ECONOMICS
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ECONOMIC GROWTH AND FEMALE LABOR FORCE PARTICIPATION – VERIFYING THE U-FEMINIZATION HYPOTHESIS. NEW EVIDENCE FOR 162 COUNTRIES OVER THE PERIOD 1990-2012

Abstract. The paper contributes by providing new insights into the relationship between female labor force and economic growth in 162 world countries over the period 1990-2012. It was hypothesized that an analysis would reveal a U-shaped relationship between female labor force participation and economic growth. The analysis is run from two different perspectives – in the first, the relationship is examined for a sample encompassing 162 countries; and in the second – the evidence is disaggregated and the relationship is re-examined within four income-groups (low-income, lower-middle-income, upper-middle-income and high-income). To examine these relationships, data on female labor force participation and per capita income are extracted from the World Development Indicators 2013 database, and the relationship is examined by deploying panel data analysis assuming non-linearity between variables. The main findings support the hypothesis of the U-shaped relationship between female labor force participation and economic growth, however high cross-country variability on the field is reported. Moreover, the U-shaped feminization hypothesis was not positively verified in the case of low-income countries.

Keywords: women, female labor force, feminization, U-shaped curve, economic growth

JEL classification: J21, O10, O50

Introduction

The worldwide trends can be summarized as exhibiting a relatively steady relationship between women`s participation in the labor market and the stage of economic growth. A great majority of empirical studies demonstrate that in the initial phases of economic growth female labor force participation tends to be decreasing, while after reaching a certain level of output per capita, a positive relationship emerges and women`s engagement in the labor market grad-

ually increases. In this vein, the following paper contributes to the present state of knowledge by providing extensive evidence on re-examination of the hypothesis, according to which the statistical relationship between female labor force participation and economic growth follows the U-shaped pattern.

The main goal of the paper is twofold. First, the authors provide new evidence on the U-shaped association between female labor force participation and economic growth in 162 countries over the period 1990-2012. To enrich the analysis, the authors deliberately disaggregate the evidence and exhibits by examining relationships in four distinct income-groups, namely: low-income, lower-middle-income, upper-middle-income and high-income countries[1]. Disaggregating the evidence sheds light on the issue providing a novel insight, and allows us to determine whether the U-feminization hypothesis is revealed only in the world sample, or –preferably – is held in respective income-groups. The data used in the consecutive analysis are exclusively derived from the World Development Indicators 2013 database. To meet the main empirical objectives, the preliminary graphical evidences are supported by the static and dynamic panel econometric methods.

This paper is structured as follows. The introductory part is followed by sections explaining the conceptual background, data and methodological strategy. Sections 4 and 5 demonstrate empirical results, and the last part is the conclusion.

1. Background

In 1965 Sinha suggested that the feminization of labor force and the level of economic growth are described by the long-term U-shaped relationship. Since then onward, a substantial body of both theoretical and empirical evidence has concentrated on the cited relationship, giving updated insights into the issue. Although the relationship between female labor force participation and the level of economic growth is relatively stable and robust over time, still the outcomes vary if accounting for various countries or country groups.

As already argued, a sizeable amount of evidence suggests a U-shaped relationship between female labor force (FLF) participation and economic growth (Tam, 2011; Lechman and Okonowicz, 2013; Olivetti, 2013; Tsani et al., 2013; Kaur and Tao, 2014). The U-hypothesis claims that economic development (approximated by GDP per capita) and FLF are mutually conditioned (Boserup et al., 2013) and such regularity is probably attributed to countries` structural transformations. The general logic standing behind the U-shaped feminization hypothesis is following. The declining part of the U-shaped curve explains shifts from a subsistence agriculture economy to an industrialized and labor-intensive economy where greater male compared to female input is demanded. It suggests the existence of a trade-off between economic growth and women`s equal access to the labor market in early stages of economic growth. However, such trade-off partly disappears particularly as development proceeds and the next transition – from industrial sector to services – emerges. The post-industrial phase of economic growth is 'unambiguously associated with increasing female labor (…)' (Olivetti, 2013). Economic growth, accompanied by declines in fertility rates, expansion of women`s access to education and their growing agency, allow rising female economic activity (Bayanpourtehrani et al. 2013a; Gaddis and Klasen, 2014). The process of growing women`s involvement in labor market participation is demonstrated by the increasing portion of the U-shaped curve, and is characteristic as the national economy becomes more service-based (Gaddis and Klassen 2013; Olivetti 2013), thus the 're-feminization' of the labor force emerges. Moreover, it shall be born in mind that today`s

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[1] The proposed classification follows the most recent World Bank Country Classification 2014.

modern industrial sectors have been fully integrated with the service sectors, which constitutes an essential prerequisite for the growing importance of women`s engagement in labor market activities. Still, different authors emphasize various aspects of the examined relationship and attribute its strength and direction to multiple factors. Durand (1975) emphasizes that the relationship between female labor force participation and the level of economic development may vary across countries, as in different economies the industrial sectors employ different amount of economically active women, which predominantly depends on specific gender relations. The aspects of potential gender discrimination and limiting women`s access to the labor market have been raised in early works of, inter alia, Boserup (1970) or Pampel and Tanaka (1986). In the same vein, Goldin (1995) argues that women may be deprived from the opportunity to freely join the labor market, which is mainly a consequence of 'social stigma' and extensive gender discrimination. Many researchers attribute the changing share of women who actively participate in labor force to educational attainment. This connection appears to be seminal under the assumption that women gain unrestricted access to the labor market and multiple job opportunities as they become better educated and skilled. Women`s labor in the formal market carries more values than women`s work at home and other non-market services (Gaddis and Klasen 2014), which brings multiple benefits for their families and women themselves. Such reasoning has been undertaken in works of, inter alia, Boserup (1970), King and Hill (1997), Mammen and Paxason (2000), Juhn and Ureta (2003), Lincove (2008).

Another major stream in research of the relationship between female labor force participation and economic growth is the attribution of that relationship to the long-term structural changes and shifts. Many hypothesize that changing patterns of structural change, which proceed as the countries follow their specific development pattern, hugely affect women`s active participation in the labor market (Çağatay and Özler, 1995; Gaddis and Klasen, 2014). In the initial phase of economic development, when a vast majority of people is low-skilled and have limited access to schooling, and the economy itself performs poorly in terms of labor productivity, a vast majority of the labor force is employed in agriculture. Hence, in the early stages of economic growth, women`s participation in the labor force is relatively high. As the country proceeds along the development pattern, and the industrial sectors start to contribute relatively more compared to the agricultural sector, women`s engagement in the labor market tends to fall. Hence the gradually growing labor demand in purely industrial sectors, i.e., mining or construction, creates less favorable conditions for women to participate in the labor market. In this line, it is rather obvious to heavily observe de-feminization of the labor force during the phase of dynamic industrialization. Next, when the national economy enters the consecutive stage of development and the service sectors are gradually becoming dominant, the labor market again offers more employment to women (Cavalcanti and Tavares, 2011). Such dynamics between women`s engagement in the labor market and economic growth, give rise to the U-feminization hypothesis.

The nature of the relationship may also vary across countries, with different religions (Muslims versus Christians) respecting various social norms and attitudes, cultural and institutional factors (Fernández, 2013). For example, in Muslim countries, due to religious restrictions women are heavily deprived from unbound access to the labor market, hence the well-grounded U-shaped relationship may vanish (see i.e. Doumato and Posusney, 2003; Nassar, 2003; Wolch and Dear, 2014).

2. Data and methodological framework

To complete the analysis we deploy two distinct variables. First, we account for Female Labor Force (FLF_{it}) participation, which explains women`s (15 years old and above) share in the country`s total labor force. Second, to approximate level of economic development, we consider gross domestic product per capita ($GDPpc_{it}$), and take natural logarithms of national GDP per capita in constant 2005 US$. All data are exclusively derived from World Development Indicators 2013. Finally we develop a cross-country panel including 162 economies over the period 1990-2012.

In the empirical part, applying panel analysis, we examine the U-shaped relationship, defining FLF_{it} as the response variable, and $LnGDPpc_{it}$ as the explanatory one, where i stands for country and t for the year. Firstly we adopt pooled OLS, to examine whether the 2-degree polynomial, expressed as:

$$FLF_{it} = \alpha_i + \delta_1 LnGDPpc_{it} + \delta_2 \left(LnGDpc_{it}\right)^2 + \varepsilon_{it}, \tag{1}$$

is appropriate to approximate the relationship between assumed variables.

If a convex relationship is confirmed, we deploy quadratic panel regressions to explore the cross-country relationship between FLF_{it} and $LnGDPpc_{it}$ and its square term. To capture time-invariant countries` specific effects, we specify a fixed effects model:

$$FLF_{it} = \alpha_i + \delta_1 LnGDPpc_{it} + \delta_2 \left(LnGDpc_{it}\right)^2 + \varepsilon_{it}, \tag{2}$$

or alternatively, if adopting binary variables:

$$FLF_{it} = \delta_0 + \delta_1 LnGDPpc_{it} + \delta_2 \left(LnGDpc_{it}\right)^2 + \gamma_2 C_2 + \ldots + \gamma_n C_n + \varepsilon_{it}, \tag{3}$$

where i – country, t – period (year), α_i – unknown intercept for each country, γ_2 - coefficient for binary-country regressors, C – country-dummy, and n –the number of countries in the sample.

As estimates generated from (3) might not be consistent due to endogeneity of explanatory variables, to confirm the results we introduce the instrumental variables (IV) estimator, and re-estimate (2) using lagged $LnGDPpc_{it}$ and lagged $LnGDPpc_{it}^2$ as instruments. Finally, to account for dynamic effects, we include the lagged depended variable, and consider:

$$FLF_{it} = \alpha_i + \delta_1 LnGDPpc_{it} + \delta_2 \left(LnGDpc_{it}\right)^2 + \delta_3 \left(FLF_{i,(t-1)}\right) + \varepsilon_{it}, \tag{4}$$

applying the Arellano-Bond (Arellano and Bond 1991) estimator.

3. Results – worldwide perspective

Confronting FLF_{it} against $GDPpc_{it}$ we have traced out the U-shaped association between variables. Chart 1 preliminarily confirms that selected countries follow the U pattern over the period 1990-2012. It is clearly displayed that both for relatively low and high levels of $GDPpc_{it}$ the FLF_{it} is at approximately 40%, while for the 'average' per capita incomes – FLF_{it} is highly variable in its absolute level. In countries where $LnGDPpc_{it}$ ranges from approx. 6 to 9, women`s participations in labor market activities is observed both at relatively high ($\cong 50\%$), and low ($\cong 14$-17%) levels. However, the picture suggests that in over analyzed decades, increases in female labor force participation in multiple countries were significant. But, despite positive changes there are still economies lagging behind, not reaching at least the world`s average $FLF_{it}$ and are located far below the theoretical line. Countries situated below the curve turning point are mostly Arab economies, where – due to cultural reasons - women`s participation in the la-

bor market remains significantly low, regardless of high GDP per capita. It leads to the general conclusion that changes in female labor force participation are not exclusively attributed by economic growth, but depend on a multitude of factors which are not captured in here.

Chart 1. Female Labor Force versus GDP per capita. 162 countries. Period 1990-2012.

Source: Authors` elaboration.

Table 1 summarizes estimation results based on multiple periods for the worldwide sample. Outcomes displayed below suggest that FLF_{it} and $GDPpc_{it}$ are specifically negatively correlated ante vertex of the quadratic curve, while after passing the low point, the examined relationship starts to be positive, thus the U-shaped patterns are generated. The low peak of the curve (OLS estimates) corresponds to $LnGDPpc_{it}=8.31$ which is equivalent to approximately 4064 of GDP per capita (in 2005 constant US$).

Table 1. Regression results. World sample

	OLS	FE	FE IV	GMM
$LnGDPpc_{it} \rightarrow (\delta_1)$	-16.8 (-18.1)	-7.37 (2.23)	-7.55 (1.44)	-.94 (.61)
$LnGDPpc_{it}^2 \rightarrow (\delta_2)$	1.01 (17.8)	.600 (0.15)	.59 (.07)	.080 (.04)
1-year-lag$FLF_{it} \rightarrow (\delta_3)$				.87 (.01)
_cons	106.8 (29.4)	59.36 (8.04)	61.03 (4.26)	7.5 (2.53)
r of the model	.08	.10 (within)	.10 (within)	-
Arellano-Bond test prob>z	-	-	-	.36
Instruments	No	No	Yes	Yes
# of countries	162	162	162	162
# of observations	3646	3646	3628	3331

Source: Authors` estimates based on data derived from World Development Indicators 2013. Note: for OLS, FE and GMM estimates – robust SE reported. For FE IV estimates – SE reported. For FE IV – lagged values of explanatory variables used as instruments.

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We start to analyze our results for the static models – OLS and fixed effects regressions. As hypothesized, regardless of the model applied, the regressor ($LnGDPpc_{it}$) always holds a negative sign, and ($LnGDPpc_{it}^2$) holds a positive one. The previous allows for drawing a more general conclusion that the female labor force participation and economic growth relationship follows the U-shaped pattern over the period in scope. The analysis is based on panel data, thus the evidence demonstrates evolution of changing participation of female labor supply (in total labor) which is attributed to economic growth. The downward slope of the curve demonstrates the de-feminization process of the labor force which goes along with economic growth. Structural changes are characteristic for countries located in early stages of growth, as women (usually unskilled) with quite low-paid jobs join the education system instead. Conveversely, the upward slope explains growth in women`s agency and empowerment across countries which is accompanied by economic growth. Observed positive changes in women`s labor market empowerment are probably becoming a permanent characteristic rather than mere cyclical change. Using within estimator, the coefficients δ_1 and δ_2, explaining mediated effects of $LnGDPpc_{it}$ on FLF_{it} due to cross-country differences, are statistically significant however – in each case – δ_1 tends to be higher than δ_2. It might suggest that the 'negative' relationship between FLF_{it} and $GDPpc_{it}$ is dominant and far better established with respect to this relationship. However, bearing in mind that the static estimations (especially OLS) may be heavily biased, we additionally account for dynamic effects using the Arellano-Bond estimators. The major advantage of using the GMM estimator compared to simple OLS, is that it allows for endogeneity of the two GDP-pc_{it} variables included in the model. To ensure the validity of our estimations we first perform the estimations starting with the second-order lags, and using a respective diagnostic test we accept or reject the estimation (we accept the estimation under rigid assumption that for the first order autocorrelation the $p<.05$; but – for the second-order autocorrelation the $p>.05$; which allows for not rejecting the validity of instruments used). Henceforth, we estimate the dynamic panel model, including first lag of the response variable. After applying the GMM estimator the U-shaped FLF_{iy} versus $GDPpc_{iy}$ interdependency has vanished, while exclusively the δ_3 coefficient – explaining the 'dynamic effect' – demonstrates statistical significance. Put another way, the U vanishes when using the dynamic estimates and the FLF_{iy} versus $GDPpc_{iy}$ relationship is not held. Important to note is that the empirical evidence on the hypothesized relationship is heavily skewed by the inclusion of Arab countries in the sample. Many Arab countries fall far below the sample average in 2012 (41.2%), and essentially disrupt the strength of the examined relationship. In 1990, the lowest FTL_{it} was reported in United Arab Emirates - $FTL_{i1990}=9.6\%$ and in another few countries, like Iran, Iraq, Jordan and Saudi Arabia, it barely exceeded 10%. After the 21-year period, in 2012, in nine countries (Saudi Arabia, Syrian Arab Republic, United Arab Emirates, Oman, Algeria, Iraq, Jordan, Iran and Bahrain) the share of women being able to actively participate in the labor market was below 20% (sic!). The lowest share of women participating in the labor force was in Saudi Arabia – $FTL_{i2012}=14.2\%$; while the highest was in Bahrain – $FTL_{i2012}=19.5\%$. In the same year, in another 12 countries, the female labor force participation in 2012 was below 30%, which accounts for persistently poor women`s engagement in national labor market activities.

4. The U-shaped Curve – Still Held in Income-Groups?

In the following section, we aim to re-examine the U-shaped feminization hypothesis and test whether it is detected in the statistical relationship (Sect.4) between FLF_{iy} and $GDPpc_{iy}$ when we deliberately disaggregate the evidence and report on analogous relationships in four income-groups. To this aim we split the original sample into four parts. Henceforth, we

test the U-shaped feminization hypothesis for four distinct country income-groups[2]: high-income (49 countries); upper-middle-income (41 countries); lower-middle-income (41 countries) and low-income (31 countries). Chart 2 graphically summarizes the disaggregated evidence on statistical relationships between female labor force participation and economic growth over 1990-2012. As expected, these results preliminarily confirm the U-shaped pattern with regard to three defined income groups, namely high-income, upper-middle-income and lower-middle-income. In contrast, in the group of low-income economies the examined relationship follows a rather inverted U pattern, thus the U-feminization hypothesis is not confirmed. For the groups of high-income and upper-middle-income economies, both graphical and numerical results are quite similar; and although the regression coefficients vary regarding respective estimates, the qualitative conclusion remains unchanged. In both cases, the U-shaped relationship is exhibited, which is confirmed by applying OLS and panel estimations. The negative relationship between female labor force engagement and level of per capita income is strong, and may be visualized through the downward part of the U-shaped pattern, compared to the positive one. Relatively best fits are reported in the group of high-income economies, where for the FE and FE IV estimates of the r-within of the model are .27 and .26 respectively. However, the analogous models for upper-middle-income economies, demonstrate worse fits while for FE the r-within is .18 and for FE IV the r-within is .17. To test for potential dynamic effects, we estimate the dynamic panel model, including first lag of the response variable. Applying the GMM estimator the U-shaped FLF_{iy} versus $GDPpc_{iy}$ interdependency vanishes, while exclusively the δ_3 coefficient – explaining the 'dynamic effect' – results in statistical significance. For high-income and upper-middle-income groups, the relatively low fits of the models with the respect to the relationship between FLF_{iy} and $GDPpc_{iy}$, are determined by inclusion of both income-groups of several countries with extremely low female labor force participation. These counties are located far below the theoretical line (see Chart 2), although they perform well in terms of GDP per capita. In 2012, among high-income economies, there were four countries identified (Bahrain, Oman, Saudi Arabia and United Arab Emirates) where the FLF_{iy} did not exceed 20%; while among upper-middle-income there were six such countries (Algeria, Iran, Iraq, Jordan, Lebanon and Libya).

The countries listed above, although they perform well in terms of economic growth, due to socio-cultural constraints the women`s engagement in labor market activities remains at an indecently low level. The latter (Bayanpourtehrani and Sylwester, 2013b; Chaturvedi and Montoya, 2013) can be accounted for by a kind of cultural discrimination against women, which are permanently refused the right to work and actively contribute to the national economy. As underlined by, inter alia, Al-Qudsi (1998), Ross (2008) or Sharabi (1988), the Muslim traditions mitigate women from unbound access to education or healthcare systems, which essentially inhibits them from entering the labor force. Unlike in non-Muslim countries, women rather tend to work at home providing low-productive and usually unpaid labor.

The regression results for lower-middle-income and low-income countries (see Table 2) do not confirm the U-shaped hypothesis. Although with respect to lower-middle-income economies, the preliminary visual inspection (see Chart 2) might suggest that the examined relationship follows the U-trajectory, these suppositions are not confirmed by the numerical analysis. Only the OLS estimations generate the 'correct' parameters` sign, while when estimating the regression applying FE or FE IV, the δ_1 is positive, and the δ_2 is negative. This is contrary to what is expected to not reject the U-hypothesis. Important to note is that OLS, FE and FE IV exhibit extremely low r-squared, which additionally cast doubts on the stability of the examined relationship.

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[2] We follow the World Bank Country Classification 2014.

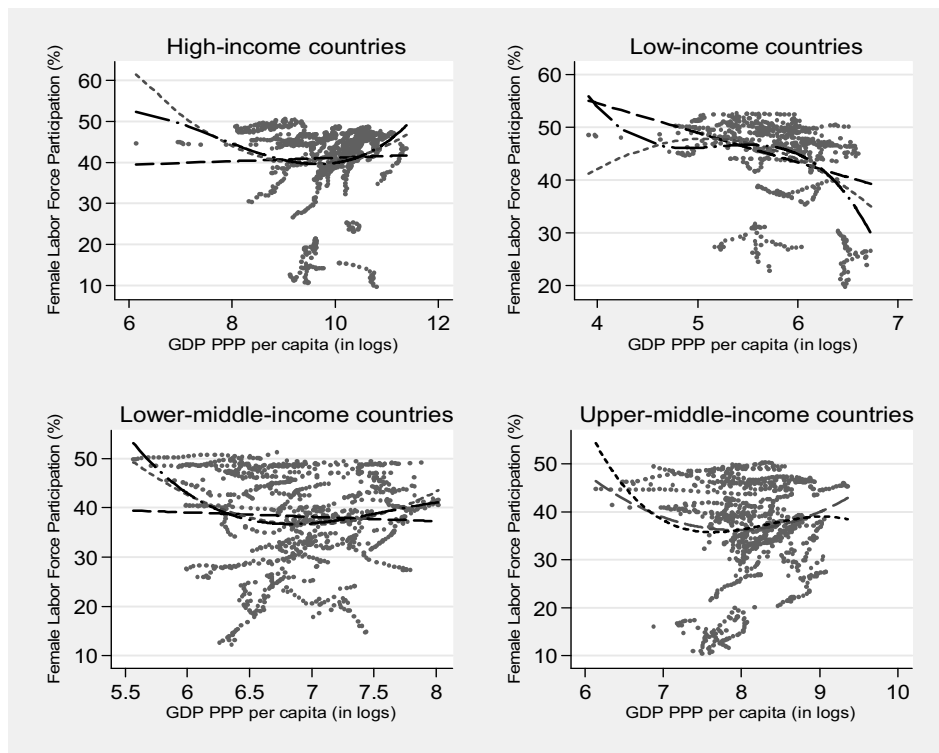**INTERDISCIPLINARY APPROACH TO ECONOMICS AND SOCIOLOGY**

Chart 2. Female Labor Force versus GDP PPP per capita. Results for four income-groups. Period 1990-2012

Source: Authors` elaboration. Note: dash line – linear prediction; long dash dot – cubic prediction; short dash red – quadratic prediction.

The previously reported 'weak' results may possibly account for huge internal differences within the lower-middle-income group. They differ not only in terms of GDP per capita, but also in terms of their current state of socio-economic development, various political and religious regimes, or, for example, legal and institutional solutions; which substantially impact the way female labor force and economic growth are interdependent in the long-term perspective.

In the lower-middle-income group there are still countries identified where the female labor force participation was found to be very low over the analyzed period. The previous heavily violates the stability of the examined relationship over the U-patterns and causes the very low r-square of the respective specifications. Countries exhibiting poor women`s participation in the national labor market are Pakistan, Sudan, Syrian Arab Republic and Yemen. Although in each of the countries mentioned above, over the period 1990-2012, notable increases are reported respecting women`s increasing engagement in the labor market, these countries still significantly lag behind with this regard. In Pakistan, the positive changes seem to be the most pervasive, as in 1990 the share of women in the total labor force was barely 12.6%, while in 2012 it grew up to 22.0%. In Yemen, some positive changes were also reported, as in 1990 the share of women in the total labor force was at around 19.2%, while in 2012 it was 25.9%. In Sudan and Syrian Arab Republic, the FLF_{iy} hardly increased between 1990 and 2012.

Table 2. Regression results broken by income groups

	High –income				Upper-middle-income			
	OLS	FE	FE IV	GMM	OLS	FE	FE IV	GMM
$LnGDPpc_{it}$ $\rightarrow (\delta_1)$	-36.9 (6.9)	**-24.9** **(7.4)**	**-22.1** **(2.7)**	.03 (1.6)	**-50.9** **(8.29)**	**-31.5** **(8.48)**	**-27.2** **(4.7)**	-2.50 (3.2)
$LnGDPpc_{it}^2 \rightarrow (\delta_2)$	1.94 (.36)	1.53 (.43)	**1.36** **(.15)**	.01 (.09)	**3.22** **(.52)**	**2.19** **(.56)**	**1.88** **(.30)**	.18 (.20)
$1\text{-year-lag}FLF_{it}$ $\rightarrow (\delta_3)$				.92 (.02)				.83 (.02)
_cons	**214.7** **(33.1)**	**136.6** **(30.9)**	**125.5** **(11.8)**	1.79 (8.06)	**238.04** **(32.64)**	**147.9** **(31.9)**	**133.4** **(18.1)**	14.4 (13.1)
r of the model	.03	.27 (within)	.26 (within)	-	.02	.18 (within)	.17 (within)	-
Arellano-Bond test prob>z	-	-	-	.54	-	-	-	.17
Instruments	No	No	Yes	Yes	No	No	Yes	Yes
# of countries	49	49	49	49	41	41	41	41
# of observations	1101	1101	1094	1005	910	910	903	831

	Lower-middle-income				Low-income			
	OLS	FE	FE IV	GMM	OLS	FE	FE IV	GMM
$LnGDPpc_{it}$ $\rightarrow (\delta_1)$	**-89.04** **(9.32)**	11.1 (14.7)	**15.8** **(4.6)**	-.64 (2.9)	**48.8** **(10.5)**	1.56 (5.1)	1.90 (2.8)	-.43 (1.7)
$LnGDPpc_{it}^2 \rightarrow (\delta_2)$	6.38 (.67)	-.76 (1.1)	**-1.13** **(.34)**	.05 (.22)	**-4.79** **(.95)**	-.15 (.49)	-.20 (.26)	.07 (.15)
$1\text{-year-lag}FLF_{it}$ $\rightarrow (\delta_3)$				.87 (.02)				.84 (.03)
_cons	**347.08** **(32.1)**	-4.42 (48.2)	-16.97 (16.0)	6.73 (9.7)	**-76.38** **(28.8)**	**40.62** **(13.3)**	**40.4** **(7.94)**	6.97 (4.97)
r of the model	.04	.02 (within)	.01 (within)	-	.14	.00 (within)	.00 (within)	-
Arellano-Bond test prob>z	-	-	-	.42	-	-	-	.29
Instruments	No	No	Yes	Yes	No	No	Yes	Yes
# of countries	41	41	41	41	31	31	31	31
# of observations	936	936	933	854	700	700	696	641

Source: Authors` estimates.

Regarding the low-income economies, the expected U-shaped pattern is muted and resembles instead the inverted U-trajectory (see Chart 2). The latter is partially confirmed by the panel regression results (see Table 2), while only the OLS estimations are statistically significant. Turning to the results of estimated FE and FE IV models, both δ_1 and δ_2 parameters are statistically insignificant, although they carry the 'correct' signs. In case of low-income countries, the existence of the inverted U-shaped relationship between female labor force participation and economic growth (compare OLS results), suggests that in a vast majority of countries over 1990-2012, the *positive* relationship between FLF_{iy} and $GDPpc_{iy}$ is dominant (the δ_1=48.8 and δ_2=(-4.79)) over the negative one. Positive trends in the growing share of female labor force are visible in most of economies that are considered low-income; see, for example, Benin, Haiti, Madagascar, Mauritania, Nepal, Niger, Togo, or Zimbabwe. Important to note is that although the OLS estimates resulted in be statistical significance, nor the FE or FE IV were reported as such; and thus it is justified to claim that with respect to this income-group the evidence is rather weak and shall be interpreted with caution.

Discussion and Conclusions

The paper was designed to re-examine the evidence on the U-shaped curve combining female labor force participation and economic growth in 162 countries over the period 1990-2012. Estimates resulted from longitudinal analysis generate support for the U-hypothesis, which implicates that in early stages of economic growth female labor force participation tends to fall, as a country advances in economic development and its economy is gradually more service-based, it grows systematically. Although we empirically confirmed the U-shaped relationship, high cross-country variability on the field remains. In contrast, disaggregation of the evidence, and examination of analogous relationships between female labor force and GDP per capita, however in four distinct income-groups; unveils variations across analyzed country groups with this regard. Notably, in high-income and upper-middle-income economies, the existence of the U-shaped relationship is positively verified, although it vanished when introducing the dynamic effects. In the group of lower-middle-income countries, the relationship is just partially confirmed as the FE regression returned statistically insignificant estimates. With respect to the low-income economies, the U-shaped curve was instead revealed to be an inverted one, thus the positive relationship between FLF_{iy} and $GDPpc_{iy}$ is demonstrated as dominant over the negative one.

Still female labor force participation ranges significantly across economies regardless of GDP per capita achieved, and is not solely attributed to economic growth, but preconditioned by a wide array of legal, cultural, social or other unquantifiable factors. The complexity of structural changes which demonstrates differentiated patterns of adjustments, affects the analyzed relationship between female labor force participation and economic growth. In here a few important issues should be mentioned with regard to the evidence provided in the paper. With respect to the examined relationship between changes in female labor force participation versus economic growth, the outcomes of the analysis may be heavily affected by the relatively short data time series, and hence should be interpreted with caution as their robustness may be violated. Bearing in mind the nature and complexity of the long-term process of labour market structural changes and economic growth, it is not fully tenable to draw rigid conclusions about a straightforward dependence of FLF_{iy} and $GDPpc_{iy}$. Arguably, changes in GDP per capita may constitute just one of the conditions for changes in female labour force engagement. This kind of interdependency may be essentially conditioned by multiple factors, which foster or – conversely – impede both increases in FLF_{iy} and/or $GDPpc_{iy}$. Level of economic development, le-

gal regulation and financial market institutions, level of competition and liberalization, learning capabilities of market agents and their absorptive capacities to adopt both technological and financial innovations, and country openness essentially predetermine the causal links regarding the examined relationship. Obviously one shall also bear in mind that the structure of national GDP and the level of infrastructural development may constitute an essential driving force or, conversely, hinder the growing women`s engagement in the formal labour market. Countries with economies that are strongly service-oriented, by definition, create more favourable conditions for increasing female labour force participation; while economies where, for instance, heavy industries play the dominant role, may potentially marginalize women`s economic activity. Moreover, some country-specific characteristics, for instance, religion, language, culture, social attitudes or moral norms, level of education and human capital determine the strength and the nature of the examined relationships. The numerical results of the examined impact of economic growth on increasing/decreasing women`s active participation in labor market are at best a rough approximation, as extreme variability in the dynamics of two processes account for a mountain of different factors that are not always easy to capture and isolate. Bearing in mind all the issues mentioned above, future work on these relationships would be highly recommended, to unveil the specificity of analyzed relationships and provide broader and more robust evidence in that field. Important to emphasize is that the examined relationship is hypothetical, and the demonstrated results basically unveil statistical links, which do not necessarily prove causalities. The evidence might not be robust and reveal sensitivity for inclusion of other potential control variables in the model. Finally the evidence is not highly convincing and might be sensitive to inclusion (exclusion) of different countries from the sample, which constitutes a promise for further research.

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