*	(1.63)
URBAN	0.477	0.548	0.064	-0.016	0.309	0.357
	(0.44)	(0.55)	(0.08)	(0.02)	(0.37)	(0.45)
ED_HUS	0.604	0.621	0.282	0.272	-0.007	-0.007
	(2.38)**	(2.58)***	(1.76)*	(1.72)*	(0.04)	(0.05)
ED_HUS^2	-0.010	-0.010	0.000	0.000	0.008	0.008
	(0.99)	(1.06)	(0.00)	(0.03)	(0.94)	(0.95)
AGE_HUS	-0.116	-0.147	0.044	0.050	0.235	0.233
	(0.56)	(0.73)	(0.41)	(0.46)	(2.73)***	(2.70)***
MUSLIM		-2.060		-1.039		0.499
		(1.15)		(0.72)		(0.35)
Constant	-10.082	-6.903	-16.014	-14.949	-17.061	-17.502
	(2.11)**	(1.05)	(3.71)***	(2.50)**	(3.94)***	(3.07)***
Observations	12720	12720	10390	10390	6753	6753
R-squared	0.07	0.08	0.05	0.05	0.05	0.05

Robust t-statistics in parentheses

*Significant at 10%

**Significant at 5%

***Significant at 1%

Table 8. Female Labor Market Participation and Religion (IV estimates)

	Working	Working	Working
	Households with at least 1 child	Households with at least 2 children	Households with at least 3 children
Extra Child	26.416	1.598	3.787
	(0.87)	(0.16)	(0.46)
MARONITE	-3.376	-12.923	-12.742
	(0.41)	(1.87)*	(1.91)*
SUNNI	-5.541	-13.751	-14.008
	(0.96)	(2.46)**	(2.69)***
SHIAA	-7.689	-15.370	-15.029
	(1.38)	(2.86)***	(2.97)***
Sex child 1		0.423	0.220
		(0.69)	(0.33)
Sex child 2			0.174
			(0.27)
EDUC	-0.432	-0.371	-0.456
	(2.38)**	(1.69)*	(1.57)
$EDUC^2$	0.081	0.062	0.060
	(5.61)***	(6.52)***	(5.51)***
AGE	-0.392	0.367	0.201
	(0.45)	(1.06)	(0.73)
URBAN	0.907	-0.183	0.934
	(0.87)	(0.23)	(0.98)
ED_HUS	0.622	0.252	0.007
	(2.54)**	(1.55)	(0.04)
ED_HUS^2	-0.010	0.001	0.009
	(1.00)	(0.10)	(1.01)
AGE_HUS	-0.180	0.092	0.198
	(0.73)	(0.77)	(2.02)**
Observations	10511	8675	5870
R-squared	0.06	0.05	0.03

Robust t-statistics in parentheses
*Significant at 10%;
**Significant at 5%

Next, we move to a finer definition of religion and consider labor market participation of women belonging to the three main religious groups present in Lebanon: Christian Maronite, Muslim Sunni, and Muslim Shiaa. Again, the estimates of Table 8 show that there are no significant differences in female participation across the three main groups.

Based on these results, it may be concluded that contrary to what is often claimed, there are no significant differences in female labor market participation for the main religious groups present in Lebanon. Obviously however, this does not guarantee that there is no relationship between religion and female discrimination, but if such a relationship exists, our results suggest that, in the case of Lebanon, it does not go through female labor market participation.

Conclusion

The purpose of this paper was to test the determinants of female labor market participation in Lebanon and check whether cultural factors (proxied by religion) play a role in determining female labor market participation.

The paper started by comparing labor market participation of young Lebanese women with labor market participation of young women in countries with a similar level of economic development and showing that female labor market participation in Lebanon is indeed extremely low at 9%, the lowest among 18 countries compared.

In the light of this limited participation, it is particularly important to discover what the determinants of participation are and whether there are policy interventions that could increase female participation. In particular, understanding the causal link between education, fertility, and female labor market participation is important in order to assess whether programs aimed at reducing fertility, will be successful in increasing access to the labor market.

Using OLS, the standard positive correlation between education and labor market participation and negative correlation between fertility and labor market participation hold for Lebanon. Results reveal that a one-standard deviation increase in education is associated with a 4 percentage point increase in labor market participation. Ihis is a substantial effect equal to a 40% increase in female labor market participation. It also shows a strong effect of fertility, with each extra child associated with a 2.3 percentage point decrease in labor market participation. However, once we control for the endogeneity of fertility, the correlation between fertility and labor market participation completely disappears. This is a rather puzzling result and the paper postulates that the lack of a significant correlation between fertility and labor market participation may be due to the availability of inexpensive domestic help. Finally, as to the relationship between religion and female labor market participation, and it has not been possible to identify any significant difference in female labor market participation across religious groups. This observation illustrates that at least in the case of Lebanon, when it comes to labor market participation, discrimination against women does not vary across religious groups. Other things being equal, women from different religious groups are equally likely to offer their services in the labor market and are equally likely to find a job. While this finding seems at variance with the cross-country evidence, it may be explained by the fact that regional values (for instance Western versus Oriental values) may transcend religious values and therefore religion is not the best proxy for cultural attitude toward female employment.[15]

In conclusion, this paper shows that neither fertility and education nor religion can explain the low labor market participation of Lebanese women. An explanation of this puzzle could then be related to the Lebanese labor law and existing policies that openly discriminate against female employment and undermine women's status. In particular, Hajj (2001) shows that Lebanese labor laws do not treat working men and women equally. In the Labor Law originally set in 1946, women are included within the group of children and adolescents and are prohibited from working in certain jobs and industries or working at night and, in most cases, working women cannot pass on their pension to their children and husband. The law indirectly places emphasis on marriage and on the woman's primary responsibility as a wife, by stipulating that a woman is guaranteed end-of-service indemnity only if she leaves her job within 12 months after marriage.

Therefore, the main policy implication of this paper is the necessity to reform the Lebanese legal code including personal status codes, employment regulations, criminal law, property law, social security law, and labor law. Laws that provide incentives such as the provision of breastfeeding and childcare

[15] The authors would like to thank Dr Belkacem Laabas for suggesting this important point.

facilities at the workplace may also positively impact on female labor market participation. It may be pointed out that there have been some successful efforts to change existing laws. Certain laws have been repealed such as that which prohibited women from acting as witnesses in real estate matters (repealed in 1993) and that which prohibited married women from engaging in any business without the permission of their husbands (repealed in 1994). However, as the results of this research demonstrate, Lebanon is still far from a gender-blind legal code.

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