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POLICY PAPER

TRADE AND WOMEN IN THE LABOR MARKET: HOW DIFFERENT IS MENA FROM OTHER REGIONS?

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Using panel data from a large group of developing economies and a Generalized Method of Moments (GMM) estimator, we examine the effects of trade and other factors on female labor-force participation and wage employment. We focus particularly on comparing the effects of trade openness in the Middle East and North Africa (MENA) region with Latin America and the Caribbean (LAC) and sub-Saharan Africa (SSA). The empirical results indicate that trade openness affects female labor-force participation and wage employment differently in these three regions. Moreover, the effects of other determinants of labor market outcomes, such as income, education, fertility, and electricity, also vary by region. We discuss the policy implications of the findings for the MENA region.

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1. INTRODUCTION

The Middle East and North Africa (MENA) region has one of the world's lowest female labor-participation rates (Figure 1), and the lowest share of women in the total labor force. At the same time, trade openness in MENA is significantly above the world average, exceeding that of regions that have much higher female labor-force participation rates (Figure 2), including Latin America and the Caribbean (LAC), and sub-Saharan Africa (SSA). As argued in Baliamoune-Lutz (2024), openness to international trade and the participation of women in the labor market have both been recognized as key drivers of economic growth and development. They are also central targets in the context of the United Nations Sustainable Development Goals (SDGs). Yet, in the MENA region, attaining these two targets simultaneously has, thus far, been quite challenging.

The pattern of a high level of gender inequality in the workforce in the MENA region persists despite significant progress in women's health and education in the region. Interestingly, the percentage of working women employed in salaried jobs in the MENA region (as a proportion of total female employment) is comparable to that of working men. This percentage is generally higher than in other developing regions (Figure 3). Thus, it is important to explore the macro-level effects of trade openness, and other factors widely discussed in the literature on female labor-force participation and wage employment, in MENA countries. Moreover, investigating whether these effects differ from those in other regions can yield valuable insights that could help policymakers in MENA countries. These insights could be used to identify entry points for policies aimed at reducing gender inequality in the labor market.

In this paper, we use a dataset covering 1991 to 2019 for a large group of developing economies, and apply a dynamic panel GMM estimator to investigate how openness to international trade affects women's participation in the labor force and wage employment, after controlling for the effects of other determinants of labor-force participation and wage employment. We focus, in particular, on the differences between the MENA region and LAC and SSA regions. The comparison with LAC and SSA is justified mainly by the fact that female labor-force participation rates in MENA are substantially lower than the rates observed in these two regions, while male labor-force participation rates in all three regions tend to be comparable (Figure 4). On the other hand, female and male wage employment rates in MENA and LAC are comparable, while wage employment rates in SSA (for men and women) are substantially lower (Figure 3).

Preliminary results from Arellano-Bond (A-B) GMM estimates show that, in contrast to its effects on women in the labor market in other regions, openness to trade has contributed significantly to widening the gender gap in the labor force and reducing women's wage employment in the MENA region, thereby exacerbating the so-called 'MENA gender equality paradox.' The results also suggest that the effects of fertility, education, income, and electricity (a proxy for infrastructure) are not uniform across regions.

Understanding the effects of trade and other factors, on female labor-market outcomes in the MENA region is important. It could improve our understanding of why increased educational attainments and improved health outcomes are not leading to higher female labor-force participation. Such insight is necessary to develop effective policies to address this paradox. We identify adverse effects of trade openness on female labor-force participation and wage employment. In addition, our results confirm the ineffectiveness of investing in tertiary education to generate higher female labor-force participation.

The remainder of the paper is structured as follows. In Section 2, we provide a brief review of the relevant empirical literature on trade openness and women's labor market outcomes. Section 3 describes the variables and methodology, and presents the estimation results. In Section 4, we discuss the main policy implications and conclude.

2. BRIEF REVIEW OF EMPIRICAL LITERATURE ON TRADE AND FEMALE LABOR MARKET OUTCOMES

Most empirical studies of the effects of trade on wage and employment gender inequality in developing economies use country-specific or micro-level data. Many studies obtained evidence that is mixed or *"tends to support either negative impacts of increased openness to trade on women's participation in the labor force and in wage employment, or a positive impact that is associated with women being over-represented in low-wage occupations"* (Baliamoune-Lutz, 2020). Indeed, Papyrakis *et al* (2012) presented a comprehensive review of theory and evidence on the effects of trade on women's labor market outcomes, and concluded that, while trade had a positive effect on women's employment in the unskilled manufacturing sector, it widened the gender wage gap.

Empirical evidence reported in various studies using micro-level data from Mexico suggests that increased trade openness (as a result of trade liberalization and NAFTA) increased demand for female workers (Aguayo-Tellez *et al*, 2014; Juhn *et al*, 2014). In contrast, other studies using micro-level Mexican data found that trade had a negative impact on women's employment and wages (Dominguez-Villalobos and Brown-Grossman, 2010; Fleck, 2001). Additionally, Ben Yahmed and Bombarda (2020) used data from Mexico covering the years 1993 to 2001, and showed that regional exposure to import liberalization increased the probability of working formally in the manufacturing sector for men and women (but especially for men). However, the authors also found that it decreased the probability of working formally in the services sectors for low-skilled women.

Gaddis and Pieters (2012) found that tariff reductions in Brazil during the 1987-1994 trade liberalization were associated with increased female labor-force participation and employment after a period of about two years. However, in a subsequent study, Gaddis and Pieters (2017) uncovered a negative effect from trade liberalization on both male and female labor-force participation rates and employment in the tradable sector, particularly among the low-skilled population. The authors noted that whereas the aggregate effects on men were significantly larger, trade liberalization reduced the percentage point gender gap in employment and participation rates. On the other hand, Benguria and Ederington (2023) found that trade (Chinese import penetration in Brazil) was associated with a reduced gender wage gap as a result of an increased female share of higher-paying occupations.

Studies using data from South Korea found that exports had negative effects on women's wages and upward mobility (Berik *et al*, 2004; Guicheney, 2015). However, using industry and regional data from China, Chen *et al* (2013) found evidence that foreign participation and export orientation increased female employment, while Li *et al* (2020) found that the association between trade openness and female labor-force participation in nine Asian countries (including China) had an inverted-U shape, with the association being first positive but becoming negative after a threshold level of trade openness. On the other hand, Wamboye and Seguino (2015) provided evidence from SSA countries suggesting

that gendered employment effects of trade liberalization depend on the structure of the economy, with infrastructure playing a vital role in gendered labor market outcomes since the early 1990s.

Research focusing either exclusively or partly on the effects of trade on women's labor market outcomes in the MENA region is remarkably scant. Al Azzawi (2014) used data from Egyptian manufacturing industries and found that trade reduced female employment in industries that were initially competitive. The author also found that increased import competition exacerbated the gender wage gap in these industries, whereas increased export intensity reduced the gender wage gap. Recent studies have investigated the effects of trade on female labor-force participation and wage employment in developing countries, while exploring whether these effects are different in different regions, including the MENA region. Baliamoune-Lutz (2020 and 2021a) found that trade reduced the female share of wage employment in the nonagricultural sector in North African countries. On the other hand, exploring the effects of trade and infrastructure on female labor-force participation in a large group of developing and emerging economies, Baliamoune-Lutz (2021b) found the effects of trade and access to electricity were non-linear (U-shaped), and exerted additional region-specific effects that were positive in LAC countries, and negative in MENA countries.

Interestingly, in an insightful recent study of the effects of trade liberalization on labor market outcomes in Morocco, Roche Rodriguez *et al* (2023) found that while trade has reduced informality, it may have decreased women's participation in the labor force by inducing a shift from female labor-intensive industries such as apparel, to male capital-intensive sectors. Indeed, firm-level analysis conducted by the authors revealed that export-driven employment growth was concentrated mainly in capital-intensive sectors.

3. EMPIRICAL ANALYSIS

3.1 Data and Methodology

We estimate the effects of several right-hand-side (RHS) variables (generally referred to as independent variables) on three labor market outcome variables: female and male labor-force participation rates (% of total labor force), and wage employment. In general, studies of the effect of trade openness on female labor market outcomes at the macro level control for three main variables: income *per capita*, education, and fertility[1]. In our main estimation equations, the RHS variables include *per-capita* income, fertility rates, education (secondary or tertiary school enrollments), and openness to international trade. In addition, in some specifications, we control for the effect of foreign direct investment (FDI), and also estimate the effect of electricity (as a proxy for infrastructure).

Many studies have shown that higher fertility is associated with lower female labor-force participation (Lee and Chung, 2008; Bloom *et al,* 2009; De Jong, 2017; Aaronson *et al,* 2021; Baliamoune-Lutz, 2021a, 2021b). Lee and Chung (2008) found that fertility was negatively associated with female labor-force participation rates in South Korea, while De Jong *et al* (2017) reported that having more children reduced women's participation in the non-farm labor force in SSA. Kpognon *et al* (2020) found that fertility has a negative effect on young women's employment in SSA. Similarly, using panel data from a large group of developing

1. See, for example, Franz (1985), Bloom *et al* (2009), Tam (2011), Gaddis and Klasen (2014), Hartani *et al* (2015), Klasen *et al* (2021), and Baliamoune-Lutz (2020, 2023).

countries, Baliamoune-Lutz (2021a, 2021b) reported that fertility had a significant negative effect on women's share of wage employment and women's participation in the labor force. It is important to note that fertility has declined significantly in the MENA region, yet the positive impact of this decline on female labor-force participation remains relatively insignificant (Majbouri, 2020).

The literature also identifies education as a key factor in labor-force participation. Female education, in particular, has been shown to have a strong influence on women's labor market outcomes. Backhaus and Loichinger (2022) found a strong positive association between female labor-force participation and female education in SSA. On the other hand, using 1987-2011 data from India, Klassen and Pieters (2015) showed that increasing education and income contributed to women's withdrawal from the labor force. Baliamoune-Lutz (2022) found that secondary education had a U-shaped effect on both male and female youth labor-force participation in a large group of developing countries. However, the author found a relatively high threshold for the positive effect (the turning point) of secondary education (enrollment rates from 89.5% to 98%). Additionally, Kpognon *et al* (2020) found that higher secondary and tertiary education had a negative effect on female and male youth employment. Similarly, Baliamoune-Lutz (2023) found that higher secondary enrollment rates increased male and female youth unemployment in LAC, and male youth unemployment in the MENA region.

Over the last three decades, there has been a significant rise in female education, especially tertiary education, in the MENA region (Figure 5). However—notwithstanding the importance of skills and quality of education—this notable rise in female education has not translated into commensurate increases in female labor-force participation. In the empirical analysis, we examine (in separate specifications) the effects of both secondary and tertiary education.

To capture the effects of economic development and structural change, we use income and access to electricity as two additional determinants of female labor-force participation. Many studies have documented the presence of a U-shaped pattern in the relationship between women's labor-force participation and economic development (Çağatay and Özler, 1995; Goldin, 1995; Mammen and Paxton, 2000; Rau and Wazienski, 1999). However, some studies did not find support for the feminization-U hypothesis (Gaddis and Klassen, 2014; Verme, 2015; Roncolato, 2016). For example, using data from a 2007 Community Survey in South Africa, Roncolato (2016) did not find statistical evidence of a U-shaped relationship between the share of households with electricity (an indicator of development and structural change) and women's probability of being in the labor force. Similarly, Verme (2015) tested the feminization-U hypothesis in the case of MENA countries and did not find clear evidence of a U-shaped pattern.

While we examine the effects of all RHS variables, our primary focus is on the influence of trade openness (*trade*) on male and female labor-force participation rates and women's wage employment in the MENA region, compared with two other regions: Latin America and the Caribbean (LAC) and sub-Saharan Africa (SSA). Openness to international trade is represented by the natural logarithm of the ratio of the sum of a country's exports and imports to its gross domestic product (GDP). We use the natural logarithm of real GDP *per capita* (based on the purchasing-power parity) for the variable *income*. The variable *fertility* represents the number of births per woman, while the percentage of the population with access to electricity is represented by the variable *electricity*, and net inflows of foreign direct investment are represented by the variable *fdi*. We use a strongly balanced panel of

annual data, covering 1991-2019 from 17 MENA countries, 16 LAC countries, and 37 SSA countries. Appendix A provides further descriptions of the variables and data sources.

3.2 Summary Statistics

Table 1 reports the main descriptive statistics for the variables of interest in the three regions.

The average labor-force participation rate for women in the MENA region is remarkably low. This rate, at 25.4%, is much lower than the average for men (77.1%) in MENA countries, and compared with the average for women in LAC (nearly 51%) and SSA (about 61%). On the other hand, employed MENA women tend to work predominantly in paid work (wage and salaried workers). Three-quarters of employed women in the MENA region are wage and salaried workers, indicating a high level of wage employment. This percentage is much higher than that of women in SSA (20.7%), and is approximately 15 percentage points greater than the percentage of women in wage employment in LAC (59.3%). Thus, notwithstanding disparities among countries, when MENA women are employed, they tend to be employed in the formal sector. Paid employment typically includes jobs in the formal sector, and therefore can provide more stable income and some social protection.

The MENA region also has a higher average trade openness (81.3%) than LAC (61.4%) and SSA (65%). On the other hand, female secondary and tertiary enrollment rates are, on average, slightly less than those for women in LAC, but are substantially higher than the average for women in SSA, while fertility rates are about 0.6 percentage points higher than the rates in LAC, and 1.9 points lower than the rates in SSA. As of 2022, average fertility rates were 1.84, 2.59, and 4.53 in LAC, MENA, and SSA, respectively.

Table 1 shows that the percentage of the population with access to electricity in the MENA region (94.2%) is, on average, higher than the percentage in LAC (90.2%), and substantially higher than the percentage in SSA countries, which is slightly less than 33%, on average, for the period under investigation. It is important to note that, while access to electricity in SSA has improved in recent years, the population with access to electricity remains less than 80%, except in seven countries (as of 2019): Mauritius, Seychelles, Cabo Verde, Gabon, South Africa, Ghana, and Comoros. In fact, in 37 SSA countries, less than 50% of the population has access to electricity.

3.3 Linear Relationship: Pairwise Correlations

Table 2 shows the correlation coefficients between four labor market indicators (female and male labor-force participation rates, and wage and salaried employment) and other variables. There are important cross-regional differences in the magnitude and sign of these correlations.

We note that the correlations of female labor-force participation in the MENA region with the other labor market outcomes are positive and quite strong: 0.67 with male labor force participation; 0.55 with female wage employment; and nearly 0.68 with male wage employment. However, while the correlation of female labor-force participation in SSA with male labor-force participation is positive and relatively high, its correlation with male and female wage employment is negative, possibly reflecting the prevalence of the informal sector and necessity entrepreneurship in SSA. On the other hand, the correlation of female labor-force participation in LAC with the other labor market indicators is rather weak. In

the case of the correlation with male and female wage employment, the coefficients are negative but small in magnitude.

Concerning the correlation of the main variable of interest, openness to trade (*open*), we note that this correlation is positive in the case of all four labor market indicators (*lfpf, lpfm, wagef*, and *wagem*) in the MENA region, although it is relatively weak. In LAC, this correlation is positive in the case of male labor-force participation and negative in the other three cases. On the other hand, in SSA, we note that trade openness has a negative correlation with male and female labor-force participation and a positive linear association with male and female wage employment.

In MENA countries, the four labor market indicators have a negative correlation with fertility, while fertility has a strong negative association with female and male wage employment in LAC and SSA. There is a weaker negative association with female labor-force participation in LAC, and a positive association with male labor-force participation in LAC, and both male and female labor-force participation in SSA. Additionally, in the MENA case, the correlations of the four labor market outcomes with male and female secondary school enrollments and female tertiary school enrollments are positive, while the correlations of male tertiary enrollments with male and female labor force and wage employment are negative or statistically non-significant.

On the other hand, income has a positive correlation with all four labor market indicators in the MENA region, and with male and female wage employment in LAC and SSA. This correlation is negative in the case of male and female labor-force participation in these two regions. Additionally, the linear association between access to electricity and female and male wage employment is positive in all three regions. The correlation between access to electricity and female labor-force participation is positive in MENA and LAC and negative in SSA, while the correlation between electricity and male labor-force participation is positive in MENA and negative in the other two regions. Interestingly, there seems to be no statistical support for a significant positive linear association between FDI and labor market indicators.

3.3. Estimation Results

The methodology we use in the econometric analysis consists of applying a dynamic panel-data two-step GMM (GMM-DIFF) estimator to estimate the effects of openness to trade (the main variable of interest), *per-capita* income, fertility, school enrollment (secondary or tertiary)—as well as net inflow of foreign direct investment and electricity (in some specifications)—on three key indicators of labor market outcomes: the female and male labor-force participation rates, and the share (%) of wage and salaried female workers in total female employment. We also control for the possible presence of hysteresis in labor-force participation and wage employment by examining the statistical significance and magnitude of the coefficient on the lagged dependent variable. The econometric specification we use considers trade openness, fertility, female enrollments in secondary or tertiary education, and income as endogenous variables.

Previous research has reported cross-regional differences in the effects of trade openness. Specifically, trade openness has been shown to exert a negative effect on women's share of total wage employment in the MENA region, while having positive or negligible effects on women's share of wage employment in other regions (Baliamoune, 2020, 2021a). Research has also identified a negative effect of trade openness on both women's labor-

force participation rates and on young female labor-force participation rates in MENA countries. However, these effects were positive in the case of women and young people in LAC (Baliamoune, 2021b, 2022). It is important to note that these studies used a dummy variable for the region and interacted it with trade openness, which does not allow for an assessment of the differentiated effect of other determinants on the labor market indicators examined.

In the present study, we estimate the effects of trade openness and the other RHS variables for each region separately. Additionally, in the case of labor-force participation, we estimate these effects for both men and women in each of the three regions: MENA, LAC, and SSA. The choice of the other two developing regions is motivated primarily by the fact that they exhibit remarkable differences and similarities with the MENA region in either labor-force participation rates or wage employment, and by the fact that previous research has identified different effects of trade in each of the three regions (by using dummy variables for the regions), as noted earlier.

Tables 3, 4, and 5 report relevant two-step GMM-DIFF estimation results for labor-force participation rates in MENA, LAC, and SSA, respectively. The estimates in columns (1) and (2) of Table 3 indicate that trade openness has a negative effect on women's labor-force participation in MENA, with the coefficient on openness to trade being negative and statistically significant at the 1-percent level.

Previous research reported a non-linear relationship between trade openness and women's labor-force participation and wage employment. Thus, we explore the presence of non-linearities by adding the square of trade openness in columns (3) through (5). The results provide support for a non-linear effect; more specifically, a U-shaped effect. When we control for tertiary education (columns 4 and 5), the effect of trade on female labor-force participation is negative, until trade openness reaches a range of approximately 94% to 98% (as a share of GDP), which is higher than the sample median (78.7%) and mean (81.3%). Given that trade openness does not appear to affect male labor-force participation, our statistical evidence indicates a different impact on women. The results suggest that trade openness may be a significant contributor to the persistence of remarkably low female participation in the labor force in MENA countries, both in absolute terms and relative to male participation.

Tables 4 and 5 display the results for LAC and SSA, respectively. We note that in LAC, while the coefficient on trade openness is generally positive, it is statistically non-significant, suggesting that, after controlling for other variables, openness to trade does not affect labor-force participation. In SSA, the effect of trade openness on female labor-force participation has an inverted U-shape, implying that increases in trade openness increase labor-force participation initially, and then decrease it after trade openness has reached a very high level. On the other hand, we find weaker empirical evidence suggesting that the effect on male labor-force participation in SSA has a U-shape. Thus, the effects of trade openness on women's participation in the labor force in LAC and SSA differ from those identified in MENA countries

In addition, the interplay between trade openness and access to electricity seems to have a negative effect on women's labor-force participation in SSA. This result implies that access to electricity in countries with higher openness to trade may reduce women's participation in the labor force. However, in SSA the linear (independent) effect of access to electricity on female labor-force participation is, as expected, positive and statistically significant.

Concerning the other factors that are often expected to affect labor-force participation, we generally find different effects in different regions. First, the results indicate that FDI does not seem to affect labor-force participation in all three regions, with the exception of a positive effect on female labor force participation in MENA countries in one specification (column 1 of Table 3). Second, secondary education seems to increase women's participation in the labor force in MENA countries, once the non-linearity in the effect of trade openness is accounted for. However, the effect of secondary education on female labor-force participation is generally statistically nonsignificant in LAC and SSA. Conversely, statistical evidence supports a positive influence from tertiary education on women's labor-force participation only in the MENA region. In LAC, there is weak evidence of a negative effect, while in SSA the effect of tertiary education is generally negative and statistically significant, particularly for male labor-force participation rates.

Third, we find that, once we control for the role of tertiary education, the effect of fertility in MENA countries is negative and statistically significant, at the 5% level. In LAC, fertility has a negative effect. However, this effect becomes statistically nonsignificant once we control for the role of tertiary education. On the other hand, the statistical evidence on the effect of fertility in SSA is not robust.

Fourth, the effect of income on labor-force participation is not consistent across regions. Studies have documented the existence of a U-shaped relationship between income and female labor-force participation. However, we used the squared form of income in some estimations (not shown), and the results indicate that there is no U-shaped pattern in this effect. Therefore, we report only the estimates using the level of income. These results indicate that income in general has a positive effect on female labor-force participation in SSA, but the evidence on this effect in MENA and LAC is very weak.

Fifth, many studies have shown that electricity positively impacts women's participation in the labor force and employment (Dinkelman, 2011; Akpandjar and Kitchens, 2017; Sedai *et al*, 2021). The results we obtained show different effects of electricity across the three regions. We do not find a statistically significant effect of electricity on labor-force participation for either men or women in MENA countries. On the other hand, while the effect of electricity on female labor-force participation in LAC is positive and significant, this effect is negative in SSA for both men and women. However, when we control for the interplay between openness and electricity, the effect of this interplay is negative and significant only in the case of female labor-force participation, while the independent effect of electricity becomes positive. These results suggest that greater openness to trade in SSA countries that have reasonably high access to electricity rates may reduce women's labor-force participation.

Finally, we note that the coefficient on the lagged dependent variable (the lag of labor-force participation) is not significant in LAC. However, it is statistically significant and generally has a high value in MENA and SSA countries, suggesting the presence of important hysteresis in labor-force participation in these two regions.

The results related to female wage employment (Table 6) indicate that trade openness has a non-linear effect on female wage employment in the MENA region, reflected in a U-shaped pattern. In LAC countries, the effect seems to be positive and linear, while the results suggest that this effect is generally negative in SSA. The effects of the other variables also differ across the three regions. Secondary education has a positive and significant effect

on women's wage employment only in the MENA region[2]. On the other hand, tertiary education seems to have no effect in MENA countries, but a strong positive effect in LAC and SSA. However, the interplay of tertiary education with trade openness in SSA appears to exert a negative effect on female wage employment, suggesting that in more open economies, tertiary education reduces the percentage of women in wage employment. It is important to note that this is not necessarily a bad outcome, as it may imply that women with tertiary education could become self-employed (possibly employers) as a result of more opportunities from greater openness to trade.

Interestingly, we find that electricity does not have a significant effect on women's wage employment in MENA and LAC countries. On the other hand, access to electricity seems to reduce women's wage employment in SSA. However, the interplay of electricity with trade openness has a positive effect. This result implies that greater access to electricity increases women's wage employment in SSA countries that are more open to international trade.

4. DISCUSSION AND CONCLUDING REMARKS

In this paper, we have examined the effects of trade openness and various commonly used determinants of labor-force participation and female wage employment. We found significant differences in the effects across regions. In particular, our results show that openness to trade may have contributed to widening the gender gap in the labor force and reducing women's wage employment in the MENA region. Thus, it may have exacerbated gender inequalities in the region's labor market. These negative effects of trade openness on female labor-force participation and wage employment could be due to a shift from female labor-intensive industries to male capital-intensive sectors in MENA countries and seem consistent with findings in recent studies (Lopez-Acevedo and Robertson, 2023; Roche Rodriguez *et al*, 2023; Tillan *et al*, 2023). The findings raise concerns about the potentially adverse impacts that further structural change and trade-induced sectoral shifts may have on women's labor-market outcomes.

Interestingly, we found that tertiary education and income do not have the expected effects on female labor-force participation and wage employment. It is generally expected that increased female tertiary education is associated with higher employment of skilled female workers and encourages more women to participate in the labor force, especially as trade openness increases (assuming trade is skill-biased). However, our results indicate that, while trade openness has adverse effects on female labor market outcomes, tertiary education in the MENA region has a positive effect on female labor-force participation but does not affect female (or male) wage employment. A possible explanation is that increased tertiary education may have led many women to raise their reservation wage (a supply-side factor), thus reducing the likelihood of them participating in wage employment, and eventually causing some women to leave the labor force. This could explain the paradox of increased education not translating into higher labor-force participation. However, the result could also be due to demand-side—rather than supply-side—factors, notably the significant slowdown in public sector hiring which was not counterbalanced by a commensurate increase in private sector hiring (Assaad *et al*, 2020).

Given this weak relationship between women's tertiary educational attainment and wage employment, women in MENA countries face either lower rate of participation in the labor force or higher rates of unemployment. Indeed, in addition to low female participation

2. The results for the other regions are omitted, but can be obtained from the author on request.

in the labor force, the MENA region shows a substantial gap between male and female unemployment rates (Figure 6). In MENA countries, female unemployment rates are significantly higher than male unemployment rates, and this difference is more pronounced than in other regions. Persistently high female unemployment rates can also lead women to leave the labor force, thereby exacerbating the gender gap in the labor market. Thus, policies aimed at reducing the high female unemployment rates may contribute to increasing women's participation in the labor force. This situation not only has implications for gender equity but also raises concerns about the efficient deployment of human capital in MENA economies. It underscores two important challenges for policymakers:

1. How can policymakers identify the type of tertiary education that would increase female labor-force participation and wage employment?
2. How can women's access to the type of education that encourages them to enter (and remain in) the labor force be improved?

We did not find evidence of a U-shaped relationship between economic development and women's participation in the labor force in the MENA region. This result aligns with findings in Verme (2015). The result suggests that as the MENA region develops further, the gender gap in labor markets may persist. Thus, as development advances—especially in non-oil-exporting MENA countries such as Morocco—it is important to investigate how some understudied factors may have constrained women's participation in the labor-force. It is also crucial to examine what might prevent an increase in female labor-force participation once income exceeds a certain threshold.

Overall, the findings that some widely used economic and social determinants of female labor-force participation and wage employment do not produce the anticipated positive effects are noteworthy. These results suggest that other factors may play a more prominent role in women's labor market outcomes. Such factors could include cultural norms, family law (especially laws governing inheritance, divorce, and marriage), labor market regulations, and infrastructure (such as the quality of public transportation and roads, and the availability of childcare facilities). We plan to investigate the effects of some of these factors in future research.

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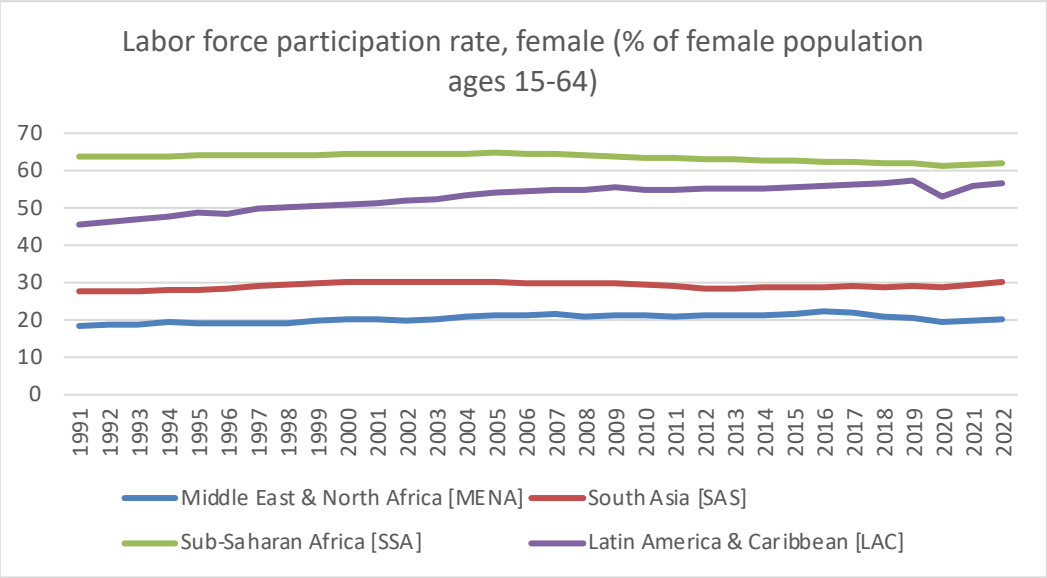
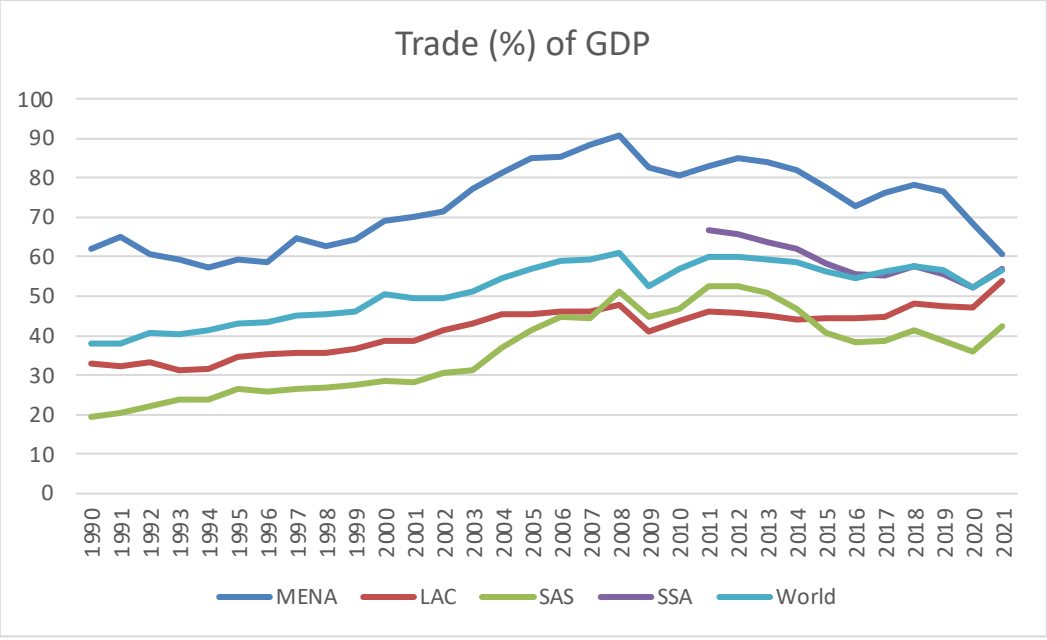
Figure 1



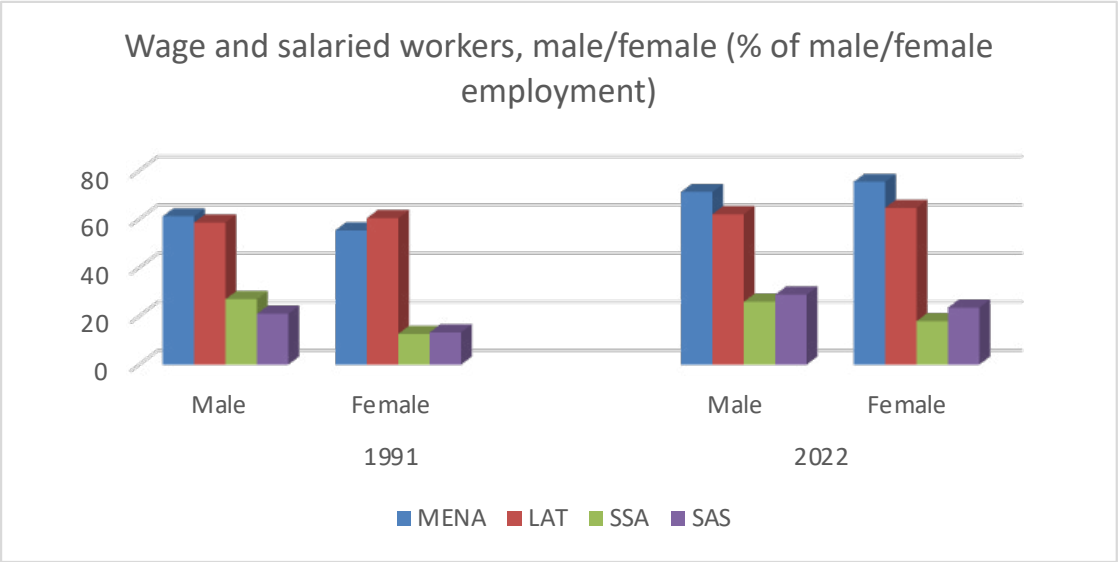
Source of data: International Labor Organization (ILO), Labor Statistics online database.

Figure 2



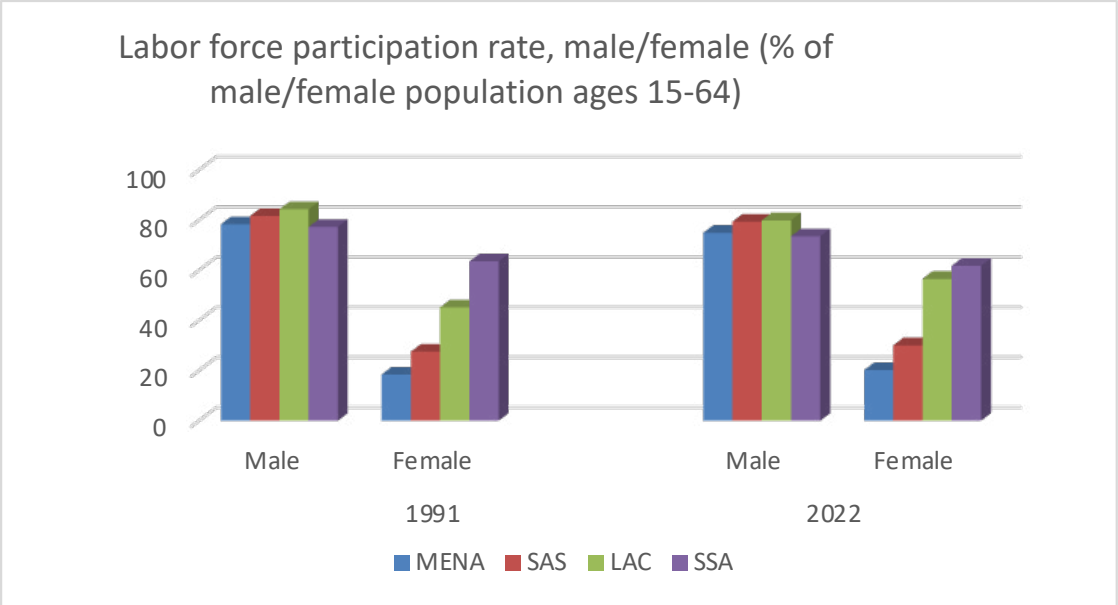
Source of data: World Bank World Development Indicators online database

Figure 3



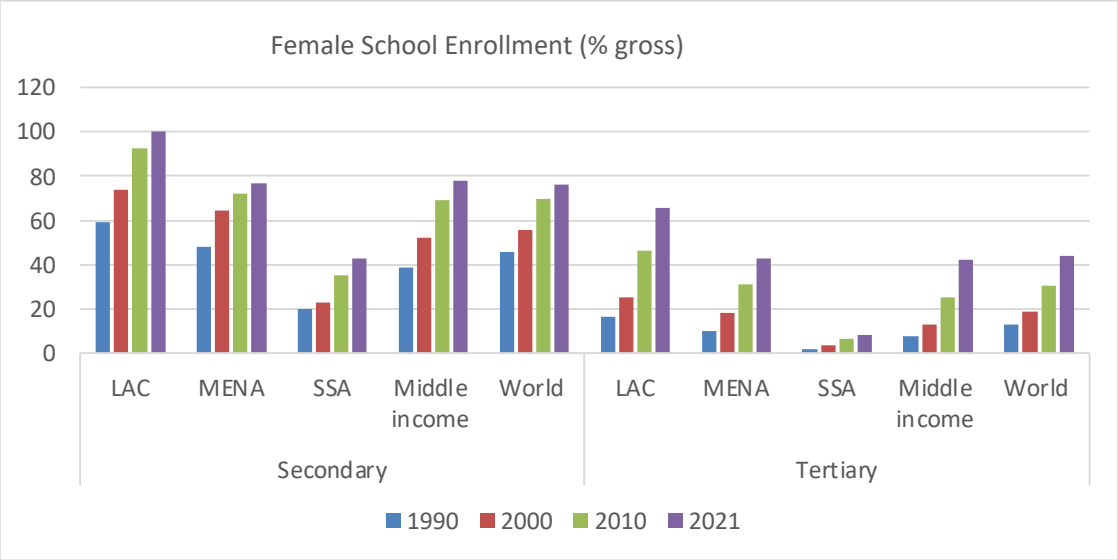
Source of data: International Labor Organization (ILO), Labor Statistics online database

Figure 4



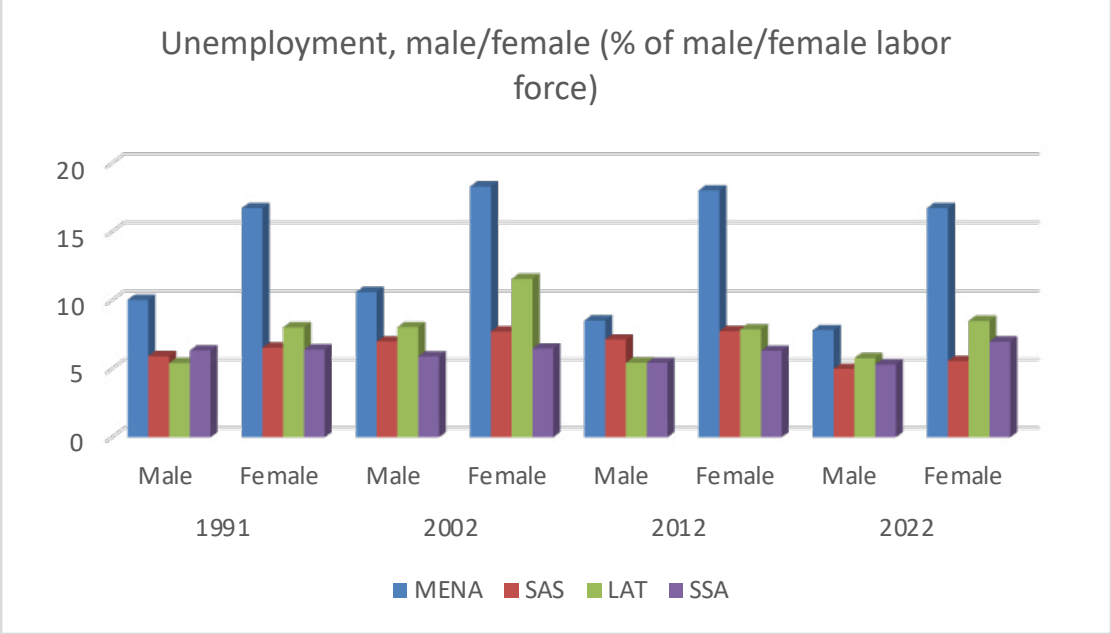
Source of data: International Labor Organization (ILO), Labor Statistics online database

Figure 5



Source of data: World Bank World Development Indicators online database

Figure 6



Source of data: International Labor Organization (ILO), Labor Statistics online database

Table 1.

Summary statistics

Variable	MENA				Latin America				Sub-Saharan Africa			
	Mean	Standard deviation	Minimum	Maximum	Mean	Standard deviation	Minimum	Maximum	Mean	Standard deviation	Minimum	Maximum
Labor force participation rate (%), female	25.42	12.44	5.35 (Yemen, 2017, 2018, and 2019)	60.31 (Qatar, 2019)	50.98	8.48	33.54	75.68	60.95	14.17	25.09	91.09
Labor force participation rate (%), male	77.10	8.70	59.45	96.39	82.35	3.20	73.36	89.58	74.77	8.81	56.30	91.83
wage employment (%), female	75.47	23.42	24.97 (Morocco, 1991)	99.89 (Qatar, the 1990s)	59.32	16.27	23.52	93.97	20.73	21.85	0.67	86.68
wage employment (%), male	74.43	17.95	42.26	99.61	59.80	11.26	31.26	91.97	33.69	20.73	5.56	84.41
trade openness	81.34	31.80	0.021	191.84	61.46	29.43	13.75	166.69	64.99	29.75	11.47	175.80
income	29,255	29,285	3,058	131,113	13,806	6,777	3,838	33,305	4,864	5,780	503,29	43,595
fertility	3.33	1.21	1.33	8.46	2.70	0.78	1.39	5.38	5.21	1.27	1.36	7.798
secondary edu, female	75.17	23.41	20.01	121.72	80.18	20.96	23.31	142.56	34.06	24.00	2.65	117.29
Secondary edu, male	75.67	17.67	36.14	119.40	75.90	19.63	26.43	131.74	39.23	20.65	5.40	109.86
Tertiary edu, female	32.35	18.84	1.06	96.38	41.16	26.31	6.95	148.93	5.64	7.48	0.10	49.94
tertiary edu, male	24.64	13.81	3.46	76.99	31.65	17.22	7.15	88.33	7.33	6.04	0.43	37.04
fdi	2.17	3.38	-4.65	29.52	3.37	2.68	-5.09	16.23	3.78	9.85	-82.89	161.82
electricity	94.23	12.83	40.77	100	90.28	10.62	54.78	100	32.78	24.24	0.53	100

Details on the source of data and variable description are in Appendix A.
Number of observations
MENA: between 381 to 522
Latin America: 335 to 551
Sub-Saharan Africa: 784 to 1247

Table 2.

Correlations

	MENA[a]				LAC[b]				SSA[c]			
	lfpf	lfpm	wagef	wagem	lfpf	lfpm	wagef	wagem	lfpf	lfpm	wagef	wagem
lfpm	0.674				0.125				0.649			
wagef	0.554	0.314			-0.177	-0.478			-0.403	-0.238		
wagem	0.657	0.497	0.880		-0.199	-0.409	0.853		-0.425	-0.311	0.933	
Open (log)	0.327	0.143	0.353	0.350	-0.232	0.206	-0.192	-0.193	-0.201	-0.322	0.464	0.502
Income (log)	0.744	0.678	0.731	0.862	0.316	-0.363	0.746	0.650	-0.473	-0.426	0.646	0.703
fertility	-0.514	-0.253	-0.394	-0.246	-0.231	0.528	-0.647	-0.602	0.296	0.277	-0.788	-0.778
second-aryf	0.534	0.283	0.709	0.699	0.490	-0.447	0.433	0.323	-0.266	-0.257	0.798	0.795
seconda-rym	0.413	0.184	0.536	0.578	0.548	-0.402	0.318	0.277	-0.259	-0.304	0.681	0.703
tertiaryf	0.361	0.125	0.449	0.381	0.476	-0.536	0.531	0.402	-0.288	-0.229	0.631	0.577
tertiarym	-0.234	-0.437	0.020	-0.125	0.484	-0.525	0.434	0.366	-0.327	-0.311	0.436	0.425
elect	0.209	0.237	0.610	0.468	0.259	-0.360	0.625	0.552	-0.415	-0.295	0.595	0.595
fdi	0.078	-0.036	0.196	0.066	0.043	-0.124	0.136	0.084	0.009	-0.042	-0.065	-0.059

Details on the source of data and variable description are in Appendix A.

[a] All coefficients are significant at the 5% level or better, except for the correlation of *fdi* with male and female labor force participation (*lfpf* and *lfpm*) and with male wage employment (*wagem*), and the correlation of tertiary education with female wage employment (*wagef*),

[b] All coefficients are significant at the 5% level or better, except for the correlation of fdi with female labor force participation (*lfpf*) and with male wage employment (*wagem*).

[c] All coefficients are significant at the 5% level or better, except for the correlation of fdi with male and female labor force participation (*lfpf* and *lfpm*).

Table 3.

Trade and women's participation in the labor force in the MENA region: Two-step GMM-diff estimate

Dependent variable: lfpf/lfpm, labor force participation (% of female/male population ages 15-64)

	(1)		(2)		(3)		(4)	
	Female	Male	Female	Male	Female	Male	Female	Male
lagged dependent variable	0.906*** (0.103)	0.887*** (0.081)	0.935*** (0.116)	0.982*** (0.065)	0.399* (0.231)	0.813*** (0.162)	0.607*** (0.195)	0.975*** (0.284)
income	1.178* (0.657)	2.496 (1.967)	1.949 (1.451)	-0.125 (1.432)	-1.896 (1.284)	-0.131 (0.566)	-0.130 (1.417)	1.201 (0.761)
trade	-1.436*** (0.451)	-0.383 (0.582)	-12.541* (6.424)	-1.144 (0.864)	-33.541** (15.218)	-0.734 (10.906)	-25.473** (11.527)	3.346 (15.563)
fertility	0.534 (0.403)	0.333 (0.545)	1.6754 (1.201)	-0.083 (0.414)	- 4.384** (2.182)	0.017 (0.334)	- 3.676** (1.755)	-0.540 (1.173)
Secondary_edu	0.022 (0.021)	-0.003 (0.021)	0.039** (0.019)	0.022 (0.024)				
fdi	0.022*** (0.006)	0.011 (0.019)	0.028 (0.025)	-0.015 (0.019)	-0.006 (0.037)	-0003 (0.023)		
trade squared			1.275* (0.681)	0.234* (0.139)	3.668** (1.722)	-0.004 (1.221)	2.802** (1.301)	-0.386 (1.789)
tertiary_edu					0.096*** (0.035)	-0.004 (0.020)	0.051* (0.030)	0.002 (0.014)
electricity							-0.145 (0.098)	-0.094 (0.091)
Obs	313	313	313	313	317	317	311	311
A-B test [z value]	-1.366 [0.17]	-1.197 [0.23]	-1.367 [0.17]	-1.172 [0.24]	1.191 [0.23]	-1.562 [0.11]	0.388 [0.69]	-0.144 [0.88]

Details on the source of data and variable description are in Appendix A.
* Indicates significance at 0.10 ** indicates significance at 0.05 and *** indicates significance at 0.01.
[a] All RHS variables except 'elect' are treated as endogenous.
We test for second-order autocorrelation and overidentifying restrictions (Sargan test, results may be obtained from the author upon request) to assess the validity of the instruments and all reported estimates pass both tests. The results from the Arellano-Bond test indicate that there is no statistical evidence of second-order autocorrelation.

Table 4.

Trade and women's participation in the labor force in the Latin America region: Two-step GMM-diff estimate

Dependent variable: lfpf/lfpm, labor force participation (% of female/male population ages 15-64)

	(1)		(2)		(3)		(4)	
	Female	Male	Female	Male	Female	Male	Female	Male
lagged dependent variable	0.365 (0.251)	0.267 (0.406)	0.313 (0.269)	0.308 (0.404)	0.307 (0.229)	0.667*** (0231)	-0.282 (0.195)	0.736*** (0.258)
income	2.299 (3.2870	-0.027 (2.611)	5.153 (3.925)	-0.415 (2.981)	9.480 (6.595)	5.865* (3.473)	17.308*** (6.772)	7.315 (4.462)
trade	0.319 (1.810)	-0.061 (2.422)	31.238 (35.664)	4.173 (24.831)	21.144 (26.427)	9.110 (14.304)	25.637 (30.703)	1.486 (19.223)
fertility	-4.926** (2.293)	-1.283 (1.464)	-3.899* (2.042)	-1.824 (1.451)	- 0.473 (2.661)	-0.779 (2.125)	- 7.767 (6.405)	-3.056 (4.657)
secondary_ edu	0.013 (0.409)	-0.067* (0.039)	0.0002 (0.046)	-0.577 (0.039)				
fdi	-0.074 (0.152)	0.131 (0.183)						
trade squared			-3.855 (4.312)	-0.352 (3.059)	-2.661 (3.386)	-1.305 (1.685)	-4.054 (3.841)	-0.314 (2.245)
tertiary_edu					0.045 (3.386)	-0.188 (0.132)	-0.319* (0.164)	-0.241 (0.165)
electricity							0.946** (0.449)	-0.113 (0.220)
Obs	354	354	354	354	258	258	257	257
A-B test [z value]	0.204 [0.84]	-1.132 [0.21]	-0.019 [0.98]	-1.560 [0.12]	-0.678 [0.48]	-1.429 [0.15]	0.545 [0.59]	-1.234 [0.20]

Details on the source of data and variable description are in Appendix A.
* Indicates significance at 0.10 ** indicates significance at 0.05 and *** indicates significance at 0.01.
[a] All RHS variables except 'elect' are treated as endogenous.
We test for second-order autocorrelation and overidentifying restrictions (Sargan test, results may be obtained from the author upon request) to assess the validity of the instruments and all reported estimates pass both tests. The results from the Arellano-Bond test indicate that there is no statistical evidence of second-order autocorrelation.

Table 5.

Trade and women's participation in the labor force in SSA: Two-step GMM-diff estimate

Dependent variable: lfpf/lfpm, labor force participation (% of female/male population ages 15-64)

	(1)		(2)		(3)		(4)		(5)	
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
Dependent variable, lag.	0.976*** (0.006)	0.952*** (0.006)	0.971*** (0.004)	0.959*** (0.023)	0.957*** (0.013)	0.921*** (0.026)	1.001*** (0.026)	0.895*** (0.021)	0.970*** (0.011)	0.962*** (0.024)
income	0.151** (0.076)	-0.079 (0.178)	0.155* (0.088)	-0.086 (0.127)	0.199 (0.143	0.061 (0.078)	0.859*** (0.155)	0.312*** (0.091)	0.501*** (0.140)	0.071 (0.224)
trade	-0.272*** (0.026)	-0.216*** (0.070)	0.188 (0.528)	-1.402** (0.621)	1.385*** (0.635)	-0.347*** (0.134)	0.465 (0.635)	-1.064*** (0.313)	0.114** (0.055)	-0.123 (0.136)
fertility	0.059 (0.052)	0.123 (0.087)	0.107*** (0.028)	0.119 (0.080)	- 0.027 (0.071)	0.235*** (0.071)	-0.241*** (0.084_	0.239*** (0.083)	- 0.147 (0.091)	0.0149 (0.140)
Secondary_edu	0.0014 (0.002)	-0.001 (0.002)	0.0019 (0.002)	0.0013 (0.002)						
fdi	-0.0015 (0.002)	0.005 (0.003)								
trade squared			-0.051 (0.068)	0.151** (0.076	-0.207*** (0.059)	0.155*** (0.016)	-0.112 (0.080)	0.120*** (0.038)		
Tertiary_edu					-0.006 (0.006)	-0.015** (0.006)	-0.017* (0.10)	-0.021*** (0.007)	-0.005* (0.003)	-0.012** (0.004)
electricity							-0.017*** (0.002)	-0.007*** (0.0007)	0.026** (0.010)	-0.012 (0.018)
trade X electricity									-0.010*** (0.002)	0.002 (0.003)
Obs	577	577	578	578	584	584	546	546	546	546
A-B test [z value]	0.345 [0.73]	-0.656 [0.52]	-0.369 [0.71]	-0.706 [0.48]	1.064 [0.29]	0.971 [0.33]	1.026 [0.30]	0.975 (0.33)	1.025 [0.31]	0.971 [0.33]

Details on the source of data and variable description are in Appendix A.
* Indicates significance at 0.10 ** indicates significance at 0.05 and *** indicates significance at 0.01.
[a] All RHS variables except 'elect' are treated as endogenous.
We test for second-order autocorrelation and overidentifying restrictions (Sargan test, results may be obtained from the author upon request) to assess the validity of the instruments and all reported estimates pass both tests. The results from the Arellano-Bond test indicate that there is no statistical evidence of second-order autocorrelation.

Table 6

Trade and women's wage employment: two-step GMM-diff estimate

Dependent variable: wage_emp_f, Wage and salaried workers, female (% of female employment)

	MENA				SSA		LAC		
	(1)	(2)	(3)	(4)	(6)	(7)	(8)	(9)	(10)
lagged dependent variable	0.901*** (0.045)	0.899*** (0.047)	0.845*** (0.031)	0.771*** (0.055)	-0.024 (0.266)	-0.041 (0.268)	0.888*** (0.014)	0.896*** (0.017)	0.885*** (0.013)
income	-2.980 (2.037)	-2.963 (2.102)	-0.074 2.636)	-3.097 (3.225)	-4.485 (5.114)	-5.469 (5.541)	1.647*** (0.517)	1.498*** (0.411)	1.475*** (0.219)
trade	-0.415 (0.641)	-0.253 (0.917)	-21.464** (9.931)	-24.421** (10.201)	17.468** (7.460)	21.852* (12.059)	-3.624* (1.873)	-1.742 (2.110)	-0.551** (0.266)
fertility	-0.653 (0.461)	0.649 (0.483)	-0.867 (1.567)	-0.661** (1.587)	1.452 (5.878)	0.420 (6.305)	-0.038 (0.171)	0.162 (0.164)	0.064 (0.101)
secondary_ edu	0.037** (0.016)	0.039** (0.018)							
trade squared		-0.029 (0.150)	2.407* (1.419)	2.833* (1.457)			0.419* (0.230)	0.174 (0.227)	
tertiary_edu			0.088 (0.282)	0.092 (0.288)	1.060** (0.4710	1.257** (0.635)	0.087 (0.061)	0.319*** (0.112)	0.384*** (0.060)
trade X tertiary-edu			-0.019 (0.064)	-0.019 (0.065	-0.264** (0.1220	-0.323* (0.176)	-0.019 (0.013)	-0.067** (0.025)	-0.081*** (0.012)
electricity				0.998 (0.671)		0.153 (0.329)	-0.015*** (0.001)	-0.106* (0.055)	-0.133*** (0.025)
trade X electricity								0.021* (0.011)	0.027*** (0.005)
Obs	315	315	322	311	258	257	546	546	546
A-B test [z value]	-1.357 [0.17]	-1.345 [0.18]	-1.105 [0.27]	-0.466 [0.64]	0.949 [0.34]	0.857 [0.39]	-0.800 [0.42]	-0.784 [0.43]	-0.788 [0.43]

Details on the source of data and variable description are in Appendix A.
* Indicates significance at 0.10 ** indicates significance at 0.05 and *** indicates significance at 0.01.
[a] All RHS variables except 'elect' are treated as endogenous.
We test for second-order autocorrelation and overidentifying restrictions (Sargan test, results may be obtained from the author upon request) to assess the validity of the instruments and all reported estimates pass both tests. The results from the Arellano-Bond test indicate that there is no statistical evidence of second-order autocorrelation.

APPENDIX A
VARIABLE DESCRIPTION AND DATA SOURCES

lfpf (lfpm): Female (male) labor-force participation rate (% of female (male) population ages 15-64). Female (male) labor-force participation rate is the share of the female (male) population aged 15-64 that is economically active: all people who supply labor for the production of goods and services during a specified period. Source: International Labor Organization (ILO) Labor Statistics online database.

wage_emp: Wage and salaried female workers (employees) are those female workers (% of total female employment) who hold the type of jobs defined as 'paid employment jobs', for which the holders have explicit or implicit employment contracts that give them a basic remuneration that is not directly dependent upon the revenue of the unit for which they work. Source: ILO Labor Statistics online database.

trade: Openness to international trade (in log) measured as the sum of exports and imports of goods and services, measured as a share (%) of gross domestic product (net of exports to developed countries). Source: World Bank World Development Indicators online database.

secondary_edu: School enrollment, secondary (% gross), female (male). This is the ratio of total female (male) enrollment, regardless of age, to the female (male) population of the age group that officially corresponds to the level of secondary education level. Source: World Bank World Development Indicators online database.

tertiary_edu: School enrollment, tertiary (% gross), female (male). This is the ratio of total female (male) enrollment, regardless of age, to the female (male) population of the age group that officially corresponds to the level of education shown. Tertiary education, whether or not to an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level.

fertility: Total fertility rate (births per woman) represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with age-specific fertility rates of the specified year. Source: World Bank World Development Indicators online database.

income: GDP *per capita* (in log) based on purchasing power parity (PPP) in constant 2021 international $. Source: World Bank World Development Indicators online database.

electricity: Access to electricity (% of population); the percentage of population with access to electricity. Electrification data are collected from industry, national surveys, and international sources. Source: World Bank World Development Indicators online database.

fdi: Net foreign direct investment. It represents the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is presented as a share (%) of gross domestic product. Source: World Bank World Development Indicators online database.

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