Trade liberalization and women empowerment in the Arab countries

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Abstract

Purpose – This paper investigates the impact of trade liberalization measured by trade openness (OPN) and tariffs on women empowerment measured by the gender gap index and gender development index, for two groups of Arab countries divided based on their income levels using annual data for the period 1995–2020. The study also considers other factors that may influence the gender gap, such as GDP growth and the female unemployment rate. The purpose of this paper is to address these issues and explorers whether the effects of trade liberalization differ based on the countries' income levels.

Design/methodology/approach – This study employs the fully modified ordinary least squares (FM-OLS) regression model for heterogeneous cointegrated panels to examine the impact of trade liberalization on women empowerment. The study constructs an empirical two regression model of women empowerment measured by the gender gap model and gender development model for the two groups of higher-income countries and lower and middle-income countries.

Findings – The authors' findings reveal that the impact of OPN on the gender gap varies between the two groups of Arab countries where more OPN within the higher-income group may increase the gender disparity, while it may reduce disparity within the lower and middle-income countries. In addition, GDP growth may reduce the gender disparity, while female unemployment raises the gender disparity between the two groups of countries in the long run. Findings also reveal that more OPN, tariffs and female unemployment may reduce gender development within the two groups, but more GDP growth may support the gender development in the long run.

Originality/value – This paper not only assesses the impact of trade liberalization on women empowerment generally, but also assess the women empowerment via two indices that are the gender gap and gender development in Arab countries which is – to the knowledge of the researchers – not yet investigated; further it explores if the effects of trade liberalization differs based on the countries' income levels.

Keywords Trade liberalization, Gender gap, Gender development, FM-OLS, Arab countries

Paper type Research paper

1. Introduction

Trade liberalization is the reduction or total removal of trade restrictions, such as tariffs, quotas and subsidies, to boost trade volume between countries (Lee, 2005). Indeed, trade liberalization has created various opportunities and challenges for male and female workers (Wang *et al.*, 2020).

The gender gap denotes the disproportionate discrimination among males and females (UNICEF, 2017). In the workplace, it refers to the divergence among the genders based on pay rates, or the chances of work; in most cases, men earn greater than women do (Rubery and

Johnson, 2019). On the other hand, women can participate significantly in enhancing economic growth when they are given access to education, employment, trade and other decision-making roles, accompanied by reducing trade barriers (Audi and Ali, 2016). Shamlawi and Saqfalhait (2018) reveal a significant positive long-run impact of the percentage of females in higher education on the participation rate of women in the labor force. Moreover, as stated by Alrabadi *et al.* (2018), no statistically significant differences are found between males and females in investment performance in the stock market.

According to International Labor Organization, women's labor force participation in Arab countries is among the lowest worldwide and estimated at only 18.4% compared to the global average of 48% (ILO, 2022). The persistence of this trend sounds puzzling in light of the great success the region has achieved in bridging other gender gaps, especially in education and health care. As women constitute about half of the region's population, the persistent very low rate of female participation has strong negative implications for the development efforts in this region.

Notwithstanding the expansion in schooling and literacy rates, women's contribution to leadership, political decisions and employment opportunities are still low in the Arab countries compared to developed countries (Shamlawi and Saqfalhait, 2016). This situation is apparent in Arab countries as well as in developing countries (Korinek, 2005). In their study, Shamlawi and Saqfalhait (2016) aim at exploring women's empowerment in Arab countries through a comparative investigation. Notably, the major Arab countries' accomplishment is in bridging the gender gap in health and education, countered by the inability of Arab countries to bridge both political and economic gaps due to several political, economic and social factors.

This research seeks to investigate whether trade liberalization empowers women by gathering evidence from Arab countries. In particular, two key questions need to be answered by this study. First, what factors are responsible for the gender gap in the region? Second, how the policy of trade openness (OPN) that has been adopted by most countries of the region has contributed to economically empowering women and bridging the overall gender gap in the region? Thus, The study employs an econometric model based on the economic theory and existing empirical studies and utilizes the method of fully modified ordinary least sqaures (FM-OLS) for heterogeneous cointegrated panels to estimate the model parameters and quantify the impact of trade liberalization on the gender gap and women empowerment.

Building on the existing literature, this paper not only assesses the impact of trade liberalization on the gender gap and gender development in Arab countries which is – to the knowledge of the researchers – not yet investigated but also explores if the effects of trade liberalization differ based on the countries' income levels. It also considers the other factors that may influence the gender gap and gender development, such as GDP growth and the female unemployment rate (FUR). It will be beneficial in drawing strategies to empower women and evaluate the effects of trade liberalization. This study is a first step toward filling a research gap on the gender gap on the Arab region including all Arab countries with available data and going beyond the single country analysis followed by most existing empirical studies, which led inconclusive results that vary from one country to another. In addition, this study divided Arab countries into two groups according to income level, which add a very important comparative analysis dimension.

The remainder of this paper is organized as follows. The next section presents the theoretical framework and literature review. Section 3 presents the methodology, data sources and descriptive statistics, followed by diagnostic tests in Section 4. Section 5 reports the empirical results, and Section 6 concludes.

2. Theoretical framework and literature review
International trade plays a vital role in modern economies as it benefits both exporting and importing countries through trade arbitrage and production specialization. However, if the

economic policies of a country are based on protectionism, such a country will put several barriers to global trade including tariffs, quotas, boycotts or other nontariff barriers to hamper this trade. The justifications for trade barriers could be political, social, economic, or environmental. Nevertheless, such barriers must be transparent and fair as they can lead to inequalities in societies (Love and Lattimore, 2009). In the same context, OPN represented by the removal of trade barriers can bring various benefits and advantages such as plummeting poverty through generating investment opportunities and creating jobs, enhancing competition, supporting innovation, exchanging the latest technologies, improving living standards, reducing gender inequality through creating various opportunities for females and increasing their participation rate in the labor market and ultimately boosting economic growth and development (Audi and Ali, 2016).

In 1957, Gary Becker introduced a theory of discrimination in his book describing the employers who practice discrimination especially in hiring workers from different minority groups (Becker, 1957). Later, Becker's theory has been modified concerning gender equality and trade liberalization. This theory has ensured that gender discrimination is a certain form of market imperfection, as the preference of hiring and paying wages is given to males, noting that the firm with such behavior bears higher costs and is driven out from the competition by firms without discrimination behavior. Seguino (2000) argued that lower salaries of females could encourage exports and investments due to product cost reduction and enhancing productivity levels. Black and Brained (2004) modified Becker's theory by emphasizing that a firm without discriminatory behavior can supply commodities at a much lower price compared to discriminatory firms.

Alternatively, Cagatay's (2005) theory of gender inequalities and international trade stated that OPN could not be advantageous to females and males in an equal manner, since it could lead to more discrimination in employment, decision-making and salary opportunities. In other words, females are more influenced by the adverse effects of trade liberalization than males, due to differences in education, wage inequalities and training opportunities. Trade liberalization could be harmful or beneficial for females depending upon the opportunities offered to them. Indeed, international trade policies must be reformulated to improve opportunities for all, including females in all dynamic sectors, reduce the gender gap and empower women. The impact of OPN on the gender gap varies from one country to another due to differences in their specific patterns, ways to deal with international competition and cultural norms (United Nations, 2011).

The empirical evidence on the impact of trade liberalization on the gender gap or gender equality has revealed that this subject is yet to be explored, as existing findings are inconclusive and vary from one country to another. On one hand, OPN can narrow the gender wage gap and enhance women's employment opportunities. The increase in import competition (or trade liberalization) can significantly increase females in the workforce and reduce the gender employment gap, by contributing to an expansion of female-intensive industries. Moreover, tariffs reduction stimulates more productive firms to update their production technologies and enter export markets, leading to improvements in women's employment and relative wage in blue-collar tasks (Ahmed and Bukhari, 2006; Assaf, 2018; Besedeš et al., 2021; Jamielaa and Kawabata, 2018; Juhn et al., 2013; Rasekhi and Hosseinmardi, 2012; Santos and Arbache, 2005; Wang et al., 2020).

On the other hand, OPN can lead to an increasing gender wage gap. Although the increase in foreign competition leads exporting plants to hire a larger share of females in unskilled labor-intensive industries to reduce the costs of workers and face international competition (as firms substitute males with low-cost females), trade liberalization reduces female employment intensity in capital and skill-intensive industries using new technologies. Consequently, the reduction in both tariffs and regulatory trade barriers and the increase in OPN can boost women's empowerment, while the female to male participation rate declines when trade liberalization increases (Audi and Ali, 2016; Banerjee and Veeramani, 2015; Ederington et al., 2009; EL-Hamidi, 2008; Giovannetti et al., 2021; Gupta, 2021).

3. Trade policies and women empowerment

To understand how trade can contribute to women's economic empowerment, it is important to explore how women participate in the trade as entrepreneurs, traders or workers, the impact on women of trade adjustment and how they benefit from trade as consumers.

Trade agreements are one important instrument used by trade policymakers and can provide greater access to global markets for women workers and women entrepreneurs. This is especially true regarding services, where women work more. Moreover, services are important inputs into many traded sectors. Thus, liberalizing services can enable further trade in goods as well as services (Organisation for Economic Co-operation and Development (OECD) organization, 2021).

The OECD organization (2021) has developed a framework that countries can use at the national level to better understand the gender impacts of their trade policies on women as workers, consumers and entrepreneurs. This framework can assist governments in their design of trade provisions and policies and monitor their impacts, and it ensures inclusive consultative processes. Once women's participation in trade is mapped, policymakers can decide how to ensure that trade is supportive of women's economic empowerment through greater market access in products and sectors, by ensuring women workers and entrepreneurs can engage fully in international markets, through complementary domestic policies to offset negative impacts or through complementary trade promotion policies that support women so they can fully reap the gains from trade.

In their study, Korinek *et al.* (2021) aim to analyze the interactions between trade and gender in the OECD countries along with three of the economic roles played by women in trade: as workers, consumers, entrepreneurs and business owners. Whereas the domestic policies are vital in addressing the impacts of trade on women or increasing their participation in trade, there are some areas where trade policy and trade promotion can play a role in supporting outcomes that are more inclusive regarding women empowerment like new trade agreements on women, including their indirect effects and can help to inform choices of market opportunities. Lowering tariffs on essential goods lowers prices and increases purchasing power, especially for lower-income households where women are disproportionately represented ensuring the participation of women in consultation and engagement processes for trade policymaking could also promote more diverse perspectives and also could identify promising paths for addressing gender equality issues. Promotion of trade tools that is advantageous for women exporters, also include measures that support SMEs' (Small and Medium Enterprises) exports. Among these measures is implementing trade-facilitating reforms that reduce charges, and besides, simplifying and automating procedures at the border, additionally, improving transparency in regulations that are associated with exporting and importing procedures. Moreover, removing trade barriers, especially trade in services where most women work, has a beneficial effect on the women's participation rate and also can contribute to a mitigate existing gender inequalities.

The World Bank and World Trade Organization study (2020) reveals that trade policy itself is a critical determinant in lowering the trade costs faced by women and improving women's access to international markets. The study suggests that removing trade barriers that impede women's access to international markets can contribute to enhancing women's participation in trade and benefits from trade. Women would benefit from lowered tariffs and nontariff barriers and improved trade facilitation and access to trade finance. Moreover, trade policies alone cannot always increase women's participation in trade. Complementary policies are essential to improve women's capacity to engage in trade by improving their access to education, financial resources, digital technologies, information and infrastructure.

The International Trade Centre (ITC) (2020) showed that trade agreements are not gender-neutral, despite the number of trade agreements that refer to gender equality and women's empowerment having increased since the 1990s. The gender and trade provisions included in recent trade agreements are the most obvious sign of willingness to use trade as a policy instrument to pursue gender equality as the report of the ITC (2020) declared.

Korinek (2005) examined ways in which greater integration through trade impacts women and men differently and ensuing implications for growth. The paper finds that trade creates jobs for women in export-oriented sectors and jobs that bring more household resources under women's control lead to greater investments in the health and education of future generations. Although women are more than ever formally employed, differences in wages earned by men and women persist in all countries. Women also have less access to productive resources, time and particularly in many developing countries, education. Professional women continue to encounter discrimination in hiring and promotion, including in OECD countries. The impact of trade liberalization on women is important not only because they represent over half of any population, but also because they face constraints that make them less able to benefit from liberalization. Once different impacts are ascertained, well-designed policy responses may aid women in taking advantage of greater openness to trade.

Der Boghossian (2019) looked at the various trade policies World Trade Organization (WTO) members have put into place to foster women's economic empowerment. This study reveals that women's economic empowerment is very high on the government's development and trade agendas. WTO members have been focusing their national trade, economic and development strategies on integrating and enhancing women's participation in their workforce. Some have explicitly acknowledged that closing the gender gap is especially important because it is correlated with per capita income, growth, development and poverty reduction. Some strategies also aim at promoting female employment and access to male-dominated economic sectors. A few trade strategies also mention that mainstreaming gender is a primary objective. While most members establish wide and general gender objectives in their trade policies, some can also be very specific, depending on the economic situation of the country.

The United Nations (2011) introduced some actions to enhance the inclusion of gender perspectives in trade policies. The following is a non-exhaustive list of examples of these actions divided into two main categories, namely gender equality policies and women's empowerment. Regarding gender equality policies: *first,* the emphasis on countries' case studies and training of policymakers and trade negotiators to support developing country capacity to assess the gender dimensions of trade policies, *second*, produce sound and reliable data to evaluate the gendered impacts of different trade measures and instruments, *third*, gather evidence on possible trade and other complementary policies and measures necessary to enable women to benefit from trade or to reduce the negative impacts that trade may have on them, *fourth*, in parallel or before the negotiation of trade agreements, provide inputs for the elaboration of gender assessments of such agreements, as part of a broader human development impact assessment and support countries to monitor the impact of such agreements on women's empowerment and gender equality during implementation, *fifth*, support countries' national and/or regional efforts to increase coherence among different but interlinked policies, such as trade, development, employment, migration and gender equality, *sixth*, support advocacy platforms of women informal traders for promoting an enabling environment for their business and access to better services and *seventh*, develop specific training programs for women entrepreneurs to enhance their participation in world trade.

Regarding women's empowerment and participation, the United Nations (2011) proposed the following: *first*, support broad-based effective participation of women and women's groups in trade consultations and negotiations as well as in trade policymaking and related implementation, *second*, facilitate the exchange of views and experiences among women engaged in trade negotiations and policy formulation and implementation, *third*, facilitate contacts, coaching and sharing of experiences among women entrepreneurs and *fourth*, facilitate the linkages between women-owned/managed micro and small enterprises and larger national or multinational firms.

Furthermore, according to the United Nations Conference on Trade and Development (UNCTAD) [1], information and communication technologies (ICTs) may contribute significantly to women's empowerment by providing business tools that promote and facilitate women's entrepreneurial activities. As various ICT tools are becoming accessible to more people, particularly in poor developing countries, it becomes an effective force affecting the way people live, work and communicate, becoming an essential requirement for practicing modern business. As more and more women have access to education and training programs, and hence master the use of ICT tools, they are becoming more qualified for modern business and entrepreneurial works.

4. Methodology

4.1 Study sample
The sample of this study covers two groups of Arab countries divided based on income levels: the higher-income countries (Bahrain, Kuwait, Oman, Qatar, the Kingdom of Saudi Arabia (KSA) and the UAE), and the lower and upper-middle-income countries (Algeria, Egypt, Jordan, Morocco and Tunisia). Accordingly, all 11 countries were included in this study from the period 1995–2020.

4.2 Study variables and their operational definitions
This study utilizes unbalanced panel data collected from the World Bank database, World Economic Forum (WEF) and the United Nations Development Programme (UNDP). The study uses two dependent variables as composite indices to measure women's empowerment in two areas: *first*, the gender gap was measured by the global gender gap index (GGGI) which was collected from global gender gap reports issued by WEF, and *second*, the gender development was measured by the gender development index (GDI) which was collected from human development reports issued by the UNDP. The two indices explain most fields of women's empowerment that may be affected by trade liberalization.

The [2] GGGI quantifies the gaps between women and men (gender disparity) across four subindices: economic participation and opportunity, educational attainment, health and survival, and political empowerment. Indicators were scored within each subindex. The GGGI was based on three underlying concepts that determined how indicators were chosen, how the data were treated and how the index can be used. These concepts can be thought of as the "rules" for how the subindices were scored, whereas scores are based on the level of access women have to resources and opportunities relative to men. Countries are given a score from 0 to 1. A score of 1 indicates full equality between women and men and a score of 0 indicates full inequality. The GGGI is published annually by the WEF and is designed to capture the magnitude of gender-based disparities and track progress over time.

The [3] GDI is determined by the ratio of female to male Human Development Index (HDI) values, with a higher GDI indicating greater female empowerment. It is used to assess gender disparities in three basic aspects of human development. *First*, health is measured by female and male life expectancy at birth. *Second*, education is measured by females and males, expected years of schooling for children and mean years of schooling for adults aged 25 years and above. *Third*, control over economic resources is measured by female and male estimated earned income. There are four steps to estimating GDI values, according to a UNDP-developed methodology.

The first step is to calculate the female portion of the wage bill, S_f, which is calculated using the following formula:

$$S_f = \frac{\frac{W_f}{W_m}\,(EA_f)}{\frac{W_f}{W_m}\,(EA_f + EA_m)} \tag{1}$$

where, $\frac{W_f}{W_m}$ is the ratio of female to male wage, EA_f is the female portion of the economically active population and EA_m is the portion of males. Female earned income per capita (GNI_{PCf}) is estimated by multiplying gross national income per capita (GNI_{PC}) by the female share of the wage bill, S_f, and then rescaling it by the female portion of the population, $P_f = \frac{N_f}{N}$. The female earned income per capita is calculated as follows:

$$GNI_{PCf} = GNI_{PC}\left(\frac{S_f}{P_f}\right) \tag{2}$$

The second step is to convert the indicators, which are in different units, into indices and then aggregate the dimensional indices for each sex by taking the geometric mean.

The geometric means of the three-dimensional indices for each gender represent the female and male HDI values in the third step, that is, as follows:

$$HDI_f = \left(I_{Health_f} \cdot I_{Education_f} \cdot I_{Income_f}\right)^{\frac{1}{3}} \tag{3}$$

$$HDI_m = \left(I_{Health_m} \cdot I_{Education_m} \cdot I_{Income_m}\right)^{\frac{1}{3}} \tag{4}$$

The final step is to compare female and male HDI values by computing the GDI which is just the ratio of female to male HDI:

$$GDI = \frac{HDI_f}{HDI_m} \tag{5}$$

The main independent variables are the tariff rate (TRF) measured by a weighted mean [4] of all products as a percentage value, and OPN measured based on World Bank national accounts data as the sum of exports and imports of goods and services as a share of gross domestic product (GDPG). Those independent variables are considered significant indicators of trade liberalization level in the sense of trading costs and ease of goods and services mobility across countries.

The other explanatory control variables are the annual growth rate of real GDPG as an indicator of economic performance which contains the unobserved macro variables, and the FUR as an indicator of female economic participation. The control variables were selected based on the World Bank database in the manner of covering the other factors that may influence the gender gap and gender development, whereas the choice of the control variables is based on previous studies, data availability and statistical diagnostic tests. Table 1 below provides details about variables' measurements and sources.

4.3 Econometric model
In light of various data testing results, particularly the stationarity and cointegration test, and since the main focus of the research is on the long-run equilibrium relationships, this study employs the FM-OLS for heterogeneous cointegrated panels to examine the impact of trade liberalization on women empowerment. Through literature review, and to explore if the effects of trade liberalization differ based on the countries' income levels, this study constructs an empirical two regression model of women empowerment measured by the gender gap model and gender development model for the two groups of higher-income countries and lower and middle-income countries as follows:

$$GGI_{it} = \alpha_0 + \sum_{j=1}^{k} B_j X_{it} + \varepsilon_{1it} \tag{6}$$

	Symbol	Variable	Measurement	Source
Dependent	GGI	Gender Gap Index	Measured by the Global Gender Gap Index (GGGI) which was introduced by the World Economic Forum as a framework for capturing the magnitude of gender-based disparities and tracking their progress over time. The index benchmarks national gender gaps on economic, education, health and political criteria $GGI = (1 - GGGI)X100$ The highest possible score is 100 *(gender inequality)* and the lowest possible score is 0 *(gender equality)*	World Economic Forum, Global Gender Gap Reports; See Footnote 2
	GDI	Women empowerment is measured by the Gender Development Index	The gender development index is a ratio that measures gender inequalities in achievement in three basic dimensions of human development: health, education and command over economic resources. A high GDI ratio means higher women empowerment	United Nations Development Programme, human development reports; See Footnote 3
Independent	TRF	Tariff	The weighted mean tariff rate of all products is measured as a percentage value. The weighted mean applied tariff is the average of effectively applied rates weighted by the product import shares corresponding to each partner country	The World Bank, world development indicators; See Footnote 4
	OPN	Trade Openness	It is the sum of exports and imports of goods and services measured as a share of gross domestic product $OPN_{it} = \frac{EXPORTS_{it} + IMPORTS_{it}}{GDP_{it}} X 100$	The World Bank, world development indicators, national accounts data
	GDPG	The growth rate of real gross domestic product	The annual percentage growth rate of real GDP at constant 2010 prices (US$) $GDPG_{it} = \frac{GDP_{it} - GDP_{it-1}}{GDP_{it-1}} X 100$	The World Bank, world development indicators, national accounts data
	FUR	Female unemployment rate	It measures the share of the female labor force that is without work but available for and seeking employment. Calculated as a percentage of the female labor force (modeled ILO estimate) $FUR_{it} = \frac{Female \, unemployeed}{Female \, lebor \, force} X 100$	The World Bank, International Labour Organization, the ILOSTAT database

Source(s): Prepared by the authors based on the World Bank, UNDP and WEF databases

Table 1.
The variables measurement

$$GDI_{it} = \alpha_0 + \sum_{j=1}^{k} B_j X_{it} + \varepsilon_{2it} \qquad (7)$$

where X_{it} is the vector of independent variables for the country "i" at the time "t", α_0 is a constant term, β_j is the coefficient of the j variable and ε is the error term. As explained earlier, the independent variables are selected based on the economic theory and previous empirical studies (Al-Sabti and Warrad, 2017). Since the dependent variables of the two models are two alternative measures of the gender gap defined broadly (all measures: economic, education and health disparities), the two models are complements and hence the estimation results are expected to reinforce each other. However, it should be noted that the GGI is a slightly wider measure since adding the political dimension.

The most common advantages of panel data analysis are that it allows examining a large number of observations with heterogeneous information and produces less data multicollinearity among the explanatory variables. Moreover, it allows using more data and can keep track of each unit of observation (Baltagi, 2005). Accordingly, the study applies the FM-OLS regression model that was constructed to take account of potential heterogeneity in the idiosyncratic dynamics and fixed effects associated with panel data, the asymptotic distributions for estimators can be made to be unbiased and free of nuisance parameters (Pedroni, 2001).

5. Statistical description and diagnostic tests

5.1 Statistical description

Before starting regression analysis, it is important to explore the data descriptive statistics that give an idea about the maximum, minimum, average, standard deviation and coefficient of variation (CV) of the study's variables. Table 2 shows the data statistics.

The statistics of CV indicate high relative variability in female unemployment and GDP growth within the higher-income countries, while GDP growth shows the highest relative variability within the group of lower and upper-middle-income countries. Besides, the gender gap and gender development show lower relative variability within the two groups of countries. Furthermore, the statistics indicate that the group of higher-income countries has more OPN than the group of lower and upper-middle-income countries while the group of higher-income countries applies tariffs lower than that within the group of lower and upper-middle-income countries.

5.2 Unit root test

This study applies three-unit root tests (Im *et al.*, 2003) (Phillips–Perron (PP) and Fisher as stated by Westerlund (2008)) and Levin, Lin and Chu (LLC) (Levin *et al.*, 2002); to test the variables stationary, the null hypothesis (H0) for these tests indicates for the existence of the unit root (the nonstationary variable). The LCC test assumes a common unit root process where it considers an appropriate test in a small sample, and both tests that of Im and PP assume the individual unit root process. The results of the panel unit root tests are given in Table 3.

Results of the unit root tests show that most variables are stationary in level with integration order I(0) except OPN and FUR in the higher-income model, and OPN and TRF in the lower and upper-middle-income model, while these variables are nonstationary in level and possibly are cointegrated with integration order I(1). Accordingly, below the cointegration test is performed to check the existence of at least one cointegrating relationship between the tested variables in the long run.

5.3 Cointegration test

Pedroni (1999) and Pedroni (2004) introduced some panel cointegration test statistics grouped into two dimensions: the panel cointegration statistics (within the dimension) and grouped mean panel cointegration statistics (between dimensions). The null hypothesis (no

	GGI	GDI	OPN	TRF	GDPG	FUR
Higher-income countries						
Std. dev.	1.93	4.27	35.95	0.46	3.86	5.80
Mean	62.43	95.44	118.05	4.06	3.62	6.83
CV	0.03	0.04	0.30	0.11	1.06	0.85
Median	62.90	94.40	100.04	4.03	3.55	4.69
Maximum	65.50	103.20	191.87	5.22	19.59	21.72
Minimum	57.30	87.60	64.20	3.20	−4.71	0.42
Lower and upper-middle-income countries						
Std. dev.	1.71	2.25	26.70	3.86	2.81	5.36
Mean	60.88	85.78	73.52	9.69	3.61	19.28
CV	0.03	0.02	0.36	0.40	0.78	0.28
Median	60.70	85.75	79.03	10.17	3.58	21.31
Maximum	64.20	89.80	118.70	18.13	12.37	27.42
Minimum	57.60	82.10	30.25	4.30	−8.60	9.49

Table 2.
Descriptive statistics

Source(s): Prepared by the authors

cointegration) of the two dimensions was tested. The results of the Pedroni cointegration test are given in Table 4.

Table 4 presents the calculated values of the Pedroni residual cointegration test statistics. The results of the two models for the two groups reveal that four (Panel PP, Panel ADF, Group PP and Group ADF) out of seven statistics are statistically significant, indicating

		Im		PP		LLC		
Variable	Test for unit root	W statistic	Prob.	Chi square	Prob.	t statistic	Prob.	Integration order
Higher-income countries								
GGI	Level	−1.43	0.07	30.46	0.00	−2.94	0.01	I(0)
GDI	Level	−8.90	0.00	30.02	0.00	−22.89	0.00	I(0)
OPN	Level	−1.06	0.14	11.94	0.45	−0.83	0.20	Nonstationary
D(OPN)	First difference	−7.54	0.00	69.95	0.00	−9.25	0.00	*I(1)*
TRF	Level	−5.10	0.00	37.37	0.00	−8.27	0.00	I(0)
GDPG	Level	−3.02	0.00	37.72	0.00	−3.20	0.00	I(0)
FUR	Level	1.62	0.94	5.94	0.92	0.42	0.66	Nonstationary
D(FUR)	First Difference	−7.99	0.00	48.71	0.00	−6.95	0.00	*I(1)*
Lower and upper-middle-income countries								
GGI	Level	−1.72	0.04	33.81	0.00	−2.08	0.01	I(0)
GDI	Level	−1.31	0.09	25.46	0.00	−7.27	0.00	I(0)
OPN	Level	066	074	4.70	0.90	−0.27	0.39	Nonstationary
D(OPN)	First difference	−6.87	0.00	69.14	0.00	−8.47	0.00	*I(1)*
TRF	Level	−0.75	0.22	13.64	0.19	−2.45	0.00	Nonstationary
D(TRF)	First Difference	−6.39	0.00	59.88	0.00	−6.93	0.00	*I(1)*
GDPG	Level	−3.93	0.00	34.80	0.00	−1.33	0.09	I(0)
FUR	Level	−1.90	0.02	19.79	0.03	−6.92	0.24	I(0)

Table 3.
Panel unit root results

Note(s): All variables are stationary with individual effects. Prepared by the authors using E views 10

	Model 1		Model 2	
Higher-income countries				
AR within dimension	*Weighted statistic*	*Probability*	*Weighted statistic*	*Probability*
Panel v statistic	2.53	0.00*	0.08	0.46
Panel rho statistic	2.12	0.98	1.93	0.97
Panel PP statistic	−4.91	0.00*	−11.07	0.00*
Panel ADF statistic	−1.95	0.00*	−4.27	0.00*
AR between dimension	*Statistic*	*Probability*	*Statistic*	*Probability*
Group rho statistic	3.16	0.99	2.68	0.99
Group PP statistic	−8.47	0.00*	−17.69	0.00*
Group ADF statistic	−2.45	0.00*	−5.54	0.00*
Lower and upper-middle-income countries				
AR within dimension	*Weighted statistic*	*Probability*	*Weighted statistic*	*Probability*
Panel v statistic	−0.46	0.67	−1.02	0.84
Panel rho statistic	1.84	0.96	0.99	0.83
Panel PP statistic	−4.17	0.00*	−6.07	0.00*
Panel ADF statistic	−2.62	0.00*	−3.41	0.00*
AR between dimension	*Statistic*	*Probability*	*Statistic*	*Probability*
Group rho statistic	2.68	0.99	1.62	0.94
Group PP statistic	−5.01	0.00*	−8.09	0.00*
Group ADF statistic	−1.94	0.02*	−3.75	0.00*

Note(s): *Indicates statistically significant at a 5% significance level

Table 4.
Cointegration test

rejection of the null hypothesis. All these four statistics have acceptable values with associated probabilities less than 0.05. Thus, this study concludes that there is a long-run cointegrating relationship between the variables of the study's models that are divided based on income level.

5.4 Testing multicolinearity
This study employs the spearman rank order to test correlations between the explanatory variables. It assesses how well the relationship between two variables can be described using a monotonic function. The correlation between two variables will be high when observations have a similar rank and low when observations have a dissimilar rank. The Spearman test null hypothesis indicates the existence of no association between ranks when (Prob. < 0.05), which means there is multicollinearity between variables. The results are presented in Table 5.

The correlation coefficients in Table 5 show that the correlation problem does not exist between the independent variables for the two groups. Furthermore, the variance inflation factors' (VIF's) test provides the same result, as presented in Table 6 below.

The results in Table 6 show that the higher value of VIF is 1.72 where all VIF values are less than 5. Hence all variables can be retained in the models of this study.

6. Econometric analysis and results
After conducting the diagnostic tests to ensure that there are no statistical problems that may affect the validity of the regression equation, this study employs the FM-OLS regression model which is suitable for non-stationary regressions, even in relatively small panels with the presence of substantial cross-sectional heterogeneity of the error process whereas FM-OLS regression will produce consistent and unbiased estimators that possess good regression properties (Pedroni, 2001). Results of the regression analysis are presented in Table 7 below.

	Higher-income countries					Lower and upper-middle-income countries			
	OPN	TRF	GDPG	FUR		OPN	TRF	GDPG	FUR
OPN	*1* – –				OPN	*1* – –			
TRF	*0.03* [0.26] (0.79)	*1* – –			TRF	*−0.02* [−0.13] (0.89)	*1* – –		
GDPG	*0.16* [1.19] (0.23)	*0.25* [1.85] (0.06)	*1* – –		GDPG	*−0.29* [−1.81] (0.07)	*0.04* [0.24] (0.80)	*1* – –	
FUR	*−0.24* [−1.81] (0.07)	*−0.15* [−1.10] (0.27)	*−0.09* [−1.68] (0.49)	*1* – –	FUR	*−0.19* [−1.16] (0.25)	*−0.04* [−0.25] (0.80)	*−0.05* [−0.38] (0.70)	*1* – –

Table 5.
Spearman rank-order test

Note(s): [ ] and () denote for *t* statistics and *t* probability, respectively
The italics values are the correlation coefficients. It were tested at the significance level of 5%. So all coefficients are not significant (meaning no correlation issue)

	Higher-income countries		Lower and upper-middle-income countries	
Variable	VIF (Model 1)	VIF (Model 2)	VIF (Model 1)	VIF (Model 2)
OPN	1.10	1.08	1.55	1.38
TRF	1.30	1.29	1.53	1.20
GDPG	1.22	1.36	1.69	1.44
FUR	1.03	1.10	1.23	1.72
Mean VIF	*1.16*	*1.20*	*1.50*	*1.43*

Table 6.
VIF

Source(s): Prepared by authors using e views 10

The regression results in Table 7 present the relationship between trade liberalization indicated by OPN and TRF and gender disparity and women empowerment in the two models of the two groups. All independent variables are statistically significant at 5%, which indicates the existence of a long-run relationship among the variables.

Findings highlight the unfavorable impact of trade liberalization on gender equality within higher-income countries. Furthermore, it reveals that trade liberalization will reduce women's empowerment within this group of countries (Model 1). On the other hand, trade liberalization harms the gender gap and women's empowerment within the lower and upper-middle-income groups (Model 2), whereas more trade liberalization reduces the gender gap (more gender equality) and reduces women's empowerment. Thus, our findings reveal that the impact of OPN on gender equality varies between the two groups of Arab countries based on income level while OPN and tariffs have an undifferentiated impact between the two groups of Arab countries.

The results of *Model 1* in the *higher-income countries* group show that FUR has a positive impact on the gender gap, while GDP growth has a negative impact on GGI. Thus, more female unemployment may increase the gender gap and disparity, whereas increasing GDP growth may reduce it. However, the results of *Model 2* in the same group show that FUR harms GDI, while GDP growth assists it.

The coefficients of both *Models (1 and 2)* in *lower and upper-middle-income countries* groups are statistically significant. For *Model 1*, the impact of GDP growth on GGI is negative, while the FUR has a positive impact meaning that more GDP growth may reduce

Model 1: GGI as the dependent variable				Model 2: GDI as the dependent variable			
Variables	Coefficient	t statistic	p value	Variables	Coefficient	t statistic	p value
Higher-income countries							
OPN	0.04	6.31	0.00	OPN	−0.01	−4.13	0.00
TRF *				TRF	−0.88	−4.72	0.00
GDPG	−0.18	−7.89	0.00	GDPG	0.16	8.78	0.00
FUR	0.46	8.12	0.00	FUR	−0.25	−4.85	0.00
R square		0.76		R-Square		0.91	
Adjusted R square		0.73		Adjusted R-Square		0.88	
Long-run variance		0.59		Long-run variance		0.11	
Lower and upper-middle-income countries							
OPN	−0.05	−3.84	0.00	OPN	−0.05	−8.33	0.00
TRF*				TRF	−0.02	−2.46	0.02
GDPG	−0.08	−2.47	0.02	GDPG	0.20	3.80	0.00
FUR	0.48	5.56	0.00	FUR	−0.09	−3.04	0.00
R square		0.70		R square		0.89	
Adjusted R square		0.63		Adjusted R square		0.86	
Long-run variance		0.16		Long-run variance		0.27	

Note(s): The significance level is 5%
*: The model was estimated after eliminating *TRF*, since it was not significant, which results in better model specification

the gender gap and disparity within the lower and upper-middle-income countries, whereas female unemployment may cause it to expand. In *Model 2*, the impact of FUR on GDI is negative, while the GDP growth has a positive impact on GDI. These results reveal that more female unemployment may reduce women's empowerment in lower and upper-middle-income countries, whereas more GDP growth may increase women's empowerment.

Furthermore, the results of the estimation of both models provide conflicting estimates (opposite signs of the key determinants of the dependent variable) reflecting the significance of the political dimension regardless of the level of income in all groups of countries. The results show clearly the sensitivity of empirical findings to various measures of the gender gap.

7. Conclusion
This paper investigates the impact of trade liberalization as a composite index – OPN and tariffs – on women empowerment measured by the GGI and GDI, by gathering evidence from Arab countries and explores if the effect of trade liberalization on women empowerment differs based on the income levels whereas the target sample of this study is divided into two groups based on income levels the higher-income countries (Bahrain, Kuwait, Oman, Qatar, the KSA and the UAE), and the lower and upper-middle-income countries (Algeria, Egypt, Jordan, Morocco and Tunisia) spanning the period 1995–2020. The study also considers the other factors that may influence the gender gap, such as GDP growth and the FUR.

Second, it also considers how the policy of OPN that has been adopted by most countries of the region has contributed to economically empowering women and bridging the overall gender gap in the region?

On the first question of the study, our empirical findings reveal that OPN, GDP growth and female unemployment are crucial macro factors that responsible for the gender gap in the region. The impact of OPN on the gender gap varies between the two groups of countries in the long run, where the results indicated that OPN shows a positive and significant impact on the gender gap within higher-income countries, while it shows a negative and significant

impact on the gender gap in lower and upper-middle-income countries. In addition, GDP growth shows a negative and significant impact on the gender gap between the two groups of countries, while female unemployment has a positive and significant impact on the gender gap between the two groups in the long run. Thus, more OPN and female unemployment within the higher-income group may increase the gender gap (disparity), whereas increasing GDP growth may reduce it. On the other hand, more OPN and GDP growth may reduce the gender gap (disparity) within the lower and upper-middle-income countries, whereas female unemployment may increase it.

On the second question of the study, the findings reveal that gender development within the two groups of countries is affected negatively by OPN, tariff and female unemployment, while GDP growth shows a positive and significant impact on it in the long run meaning that more OPN, tariffs and female unemployment may reduce women's empowerment within the two groups, but more GDP growth may support women's empowerment. Therefore, the policy of OPN that has been adopted by most countries of the region has contributed negatively on women empowerment.

In terms of policy recommendations, decision-makers should be able to reevaluate and manage OPN, maintaining an increasing rate of economic growth and a low FUR. Developing institutional arrangements for controlling trade liberalization and fighting female unemployment, including the implementation of consistently low and credible TRFs, would therefore seem to have potentially large benefits in terms of women's empowerment and reducing gender disparity.

This research can be expanded in the future by adding other regions for comparative purpose, and also by expanding the time dimension of the panel data and probably using other measures of trade liberalization to assess the stability of the empirical findings.

Notes

1. Empowering Women Entrepreneurs through Information and Communications Technologies: A Practical Guide (English) –UNCTAD Current Studies on Science, Technology and Innovation, No. 9 (UNCTAD/DTL/STICT/2013/2) December 30 2014.

2. The global gender gap methodology was issued by the WEF, available at: https://reports.weforum.org/global-gender-gap-report-2018/measuring-the-global-gender-gap/.

3. The GDI calculation and technical notes are available at the UNDP: https://hdr.undp.org/system/files/documents//technical-notes-calculating-human-development-indices.pdf.

4. World Bank staff estimates using the World Integrated Trade Solution system, based on data from the UNCTAD Trade Analysis and Information System (TRAINS) database and the WTO's Integrated Data Base (IDB) and Consolidated Tariff Schedules (CTS) database.

References

Ahmed, N. and Bukhari, S.K. (2006), "Gender inequality and trade liberalization: a case study of Pakistan", *Forman Journal of Economics Studies*, Vol. 2 No. 1, pp. 28-38.

Al-Sabti, L. and Warrad, T. (2017), "Gender inequality in education and its impact on economic growth in Algeria: an applied study for the period 1980-2014", *Jordan Journal of Economic Sciences*, Vol. 4 No. 2, pp. 151-170.

Alrabadi, D., Al-Abdallah, S. and Abu Aljarayesh, N. (2018), "Behavioral biases and investment performance: does gender matter? Evidence from Amman stock exchange", *Jordan Journal of Economic Sciences*, Vol. 5 No. 1, pp. 77-92.

Assaf, A. (2018), "Evaluating the impact of trade openness on women's job opportunities: an analysis for Middle East countries", *Global Journal of Economics and Business*, Vol. 4 No. 1, pp. 99-110.

Audi, M. and Ali, A. (2016), "Gender gap and trade liberalization: an analysis of some selected SAARC countries", MPRA Paper No. 83520, available at: https://mpra.ub.uni-muenchen.de/83520/1/MPRA_paper_83520.pdf

Baltagi Badi, H. (2005), *Econometric Analysis of Panel Data*, 3rd ed., John Wiley & Sons, England.

Banerjee, P. and Veeramani, C. (2015), "Trade liberalization and women's employment intensity: analysis of India's manufacturing industries", Indira Gandhi Institute of Development Research Working Paper, pp. 2015-2018, available at: http://www.igidr.ac.in/pdf/publication/WP-2015-018.pdf

Becker, G. (1957), *The Economics of Discrimination*, University of Chicago Press, Chicago.

Besedeš, T., Lee, S.H. and Yang, T. (2021), "Trade liberalization and gender gaps in local labor market outcomes: dimensions of adjustment in the United States", *Journal of Economic Behavior and Organization*, Vol. 183 No. C, pp. 574-588, available at: https://cpb-us-w2.wpmucdn.com/sites.gatech.edu/dist/7/1661/files/2020/10/draft_gender_060220.pdf

Black, S.E. and Brainerd, E. (2004), "Importing equality? The impact of globalization on gender discrimination", *Industrial and Labor Relations Review*, Vol. 57 No. 4, pp. 540-559.

Cagatay, N. (2005), *Gender Inequalities and International Trade: A Theoretical Reconsideration*, Department of Economics, University of Utah, Consultado el.

Der Boghossian, A. (2019), "Trade policies supporting women's economic empowerment: trends in WTO members", (No. ERSD-2019-07). WTO Staff Working Paper, World Trade Organization (WTO), Geneva.

Ederington, J., Minier, J. and Troske, K.R. (2009), "Where the girls are: trade and labor market segregation in Colombia", IZA Discussion Paper 4131, Institute of Labor Economics (IZA), Bonn, available at: https://www.iza.org/publications/dp/4131/where-the-girls-are-trade-andlabormarket-segregation-in-colombia

EL-Hamidi, F. (2008), "Trade liberalization, gender segregation, and wage discrimination: evidence from Egypt", Economic Research Forum Working Papers No. 414.

Giovannetti, G., Sanfilippo, M. and Vivoli, A. (2021), "Trade liberalization, employment, and gender in Ethiopia", WIDER Working Paper 2021/59, United Nations University World Institute for Development Economics Research, available at: https://www.wider.unu.edu/sites/default/files/Publications/Working-paper/PDF/wp2021-59-trade-liberalization-employment-gender-Ethiopia.pdf

Gupta, A. (2021), "Effect of trade liberalization on gender inequality: the case of India", *IMF Economic Review*, Vol. 69 No. 4, pp. 682-720, doi: 10.1057/s41308-021-00143-7.

ILO Web site (2022), available at: https://www.ilo.org/beirut/areasofwork/equality-discrimination/lang--en/index.htm

Im, K.S., Pesaran, M.H. and Shin, Y. (2003), "Testing for unit roots in heterogeneous panels", *Journal of Econometrics*, Vol. 115 No. 1, pp. 53-74.

International Trade Centre (2020), "Delivering on the buenos aires declaration on trade and women's economic empowerment", Geneva, available at: https://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/ITC_TIG_Report_20201209_02_web_pages.pdf

Jamielaa, M. and Kawabata, K. (2018), "Trade openness and gender wage gap: evidence from Indonesia", *Journal of International Cooperation Studies*, Vol. 26 No. 1, pp. 25-39.

Juhn, C., Ujhelyi, G. and Villegas-Sanchez, C. (2013), "Trade liberalization and gender inequality", *American Economic Review*, Vol. 103 No. 3, pp. 269-273.

Korinek, J. (2005), "Trade and gender: issues and interactions", OECD Trade Policy Working Paper No. 24, available at: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.523.952&rep=rep1&type=pdf

Korinek, J., Moïsé, E. and Tange, J. (2021), *Trade and Gender: A Framework of Analysis*, OECD Trade Policy Papers, No. 246, OECD Publishing, Paris, doi: 10.1787/6db59d80-en.

Lee, Y.-S. (2005), "Foreign direct investment and regional trade liberalization: a viable answer for economic development", *Journal of World Trade*, Vol. 39, pp. 701-717.

Levin, A., Lin, C.F. and Chu, C.S.J. (2002), "Unit root tests in panel data: asymptotic and finite-sample properties", *Journal of Econometrics*, Vol. 108 No. 1, pp. 1-24.

Love, P. and Lattimore, R. (2009), "Protectionism? Tariffs and other barriers to trade", in *International Trade: Free, Fair and Open*, pp. 54-57.

OECD organization (2021), "Trade and gender. Trade policy brief", available at: https://www.oecd.org/trade/topics/trade-and-gender/

Pedroni, P. (1999), "Critical values for cointegration tests in heterogeneous panels with multiple regressors", *Oxford Bulletin of Economics and Statistics*, Vol. 61 No. S1, pp. 653-670.

Pedroni, P. (2001), "Fully modified OLS for heterogeneous cointegrated panels", in *Nonstationary Panels, Panel Cointegration, and Dynamic Panels*, Emerald Group Publishing, Vol. 15, pp. 93-130.

Pedroni, P. (2004), "Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis", *Econometric Theory*, Vol. 20 No. 3, pp. 597-625.

Rasekhi, S. and Hosseinmardi, H. (2012), "An impact of globalization on gender wage inequality: a case study of selected developing countries", *International Journal of Business and Development Studies*, Vol. 4 No. 1, pp. 27-40.

Rubery, J. and Johnson, M. (2019), "Closing the gender pay gap: what role for trade unions?", ILO Actrav Working Paper. 978-92-2-133301-2 (web pdf), International Labour Office. Bureau for Workers' Activities, available at: https://www.ilo.org/wcmsp5/groups/public/--ed_dialogue/actrav/documents/publication/wcms_684156.pdf

Santos, M.H. and Arbache, J.S. (2005), *Trade openness and gender discrimination*, World Bank, Washington, DC, Working Paper, available at: https://openknowledge.worldbank.org/handle/10986/26454

Seguino, S. (2000), "Accounting for gender in Asian economic growth", *Feminist Economics*, Vol. 6 No. 3, pp. 27-58.

Shamlawi, H. and Saqfalhait, N. (2016), "Women empowerment in the Arab region: a comparative investigation", *International Journal of Business and Economics Research*, Vol. 5 No. 6, pp. 191-201.

Shamlawi, H. and Saqfalhait, N. (2018), "Factors affecting women labor force participation rate in Jordan", *Jordan Journal of Economic Sciences*, Vol. 5 No. 2, pp. 111-125.

The World Bank, world development indicators, available at: https://databank.worldbank.org/source/world-development indicators/Type/TABLE/preview/on#

Unicef (2017), "Gender equality, glossary of terms and concepts, Unicef regional office for South Asia, November 2017", available at: https://www.unicef.org/rosa/media/1761/file/Gender%20glossary%20of%20terms%20and%20concepts%20.pdf

United Nations (2011), "Gender equality and trade policy", Resource paper, United Nations Inter-Agency, Women watch, Network on Women and Gender Equality, available at: https://www.un.org/womenwatch/feature/trade/gender_equality_and_trade_policy.pdf

United Nations Development Programme, human development reports, available at: http://hdr.undp.org/en/content/gender-development-index-gdi

Wang, F., Kis-Katos, K. and Zhou, M. (2020), "Trade liberalization and the gender employment gap in China", IZA Discussion Papers, No. 13626, Institute of Labor Economics (IZA), Bonn, available at: https://docs.iza.org/dp13626.pdf

Westerlund, J. (2008), "Panel cointegration tests of the Fisher effect", *Journal of Applied Econometrics*, Vol. 23 No. 2, pp. 193-233.

World Bank and World Trade Organization (2020), "Women and trade: the role of trade in promoting gender equality", available at: https://www.wto.org/english/res_e/publications_e/women_trade_pub2807_e.htm

World Economic Forum, Global Gender Gap Reports, available at: https://www.weforum.org/reports

Further reading

Wang, F., Kis-Katos, K. and Zhou, M. (2020), "Trade liberalization and the gender employment gap in China", CeGE Discussion Papers, No. 399, Center for European, Governance and Economic Development Research (CeGE), Göttingen, available at: https://www.econstor.eu/bitstream/10419/222578/1/1726024792.pdf

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