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Female Labor Participation in the Arab World

Some Evidence from Panel Data in Morocco

Paolo Verme
Abdoul Gadiry Barry
Jamal Guennouni

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Abstract

Female labor participation in the Arab world is low compared with the level of economic development of Arab countries. Beyond anecdotal evidence and cross-country studies, there is little evidence on what could explain this phenomenon. This paper uses the richest set of panel data available for any Arab country to date to model female labor participation in Morocco. The paper finds marriage, household inactivity rates, secondary education, and gross domestic product per capita to lower female labor participation rates. It also finds that the category urban educated women with secondary education explains better than others the low level of female labor participation. These surprising findings are robust to different estimators, endogeneity tests, different specifications of the female labor participation equations, and different sources of data. The findings are also consistent with previous studies on the Middle East and North Africa region and on Morocco. The explanation seems to reside in the nature of economic growth and gender norms. Economic growth has not been labor intensive, has generated few jobs, and has not been in female-friendly sectors, resulting in weak demand for women, especially urban educated women with secondary education. And when men and women compete for scarce jobs, men may have priority access because of employers' and households' preferences.

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Some Evidence from Panel Data in Morocco

Paolo Verme, Abdoul Gadiry Barry[1], Jamal Guennouni[2]

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[2] Chief of the Labor Force Survey Unit, Department of Statistics, High Commission for the Plan of Morocco.

Introduction

Female Labor Participation (FLP) in the Middle East and North Africa (MENA) region remains low relative to world standards, relative to countries at similar levels of economic development, and also relative to other prevalently Muslim countries in other parts of the world. Why this is the case is still unclear, principally for three reasons. The first is that few countries in the MENA region have regular labor force surveys. The second is that where Labor Force Surveys (LFSs) exist, they have been introduced recently and this makes the study of long-term determinants of FLP difficult. And the third reason is that, where LFSs exist, they are rarely made available to researchers. The main source of data on FLP is the ILO-EAPEP database that covers female participation rates from 1990. This source of data provides annual FLP figures for most countries in the world including MENA countries and can be used to study long-term determinants of FLP that may be available such as fertility rates or female education. However, ILO-EAPEP data fill gaps in national data with estimates and one cannot study determinants of FLP that are more short-term and related to individuals or households such as marriage or the number of children.

A recent paper (Verme, 2014) used the ILO-EAPEP data to study FLP in MENA countries for the first time testing for the U-shape hypothesis (Goldin, 1995), the dominant long-term theory in economics on FLP. This hypothesis states that FLP rates are expected to follow a U-path as they go through the process of economic development and GDP per capita increases. During the first stages of economic development, FLP rates decline as countries go through a process of economic transformation from agriculture to industry, fertility rates are high and female education is low. During later stages of economic development, FPRs increase with the relative expansion of the industry and services sectors, female education increases and fertility rate decline. The paper found the MENA region to outperform other regions in the world in terms of these structural transformation factors and to be on the upward section of the U curve in terms of GDP per capita. However, the region underperforms in terms of FLP rates and the FPR/GDP relation is hump shape for the region as a whole and can be U-shape, hump-shape or non-significant if countries are taken individually. Hence, the U-shape hypothesis *per se* does not provide clear leads on why FPR in the MENA region are low.

This paper complements the study on the MENA region by focusing on Morocco and using a selection of cross-section, longitudinal and panel data. Morocco is the ideal case-study in the MENA region for a combination of factors. It is the second largest country in the region in terms of population and is the only country in the region that has large and consistent quarterly LFSs dating back to 1999. Other countries in MENA have either started LFSs later, do not have these surveys, do not have such frequency of data or do not provide to researchers the data they have. The Morocco LFS has also the distinct advantage of having a panel component that started in 2007. In addition, Morocco stands out as one of the countries that failed women the most in the MENA region in terms of FLP despite its relative good position in terms of economic development. World Bank (2013) compared 12 countries in the region in terms of male-female participation gap and found Morocco to be among the worst performing countries. Verme (2014) found that Morocco underperformed in terms of FLP across MENA countries despite the relatively better economic performance of this country.

This paper uses all LFS data available for Morocco to study factors that could affect FLP. Unlike Verme (2014) which focused on the long-term determinants of participation, this paper focuses on the medium and short-term factors. For the medium term, we will use quarterly data between 1999 and 2013 and reproduce with these data the long-term equation typically used for studies of long-term determinants. For the short-term, we will focus on the panel component of the LFS covering the period 2007-2011. In this way, we should be able to bridge the long-term with the short-term analysis and provide a set of explanatory factors that range from individual and household factors to structural, seasonal and spatial factors.

One shortcoming of this work is the lack of earnings data. These data are not available from the Morocco LFS and this constrained our analysis to non-wage determinants of FLP. This is an important shortcoming of course because it is known from the literature that both females and males earnings and females reservations wages contribute to explain FLP. However, in emerging economies where markets are largely informal and/or suffer from sluggish labor demand earnings may play a less relevant role than in advanced and vibrant economies while household characteristics, education, location and cultural factors may play more important roles. In the absence of earnings and in view of the very scarce data and literature on FLP in the MENA region, this makes the study of non-wage determinants of FLP in Morocco an important step forward in filling these gaps.

The paper is organized as follows. The next section reviews some of the literature on female labor participation. Sections three and four present the models and data. Section four presents the results and section five concludes.

Non-wage determinants of female labor participation in emerging economies

The literature on female labor participation (FLP) is vast and can be broadly divided into two blocks. The first block seeks the long-term and historic factors that determine FLP and has been largely led by Ester Boserup and Claudia Goldin. This block of the literature states that FLP should be understood in the context of economic development of nations. When economies experience economic transformation from agrarian to industrialized societies, the agricultural sector shrinks contributing to the reduction in FLP as the new jobs created in the new industrial sectors are mostly taken by men. But as economies continue to grow, female education expands, fertility rates decline, women acquire more control over household decisions and sectors such as services and manufacturing expand, FPRs start to increase again. This is what is known as the U-shape hypothesis (Goldin, 1995), the idea that, during the process of economic development and growth, FPR is U-shaped in GDP per capita.

The U-shape hypothesis has found numerous confirmations over the years (Boserup, 1970, Durand, 1975; Goldin, 1995, Psacharopoulos and Tzannatos, 1989, Mammen and Paxson, 2000, Tsani, 2013, Olivetti, 2013) and most of this literature traced a few key determinants of FPR pointing essentially to four sets of factors. The first is the economic transformation argument from agriculture to industry and services already illustrated. The second is the increase in female education, particularly secondary education, identified as the turning point for females to join the modern sectors. The third is long-term changes in the population structure, fertility rates in

particular. As women are more educated, marry later and have shorter reproductive periods, fertility rates decline and this prolongs participation before marriage and reduces the risk of non-participation during marriage. The fourth set of factors relates instead to culture and gender norms. This argument states that culture including religion, attitudes towards women, norms related to the role of women in the family and society all play a role in FPRs.

This hypothesis and the long-term factors behind FPR in the MENA region and Morocco have been studied recently by Verme (2014). This paper was able to largely reproduce results for the U-shape hypothesis across world countries and regions but also found the MENA region and Morocco to stand out in different respects. On the one hand, the MENA region has outperformed other regions of the world in terms of the essential drivers of the U-shape hypothesis including the economic transformation away from agriculture, growth of female secondary education and the sharp fall in fertility rates. But on the other hand the MENA region as a whole shows an inverted U-shape and individual countries can show any shape: U-shape, hump-shape or a flat FLP/GDP relation. Women seem to exit the labor market around marriage age and they stay out of the labor market for the rest of their working lives. Also, while MENA countries as a whole experienced growth in FPR between 1990 and 2000 and then again between 2000 and 2010, Morocco experienced a reduction in FPRs during the latest period. Hence, Morocco is not only atypical in what sets MENA countries apart from other world regions but also lags behind other MENA countries in terms of FPRs performance.

The considerations above make of Morocco a special case and point at seeking the causes of low FPRs among factors other than long-term structural factors. This takes us to the second block of literature, the one that uses cross-section or short spells of longitudinal data to study FPRs. This literature is very rich, covers FLP and female labor supply models, and spans across the social sciences. We cannot cover this literature extensively but there are a number of factors that have consistently emerged over the years as good predictors of FLP such as females' potential wages and the wage of husbands (Mincer, 1962, Gronau, 1977), family structure and fertility rates (Mincer, 1962), or husbands' education (Khandker, 1988). This literature largely focused on earnings and advanced countries, particularly the US, and for these reasons is less relevant for the case of Morocco. A more recent literature started to investigate FLP and non-wage determinants of FLP in emerging economies and this provides some leads for our work.

Psacharopoulos and Tzannatos (1991) looked at FPRs in 13 Latin American countries. They find that despite worsened economic conditions between 1970 and 1990, women's participation in the labor force has increased significantly since the 1950s. The factors that have most affected women's decisions to join the work force have been (after controlling for age) education, marriage, heading the household and having children. For example, in Argentina a woman with less than primary **education** has a probability of participation of only 28 percent compared with a probability of 58 percent of a woman who is a university graduate. In Venezuela, the probability of participation for the corresponding education groups rises from about 30 percent to more than 85 percent. In Chile, the probability for **married** women to participate is 14 percent compared to 41 percent for single women. In Costa Rica, the corresponding figures are 18 percent and 40 percent. In Colombia the probability of participation for a woman who is **head of household** is 47 percent as compared to 21 percent for a woman who is not the head of a household. In

Panama, this same difference is between 20 percent and 57 percent and in Uruguay it is between 34 percent and 66 percent. The **number of children** is also important but this depends also on the age of the children. The probability of participation drops by about 3 to 5 percentage points for each additional child with the effect being stronger for women with **children below the age of six**. In fact, the presence of **older children** increases the probability of female participation in some countries. The presence of **adult non-workers** in the household decreases the probability of female participation.

These same factors have also emerged in other studies on emerging economies. A study by Contreras and Plaza (2010) on Chile confirms the Psacharopoulos and Tzannatos (1991) results. The article also examines cultural values that influence female labor participation and finds that **conservative cultural values** tend to decrease participation to an extent that this factor can compensate for the positive effect of human capital variables. Ejaz (2007) looked at Pakistan and found that age, educational attainment, marital status and number of children are all important predictors of participation. Chen et al. (2014) studied FLP rates in China and found that household and individual factors played a different role in urban and rural areas with individual factors being more important in urban areas and household factors being more important in rural areas.

The evidence on the MENA region remains scarce for the reasons already outlined in the introduction. Chamlou et al. (2011) looked at Amman in Jordan and found that higher education (post-secondary/university/post-university) has a positive and significant impact on FPR whereas secondary and less than secondary do not. In addition, there is a strong negative and statistically significant association between **traditional social norms** and the participation of women in the labor force. To our knowledge, there are only two unpublished papers that have studied FLP in Morocco. The first paper, by Assaad and Zouari (2003), used the 1990-1991 Living Standards Measurement Survey (LSMS) to estimate the impact of marriage and fertility on FLP in urban Morocco. It found marriage to be a constraint only in relation to paid employment, children of school age reduce women's participation, and education or education of the father increases women's participation. The second paper paper, by Taamouti and Ziroili (2011), used the Moroccan LFS and analyzed the individual determinants of female labor participation in urban areas for the period 2000-2010. This paper found that age and education significantly influence women's decision to join the labor force while married and widowed women and women with children have lower participation rates.

This paper extends the work on FLP in MENA countries and in Morocco in various directions. It uses two distinct sets of data and models to study medium-term and short-term factors affecting FLP: a regional panel data set based on macro data to study medium-term macro and seasonal determinants of FLP and an individual panel data set based on LFSs micro data to study short-term individual and household determinants. We will also compare cross-section results from the 2007 LFS and HBS surveys cross-validating results from the two different data sources.

Models

We use two separate sets of data and two models. The first set of data is a quarterly data set covering aggregate regional statistics derived from macro data and LFSs (1999-2012). We call the model applied to these data the *regional medium-term model*. The second is a panel data set based on LFSs and covering individuals during the period 2007-2011. We call the model applied to these data the *individual short-term model*. Note that these are both panel models, the first traces regions over quarters and the second traces individuals over years on a quarter to quarter basis.

Regional medium-term model. The quarterly model is a longitudinal panel model with a continuous dependent variable (quarterly FLP rate) where time (*t*) is represented by year-quarter observations and the panel is represented by the regions (*i*) of Morocco. We first estimate this model with an OLS Instrumental Variable (OLS-IV) estimator of the form:

$$FLP_{it} = \rho FLP_{it-1} + \beta_1 lny_{it} + \beta_2 (lny_{it})^2 + \beta_3 X_{it} + \vartheta_{it} \quad (1)$$

where *y* is GDP per capita and *X* is a vector of controls. We also use an Arellano-Bond General Methods of Moments estimator (AB-GMM) of the form:

$$FLP_{it} = \rho FLP_{it-1} + \beta_1 lny_{it} + \beta_2 (lny_{it})^2 + \beta_3 X_{it} + \mu_i + \vartheta_{it} \quad (2)$$

where μ_i are the panel effects and ϑ_{it} is the i.i.d error term. The outputs of the two models and the outputs of various types of reduced form of Equation 2 are then compared (see Table 1). This is the standard approach used in long-term models testing for the U-shape hypothesis (see for example Tam, 2011, Gaddis and Klasen, 2013 and Tsani et al., 2013). The main difference is that we use quarterly cross-region data in one country rather than annual cross-country data.

Individual short-term model. This model includes a binary dependent variable (FLP) and a one year lag quarter to quarter panel component and it is estimated on the pooled individual quarterly data for the period 2007-2011. The model is estimated with a logit model for panel data. The probability of participation *P* is given by

$$P[Y_{it} = 1 \backslash (X_{it}, \beta, \alpha_i)] = \Delta(\alpha_i + X'_{it}\beta) \quad (3)$$

where Δ(.) is the cumulative logistic distribution, α_i represents the individual specific effects and X'_{it} is a core of independent variables. The individual effects could be treated as fixed effects or as random effects. The fixed effects model treats the individual specific effect α_i as an unobserved random variable that may be correlated with the regressors X'_{it}. The random effects model treats α_i as following a standard i.i.d distribution. We use both fixed and random effects models and test for differences with a Hausman test. Tests show that the fixed effects model provides more consistent estimations but also loses up to 90% of observations due to the fact that the panel time lag is of only one year. We opt therefore to present results for both fixed effects and random effects (see Table 2). All regressions are carried out separately for urban and rural areas.

As an additional robustness test of the LFS data, we also compare results of a cross-section FLP model applied to LFS data and Household Budget Survey (HBS) data collected in 2007.[3] This is a simple cross-section logit model using exactly the same variables used for the individual panel short-term model in Equation (3).

Data

The Morocco LFS is a household survey covering all residents of Morocco. The sample size is about 60,000 households, 40,000 urban and 20,000 rural. The questionnaire contains information on all household members, approximately 270,000 individuals every year. This sample is divided into four equal independent sub-samples of 15,000 households each interviewed quarterly. Each sub-sample is representative at the regional level and by urban and rural areas. Sampling is a random three stages process.

For the quarterly medium-term model, we use all available rounds of the quarterly LFS of Morocco since its beginning in 1999 and until the end of 2012. This amounts to 14 years and 56 points in time. We also have 14 regions that represent the panel component, which turns the quarterly data set into 784 observations. For this model we only use FLP, average education and GDP per capita or, alternatively, sector Value Added per capita and the sector share of value added per capita. FLP and education variables are quarterly and by region while GDP per capita, sector value added and the share of sector value added were available per quarter but not per region. For education, we use three indicators: no diploma (base category), middle education (primary, college, professional qualifications and special qualifications) and higher education (technician, advanced technician, completed secondary, university, institutes and special schools).[4]

For the individual panel short-term model, we use the panel component of the LFS over the period 2007-2011. Starting from 2007, half of the households are re-interviewed every year in the same quarter, which makes the survey a quarterly panel survey with one time lag of one year. Moreover, since 2007, interviews are conducted all year long by means of a computerized system where data input occurs with Personal Digital Assistance (PDA) devices and data input verification is carried out both automatically with a special software and with controllers in real time. This allows interviewers to correct most data input errors during the interview and makes the surveys very consistent over time.

The variables we use in the short-term model are of three types: variables related to women's individual characteristics, variables related to household characteristics and the quarterly GDP to reflect overall economic conditions. Individual variables include age, education and marital status. Household variables include the type of activity of the household head and spouse (active or not), education of the head of the household, and variables related to the structure of the household (percentage of inactive women and not in school, children under 6 years old, children

[3] This is the only year between 2007 and 2011 when both the LFS and HBS surveys were administered.
[4] These terms are lose translations from the Moroccan French system and should not be taken as corresponding to US or UK degrees.

aged 6-17 years old and out of school and inactive persons above the age of 60). This selection of variables was largely based on findings from the literature on emerging economies and from our own screening of possible predictors of FLP.

The HBS data used for comparing results with LFS data is the 2007 National Living Standards Survey covering 7,200 households. The survey focused on household expenditure and revenues and was principally administered to measure poverty, inequality and other dimensions of living standards but contains modules on employment and education and uses the same employment and educational categories used by the LFS. It was therefore possible to reproduce with precision the set of variables used with LFS data.

Results

FLP trends

The period covered by this study (1999-2012) was a period characterized by sustained growth, averaging four percent a year, and by a very rich set of macroeconomic and social reforms that transformed the economy. For most of the period considered, macroeconomic stability reigned in Morocco and GDP growth trickled down effectively to the population so that the country was able to deliver in terms of households income and poverty reduction. The overall economic performance of Morocco during the period considered was good by macroeconomic and microeconomic standards (see Douidich et al, 2013 and Verme et al., 2014 for a full description of reforms and economic performance).

By contrast, the labor market performance has been disappointing. The unemployment rate declined marginally in recent years but only for men and the Labor Force Participation Rate (LFPR) and the Employment Rate experienced little changes, despite evident employment and job mobility, and females experienced overall declines in both rates (Verme et al, 2014). Quarterly data (Figure 1) show that: 1) the FPR in both urban and rural areas declines over time; 2) the FPR rate is higher in rural areas as compared to urban areas; 3) The urban-rural gap increases over time and 4) the rural FPR has been more volatile than the urban FPR (as one should expect because of seasonality effects).

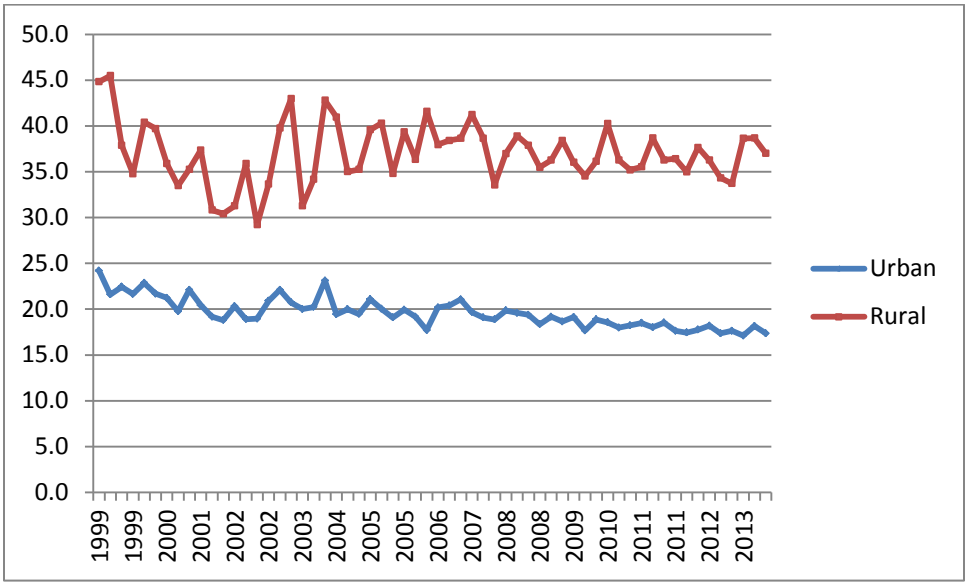
It is remarkable that both urban and rural female participation rates declined during a period of sustained growth and it is also difficult to observe a rural-urban trade-off, with shrinking FPR in rural agricultural areas and rising FPR in urban industrialized areas. This is striking also because female enrollment and completion rates have increased remarkably during the same period and for all levels of education while fertility rates continued to decline and marriage age increased.

Declining female participation rates have been explained by a combination of mainly three factors. The first factor points to a poor performance of women relatively to men. Males' participation rates between 1999 and 2012 have increased and women show a worse performance than men on all aspects of labor mobility including job and occupational mobility (Verme et al., 2014). The second factor relates to culture and gender norms and is signaled by an exit of women

from the labor force around marriage age. Economic conditions being equal, women who get married have a much higher likelihood of exiting the labor force also when controlling for children. We still know little about why this happens but it is clear that marriage is the breaking point. The third aspect is economic and related to the very weak performance of sectors that are more likely to hire women with primary and secondary education such as manufacturing and services (Verme, 2014). These factors will be explored further in the rest of the paper.

There are also two other stylized facts that may play a role in explaining FLP. One is the rising of enrollment rates at all levels of education and the resulting elongation of the period of schooling. This delays labor market entrance and increases the demand-supply mismatch if sectors that are more likely to hire well educated women do not perform, as we have seen for Morocco. The female unemployment rate has indeed increased while female participation was declining. The second factor is the astonishingly high share of women in school age out of school and out of work despite progress in education. Using LFS data for the period 2007-2011, we found less than 5 percent of men to be simultaneously out of work and out of school in both urban and rural areas. By contrast, the figures for women show that 4 in 10 women in urban areas and 6 in 10 women in rural areas aged 15 to 29 years are neither in work nor in school. This high share of young women at home has an impact on child and elderly care in households with employed women with children, an important factor to model in the econometric equations that follow.

Figure 1 - Female Labor Force Participation Rate (Quarterly, 1999-2013)



Source: LFS (1999-2013)

Regional medium-term panel model

In this section we review the results of the medium-term quarterly regressions largely following the recent literature on long-term determinants of FLP (Tam, 2011, Gaddis and Klasen, 2013, Tsani et al., 2013). Table 1 provides ten different specifications of the equations. The first four

equations test for estimators and endogeneity. The last six equations test for different sets of regressors.

Equations (1) and (2) test for alternative estimators. Equations (1) uses an OLS-IV model with one lag of the dependent variable while Equation (2) uses an AB-GMM estimator. Results are very close between the two equations, there are no changes in either sign or significance in any of the regressors and the coefficients are all very close.

Equations (3) and (4) test for lags and endogeneity. Equations always use quarter fixed effects to control for seasonal effects. However, this may not eliminate seasonal effects completely particularly because these effects may be different across regions. Equations (3) tests therefore with five lags so as to reach the same quarter of the previous year and the quarter before that (L4 and L5). We find that all quarter except L3 are significant and that the highest coefficient is in L4 (the same quarter in the previous year). This confirms that using only the first lag may not be optimal. However, Equation (3) also shows that L1 is the second most significant lagged value and also that the Sargan test is only slightly better than the one in Equation (2). Instead, if we treat the log of GDP per capita as endogenous (this is an option of the AB-GMM estimator), the Sargan test cannot reject the null hypothesis of exogeneity.[5] Therefore, we keep Equation (2) as the best compromise in terms of simplicity and endogeneity and test this model further with different specifications of regressors (Equations 5-10).

Results show that GDP per capita is non-significant across all specifications of the model except (3) where the effect is weakly significant and negative. This complies with what found for Morocco by Verme (2014) in the MENA countries study that used the ILO-EAPEP data. A middle level diploma as we defined it (see data section) reduces the probability of participation and this result is significant across all specifications of the model. We will see that this result is confirmed by the individual panel short-term models and has some clear explanations discussed further below. Instead, having a higher education increases the probability of participation as one should expect. It is noticeable that both the third and fourth quarter of the year significantly reduce the probability of participation. This is related to the agricultural season which is labor intensive during the second quarter of the year and by the fact that most active women are in agriculture.

Equations (5) and (7) include the share of the secondary and tertiary sector in total GDP while Equations (8), (9) and (10) include the log of value added for the primary, secondary and tertiary sectors separately. Equation (6) also tests for linearity of GDP per capita rather than for the U-shape hypothesis. The rationale of these equations is to see whether FLP is sensitive to structural changes of the economy or to changes in the output of particular sectors rather than simply GDP per capita. Gaddis and Klasen (2013), for example, find sectors values added to be more relevant than GDP per capita. We also saw that manufacturing and services are key sectors for female participation while GDP growth *per se* has done nothing to increase FLP in Morocco. However,

[5] The null hypothesis of the Sargan test is that the overidentifying restrictions are valid or, in other words, that the instruments taken together are exogenous. Therefore rejecting the null hypothesis is what validates our model in respect to endogeneity of the instruments.

we consistently find no significance for any of these variables across all specifications whether we consider a linear or quadratic fit.

From the regional panel models, we can conclude that results indicate no effects of changes in GDP per capita over FLP rates. This is consistent with findings in Verme (2014) which, using the ILO-EAPEP data, did not find any significance of the GDP per capita or its squared value when regressed against FLP rates.[6] It is also clear that a middle education level leads to lower FLP rates than no education or higher education (see more on education in the next section) and that the third and fourth quarters of the year are the most difficult for women in terms of participation due to the agricultural season.

Table 1 – Regional Panel Medium-term Models

VARIABLES	(1) OLS-IV	(2) AB-GMM	(3) AB-GMM	(4) AB-GMM*	(5) AB-GMM
L.flpr	0.481***	0.474***	0.317***	0.0854**	0.471***
	(0.0315)	(0.0344)	(0.0377)	(0.0410)	(0.0344)
L2.flpr			0.137***		
			(0.0365)		
L3.flpr			0.0478		
			(0.0367)		
L4.flpr			0.397***		
			(0.0365)		
L5.flpr			-0.136***		
			(0.0370)		
ln_PIB_pc	-83.82	-86.74	-172.6*	-94.35	-28.63
	(99.20)	(104.1)	(99.06)	(84.21)	(112.7)
ln2_PIB_pc	-7.598	-7.886	-15.93*	-8.442	-2.758
	(9.060)	(9.508)	(9.069)	(7.686)	(10.26)
middle education	-0.132**	-0.141**	-0.121**	-0.203***	-0.136**
	(0.0558)	(0.0600)	(0.0524)	(0.0557)	(0.0601)
upper education	0.290***	0.284***	0.241***	0.334***	0.292***
	(0.0769)	(0.0819)	(0.0721)	(0.0755)	(0.0816)
quarter 2	-0.315	-0.292	0.223	0.432	-0.371
	(0.424)	(0.444)	(0.399)	(0.363)	(0.449)
quarter 3	-2.265***	-2.246***	-1.171***	-1.523***	-2.332***
	(0.423)	(0.443)	(0.409)	(0.362)	(0.446)
quarter 4	-1.427***	-1.422***	-0.876**	-1.409***	-1.620***
	(0.425)	(0.444)	(0.403)	(0.358)	(0.466)
secondary sector					25.10
					(21.04)
tertiary sector					-14.14
					(14.83)
ln VA per capita primary sector					
ln VA per capita primary sector squared					

[6] This may be explained by one of two factors. Either the U-shape hypothesis does not apply to Morocco or the country is transiting through and lags on the saddle point of the curve.

ln VA per capita primary sector					
ln VA per capita primary sector squared					
ln VA per capita primary sector					
ln VA per capita primary sector squared					
Constant	-214.8	-221.7	-459.1*	-235.1	-56.30
	(271.8)	(285.2)	(270.8)	(230.9)	(311.5)
Observations	756	742	686	742	742
Number of region	14	14	14	14	14
Sargan test		613.5	638.2	333.7	616.5

Table 1 – Regional Panel Medium-term Models (Cont.)

VARIABLES	(6) AB-GMM	(7) AB-GMM	(8) AB-GMM	(9) AB-GMM	(10) AB-GMM
L.flpr	0.475***	0.467***	0.476***	0.479***	0.474***
	(0.0343)	(0.0341)	(0.0340)	(0.0342)	(0.0344)
L2.flpr					
L3.flpr					
L4.flpr					
L5.flpr					
ln_PIB_pc	-0.434				
	(1.563)				
ln2_PIB_pc					
middle education	-0.149**	-0.117**	-0.147***	-0.169***	-0.134**
	(0.0590)	(0.0548)	(0.0538)	(0.0560)	(0.0599)
upper education	0.282***	0.291***	0.283***	0.278***	0.290***
	(0.0819)	(0.0814)	(0.0818)	(0.0820)	(0.0818)
quarter 2	-0.331	-0.367	-0.241	-0.347	-0.311
	(0.442)	(0.443)	(0.447)	(0.444)	(0.443)
quarter 3	-2.277***	-2.309***	-2.249***	-2.302***	-2.253***
	(0.441)	(0.439)	(0.441)	(0.444)	(0.442)
quarter 4	-1.445***	-1.586***	-1.352***	-1.466***	-1.462***
	(0.443)	(0.453)	(0.449)	(0.455)	(0.443)
secondary sector		15.89			
		(15.25)			
tertiary sector		-13.22			
		(13.59)			

ln VA per capita primary sector			-83.43		
			(64.48)		
ln VA per capita primary sector squared			-5.643		
			(4.372)		
ln VA per capita primary sector				25.90	
				(230.9)	
ln VA per capita primary sector squared				1.842	
				(16.74)	
ln VA per capita primary sector					-102.9
					(110.5)
ln VA per capita primary sector squared					-8.282
					(8.948)
Constant	14.60	19.22**	-291.3	108.6	-303.1
	(9.781)	(9.082)	(237.9)	(796.3)	(341.3)
Observations	742	742	742	742	742
Number of region	14	14	14	14	14
Sargan test	614.0	617.2	612.2	612.6	613.7

Source LFSs 2007-2011. Conditional logit fixed effect: dependant variable: FLP (1: in the labor force; 0: otherwise). Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

Individual panel short-term model

In this section, female participation rates regressions are carried out on the pooled sample 2007-2011 separately for urban and rural areas using a panel logit model with fixed effects and random effects. Table 2 shows the results. The panel observations are of only one year in length from quarter to quarter, i.e. each individual is observed only two times in two consecutive years and in the same quarter of the year. Only 13.7 percent of urban residents and 15.2 percent of rural residents change participation status during the one year they are observed, which means that all other individuals are dropped from the fixed effects model. This is evidently a constraint because many variables change little over a one year period and because we lose information for up to 85% of the sample, which explains why we retained the random effects model. The set of independent variables were tested for multicollinearity and all variables passed VIF and tolerance tests. Hausman tests are provided in the annex.

The first interesting finding is that GDP growth reduces the probability of participation for women in both urban and rural areas and according to both FE and RE estimations. This may comply with the U-shape hypothesis if Morocco found itself on the downward part of the curve, a fact we said is at odds with the overall performance of the country and the trends in the variables that are usually associated with the U-shape hypothesis (structural transformation, female education, fertility rates). This apparently odd result is explained by the fact that growth has been jobless and that employment generation, where it occurred, occurred in male dominated sectors. As already reported, Verme et al. (2014) showed that male participation increased during the period 2007-2011.

Age is clearly hump-shaped in FLP. We also know that the turning point of the hump when FLP starts to decline is around the age of 25, which largely coincides with marriage age. This result is consistent with Verme (2014), which found the female peak of participation in MENA countries

and Morocco coinciding with the 25-29 age cohort. In fact, Table 2 shows that being married invariably reduces the probability of participation in both urban and rural areas. The interaction between age and marriage is also always positive and significant, which means that older married women do better than younger married women. Therefore, marriage rather than age is the key factor to understand participation for women.

Secondary education seems to consistently reduce the probability of participation in both urban and rural areas. This is a surprising result but also the key to understand low FLP rates. Morocco managed to improve secondary education for men and women very significantly over the past two decades and this is consistent with one of the long-term factor of female participation. But the country was unable to develop sectors that are more likely to employ women with secondary education including manufacturing and services. Consistent with Verme at al. (2014), women are more likely to be either low educated and better employed in low skills jobs or highly educated and in search of work or employed in the public sector. In a sense, the system failed to make use of the vast majority of women who completed secondary education by creating jobs in labor intensive sectors that require middle-level skills. The alternative for women is vocational education, which provides a distinct advantage for FLP.

Having an active spouse increases the probability of participation in both urban and rural areas and in both models. This is after controlling for marriage. Therefore, married women participate less than non-married but, among married women, having an active spouse is an advantage. This also means that married couples tend to either work or not work. This may be related to stigma and social networks. A working husband has fewer stigmas associated with a working wife, and a wife of an active person is more likely to be socially connected to other active people and jobs.

Children play an important role for FLP as expected but also clearly differently as compared to advanced economies. The probability of participation decreases with the number of children below six only according to the RE model and only in urban areas. However, if we look at the next variable which measures the number of children out of school and out of work between the age of 7 and 17 we find this variable to increase FLP with both FE and RE models. This would suggest that older siblings look after younger siblings and increase in this way the likelihood of participation of older women, particularly in rural areas. Vice-versa, this could be a factor that keeps older children, especially females, out of school but the other results on economic performance would suggest that this is related to weak demand rather than strong social norms.

Having more than a third of the other women in the household above the age of 15 inactive reduces the probability of participation consistently across areas and models. The same result is found for the number of inactive persons above the age of 60. This may mean that these are very poor families with most people inactive or that the household has many inactive individuals requiring attention. These two factors may reinforce each other.

Being household head increases participation for women according to the RE model but not to the FE model. Given the low probability of this status changing over one year and given the low share of women head of household, we cannot conclude that this is a valid result. The same conclusion can be applied to the head of household having achieved general education, which is not significant in the FE model.

Table 2 – Individual Panel Short-Term Models

VARIABLES	(1) Urban, FE	(2) Urban, RE	(3) Rural, FE	(4) Rural, RE
gdp_real_index	-0.0268**	-0.00869***	-0.0342***	0.00453**
	(0.0124)	(0.00213)	(0.00976)	(0.00177)
Age	0.820***	0.560***	0.469***	0.315***
	(0.0960)	(0.00933)	(0.0731)	(0.00588)
age squared	-0.00834***	-0.00742***	-0.00182***	-0.00362***
	(0.000892)	(0.000118)	(0.000591)	(6.62e-05)
Married	-1.499***	-5.696***	-1.882***	-2.784***
	(0.423)	(0.158)	(0.371)	(0.0901)
ageXmarried	0.0229**	0.0551***	0.0344***	0.0619***
	(0.0104)	(0.00367)	(0.00791)	(0.00211)
head of household	0.843	0.645***	0.578	0.109**
	(0.722)	(0.0628)	(0.388)	(0.0525)
primary education	0.126	0.268***	0.0440	-0.694***
	(0.0907)	(0.0480)	(0.0942)	(0.0586)
secondary education	-1.845***	-4.525***	-2.403***	-3.942***
	(0.279)	(0.121)	(0.858)	(0.327)
ageXsecondary education	0.0541***	0.154***	0.0768**	0.116***
	(0.00839)	(0.00358)	(0.0317)	(0.0122)
tertiary education	1.296***	4.324***	1.707**	3.252***
	(0.166)	(0.0855)	(0.846)	(0.343)
vocational education	2.083***	5.617***	2.189***	2.336***
	(0.140)	(0.0710)	(0.510)	(0.255)
household head has general education	-0.0585	-0.185***	0.167	-0.576***
	(0.0847)	(0.0431)	(0.117)	(0.0631)
spouse is active	0.723***	1.132***	0.428***	1.157***
	(0.127)	(0.0861)	(0.0569)	(0.0380)
household has children under six y.o.	0.124	-0.253***	0.0918	0.209***
	(0.113)	(0.0432)	(0.0840)	(0.0310)
household has children in age 7-17 out of school and work	0.355***	0.680***	0.0682	0.433***
	(0.0819)	(0.0529)	(0.0463)	(0.0277)
household has more than 1/3 of other females inactive	-1.106***	-0.505***	-1.506***	-1.880***
	(0.0816)	(0.0460)	(0.0628)	(0.0430)
number of over 60 y.o. inactive	-0.942***	-0.354***	-1.341***	-1.254***
	(0.0735)	(0.0315)	(0.0443)	(0.0271)
Constant		-10.74***		-6.919***
		(0.308)		(0.242)
Observations	19,262	205,564	31,298	140,154
Number of indcode	9,631	102,782	15,649	70,077

Source LFSs 2007-2011. Conditional logit fixed effect: dependent variable: FLP (1: in the labor force; 0: otherwise). Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

As a further test, we compare cross-section estimations between LFS and HBS data for the only year when these two surveys have been both administered. Results are shown in Table 3. As can

be seen, the results are very similar in terms of sign, significance and even coefficients for almost all variables considered and in both urban and rural areas. There is only one variable (ageXmarried) that is consistently different for the two models. We should conclude that results on age, marriage, education and household characteristics described for Table 2 are robust to location (urban and rural), fixed and random effects specifications and to the source of data.

Table 3 – LFS Vs. HBS Data

	(1) Urban LFS 2007	(3) Urban HBS 2007	(2) Rural LFS 2007	(4) Rural HBS 2007
Age	0.332***	0.466***	0.203***	0.200***
	(0.00715)	(0.0253)	(0.00528)	(0.0401)
age squared	-0.00461***	-0.00661***	-0.00248***	-0.00240***
	(9.48e-05)	(0.000383)	(6.06e-05)	(0.000659)
Married	-3.152***	-2.766***	-1.438***	-1.261**
	(0.135)	(0.441)	(0.0821)	(0.538)
ageXmarried	0.0238***	0.0137	0.0283***	-0.00330
	(0.00336)	(0.0120)	(0.00198)	(0.0186)
head of household	0.903***	0.803***	1.530***	1.077**
	(0.0471)	(0.203)	(0.0484)	(0.534)
primary education	-0.0330	-0.215**	-0.537***	-0.110
	(0.0414)	(0.108)	(0.0660)	(0.145)
secondary education	-2.778***	-2.273***	-2.489***	-3.091***
	(0.103)	(0.253)	(0.363)	(0.904)
ageXsecondary education	0.0914***	0.0838***	0.0828***	0.107***
	(0.00309)	(0.00816)	(0.0137)	(0.0367)
tertiary education	1.931***	1.279***	2.768***	1.350*
	(0.0624)	(0.170)	(0.311)	(0.796)
vocational education	2.258***	2.046***		
	(0.0484)	(0.204)		
household head has general education	-0.340***	-0.250***	-0.137**	-0.329
	(0.0372)	(0.0959)	(0.0689)	(0.223)
spouse is active	3.653***	2.313***	3.042***	1.717***
	(0.0433)	(0.120)	(0.0312)	(0.136)
household has children under six y.o.	-0.162***	-0.315***	-0.0131	-0.287**
	(0.0350)	(0.0980)	(0.0290)	(0.141)
household has children in age 7-17 out of school and work	0.300***	0.400***	0.00143	0.521***
	(0.0443)	(0.137)	(0.0284)	(0.148)
household has more than 1/3 of other females inactive	-0.138***	-0.343***	-0.477***	-1.408***
	(0.0361)	(0.112)	(0.0443)	(0.264)
number of over 60 y.o. inactive	0.0556**	0.155**	0.0490*	-0.199
	(0.0239)	(0.0675)	(0.0257)	(0.125)
Constant	-6.502***	-7.547***	-5.156***	-3.618***
	(0.130)	(0.405)	(0.105)	(0.594)
Observations	63,266	4,625	39,716	1,407
Adjusted R-squared	0.393	0.306	0.325	0.220
Log likelihood	-18875	-2037	-17850	-746.0

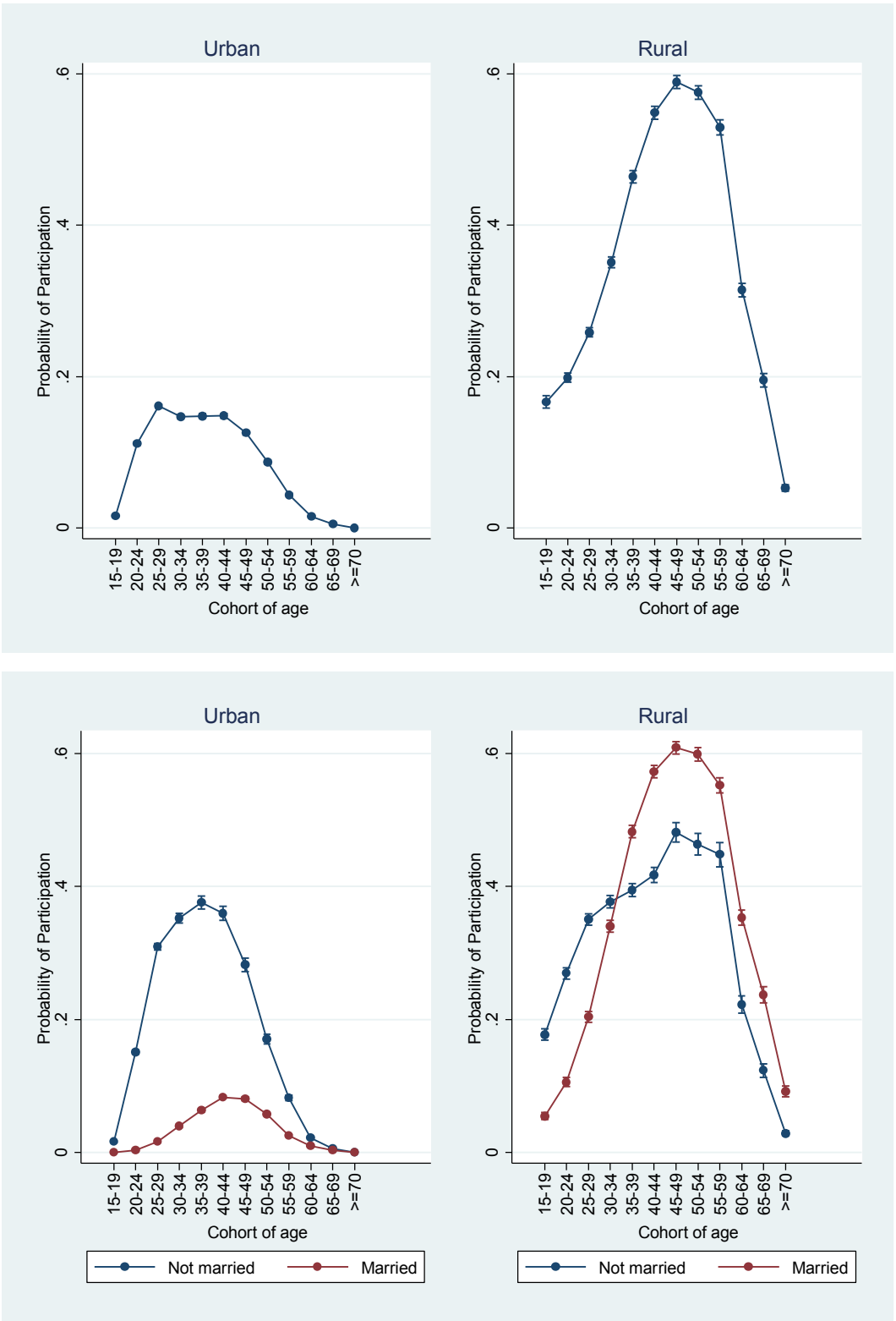
Source LFSs 2007 and HBS 2007. : Logit regressions, dependent variable: FLP (1: in the labor force; 0: otherwise). Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

To further investigate the question of age and participation, we plot the marginal probability of participation conditional on the variables used in Table 2 and plot the results in Figure 2 by age cohorts (top panel). The graphs confirm what we learn in the table in terms of the hump shape relation between age and FLP. They also highlight the urban-rural divide in terms of FLP and pinpoint when women really exit the labor force. In urban areas female participation is much lower than in rural areas for all age-cohort. In fact, this explains the low FLP rates in Morocco given that rural rates can reach up to 60%. It is also evident that in urban areas the exit age is in the 25-29 age cohort, which again explains what was found for Morocco as a whole.

If we further split the probability of participation by marital status (Figure 2, bottom panel) we can see that marriage has a major role in Urban areas in keeping FLP rates low. The probability of participation for married women in Urban areas is below 10% as compared to a probability for unmarried women of close to 40%. The peak of the two curves also shifts to the right of the age cohort scale as compared to figure 2, which means that marriage is what keeps the peak in Figure 2 around the age of 25-29. This marriage effect is not visible in rural areas where marriage can even increase participation.

If we consider that most women in rural areas are uneducated, we should conclude that low FPRs in Morocco are mainly explained by women in urban areas with secondary education. This group is not likely to participate mainly because of marriage and because they have an education level matching sectors that are not growing. In addition, educated women are likely to marry educated men who we know have done better than women in the labor market and may be able to support their families on their own. Married women with secondary education are often married to highly educated men working in the public sector and the public sector in Morocco is known for paying very good salaries. This last factor, in turn, contributes to reduce the likelihood for educated women to seek employment as amply shown by the literature on FLP in the US (Mincer, 1962, Gronau, 1977).

Figure 2 – Probability of Participation by Age Cohort and Marital Status



Source: LFSs 2007-2011. Values are estimated as marginal effects based on equations (2) and (4) in Table 2 and conditional on age cohorts and marital status. Bars over points represent 95% confidence intervals.

Conclusions

The paper has tested some of the possible predictors of FLP in Morocco based on long-term theories and more recent evidence on emerging economies and using the most comprehensive set of data available for any MENA country to date.

The statistical overview depicted a country that performed well in terms of macro and microeconomic developments and much less well in terms of labor market outcomes, particularly for women. FLP rates declined slowly but steadily between 1999 and 2012 and a recent work on labor mobility in Morocco (Verme at al., 2014) found women to have performed worse than men on all dimensions of labor mobility considered. A recent study on FLP in MENA countries (Verme, 2014) also found Morocco to underperform comparatively to other countries at similar levels of economic development. This paper tried to better understand some of the medium and short-term factors that may help to explain such performance.

From the regional panel models, we concluded that GDP growth has not attracted more women in the labor market in Morocco. This is consistent with previous findings about labor mobility, which indicated that growth did not really result in substantial labor market gains and women lost relative to men. It is also clear that a middle education level leads to lower FLP rates as compared to no education or higher education. This finding was confirmed by the short-term model for both urban and rural areas and can possibly be explained in terms of poor performance of strategic sectors for women's employment such as manufacturing and services. Morocco did grow but in low productivity sectors that did not improve employment overall, favored men rather than women and favored uneducated rather than secondary educated women. We also know from previous studies that tertiary educated women who work tend to be employed in the public sector.

Age is clearly hump-shaped in FLP and the turning point when FLP starts to decline is around the age of 25. This is a finding common to the MENA region and is explained by marriage. After controlling for marriage, having an active spouse increases the probability of participation in both urban and rural areas. Children also play an important role for FLP but differently from advanced economies. Children under the age of six is not a major constraint to FLP if the household also has children in age 6-17 out of school and out of work. In other words, the pervasive phenomenon of female children out of work and education can result in a better participation rate of older women. This result highlights a phenomenon that is likely to constrain female participation for generations to come. Indeed, having more than a third of the other women above the age of 15 in the household inactive reduces the probability of participation. Together with the result on active spouses and people above 60 inactive, this result can be read as a "clustering" of women living in households with very low levels of activity among the young and the old, probably very poor households most likely to live in urban areas.

Overall, the key group that explains low FLP in Morocco is married educated women in urban areas. This group is not likely to participate mainly because of marriage and because they have an education level matching sectors that are not growing. In addition, educated women are likely to marry educated men whose income may be sufficient to support their families, a factor that may further discourage women from seeking work. In a paper on relative deprivation in Morocco,

Serajuddin and Verme (forthcoming) show that both males and females think it is a priority for men to work as opposed to women and women complain less than men when excluded from employment. These findings reinforce findings on labor mobility and suggest that when jobs are scarce gender norms determine a higher take-up for men.

References

Assaad, R. and Zouari, S. (2003) The timing of marriage, fertility, and female labor force participation in Morocco. Proceedings of the Middle East Economic Association 5.

Boserup, E. (1970) Woman's Role in Economic Development, London: George Allen and Unwin Ltd.

Chamlou, N. Muzi, S. Ahmed, H. (2011). Understanding the Determinants of Female Labor Force Participation in the Middle East and North Africa Region: The Role of Education and Social Norms in Amman, AlmaLaurea Working Papers series, 31

Chen, J. Shao, X. Murtaza, G. Zhao, Z., (2014) Factors that influence female labor force supply in China, *Economic Modelling* 37, 485–491

Ejaz, M. (2007). Determinants of female labor force participation in Pakistan: An empirical analysis of PSLM (2004–05) micro data [Special Edition]. *Lahore Journal of Economics*, 203–223

Gaddis, I and Klasen, S. (2013) Economic Development, Structural Change, and Women's labor force participation. *Journal of Population Economics*, DOI 10.1007/s00148-013-0488-2

Goldin, C. (1986) The Economic Status of Women in the Early Republic: Quantitative Evidence. *The Journal of Interdisciplinary History*, Vol. 16 (3): pp. 375-404;

Goldin, C. (1990) Understanding the Gender Wage Gap: An Economic History of American Women. Oxford University Press

Goldin, C. (1995). The U-Shaped Female Labor Force Function in Economic Development and Economic History, in T.P. Schultz (ed.). Investment in Women's Human Capital, Chicago: The University of Chicago Press ;

Gronau, R. (1977) Leisure, Home Production, and Work: the Theory of the Allocation of Time Revisited. *The Journal of Political Economy*, Vol. 85, No. 6. pp. 1099-1123.

Luci, A. (2009) Female labour market participation and economic growth. *International Journal of Innovation and Sustainable Development*, Vol. 4, 2/3;

Lundberg, S. (2010) The Sexual Division of Labour. In The Shape of the Divison of Labour: Nations, Industries and Households, edited by Robert M. Solow and Jean-Philippe Touffut, pp. 122-48. Cheltenham, UK: Edward Elgar

Mincer, J. (1962) Labor Force Participation of Married Women: A Study of Labor Supply in Aspects of Labor Economics (NBER) Princeton University Press, p. 63-106

Olivetti,C (2013) The Female Labor Force and Long-run Development: The American Experience in Comparative Perspective, NBER Working Paper No. 19131

Psacharopoulos, G. and Tzannatos, Z. (1989), Female labor force participation: An international perspective. World Bank Research Observer, 4(2), 187-201

Serajuddin, U. and Verme, P. (forthcoming) Who is deprived? Who feels deprived? Labor Deprivation, Youth and Gender in Morocco, *Review of Income and Wealth*, DOI: 10.1111/roiw.12080

Taamouti, M. and Ziroili, M. (2011), Individual determinants of female labor participation in Morocco, mimeo

Tam, A. (2011). U-shaped female labor participation with economic development: Some panel data evidence. *Economics Letters*, 110, 140-142

Tsani, S. Paroussos, L. Fragiadakis, C. Charalambidis,I. Capros, P. (2012), Female labor force participation and economic development in Southern Mediterranean Countries: What scenarios for 2030?, MEDPRO Technical Report No. 19

Verme, P. (2014) Economic Development and Female Labor Participation in the Middle East and North Africa. A Test of the U-shape Hypothesis, mimeo

Verme, P., Barry, A. G., Guennouni, J. and Taamouti, M (2014) Labor Mobility, Economic Shocks and Jobless Growth. Evidence from panel data in Morocco, World Bank Policy Research Working Papers, No. 6795.

Annex – Hausman Tests

	(b) Logit FE	(B) Logit RE	(b-B) Diff.	sqrt(diag(V_b-V_B)) S.E.
Urban (Chi2=3491.73, Prob>chi2 = 0.0000)				
gdp_real_index	-0.027	-0.009	-0.018	0.012
age	0.820	0.560	0.260	0.096
age squared	-0.008	-0.007	-0.001	0.001
married	-1.499	-5.696	4.198	0.393
ageXmarried	0.023	0.055	-0.032	0.010
head of household	0.843	0.645	0.198	0.720
primary education	0.126	0.268	-0.142	0.077
secondary education	-1.845	-4.525	2.680	0.251
ageXsecondary education	0.054	0.154	-0.100	0.008
tertiary education	1.296	4.324	-3.028	0.143
vocational education	2.083	5.617	-3.534	0.121
household head has general education	-0.059	-0.185	0.126	0.073
spouse is active	0.723	1.132	-0.409	0.094
household has children under six y.o.	0.124	-0.253	0.377	0.105
household has children in age 7-17 out of school and work	0.355	0.680	-0.326	0.063
household has more than 1/3 of other females inactive	-1.106	-0.505	-0.601	0.067
number of over 60 y.o. inactive	-0.942	-0.354	-0.588	0.066
Rural (Chi2=746.98, Prob>chi2 = 0.0000)				
gdp_real_index	-0.034	0.005	-0.039	0.010
age	0.469	0.315	0.154	0.073
age squared	-0.002	-0.004	0.002	0.001
married	-1.882	-2.784	0.903	0.360
ageXmarried	0.034	0.062	-0.027	0.008
head of household	0.578	0.109	0.468	0.385
primary education	0.044	-0.694	0.738	0.074
secondary education	-2.403	-3.942	1.540	0.793
ageXsecondary education	0.077	0.116	-0.039	0.029
tertiary education	1.707	3.252	-1.545	0.773
vocational education	2.189	2.336	-0.146	0.442
household head has general education	0.167	-0.576	0.743	0.099
spouse is active	0.428	1.157	-0.729	0.042
household has children under six y.o.	0.092	0.209	-0.118	0.078
household has children in age 7-17 out of school and work	0.068	0.433	-0.365	0.037
household has more than 1/3 of other females inactive	-1.506	-1.880	0.375	0.046
number of over 60 y.o. inactive	-1.341	-1.254	-0.087	0.035