

## The Impact of Trade Openness on Gender Pay Gap

Taleb Awad Warrad<sup>1</sup> , Ali Ibrahim Awartany<sup>2</sup> , Alaa' Saber Al Hourani<sup>3</sup> 

<sup>1</sup> Professor of Economics and WTO-Chair Holder, Department of Business Economics, School of Business, the University of Jordan, Jordan.

[t.awad@ju.edu.jo](mailto:t.awad@ju.edu.jo)

<sup>2</sup> Chief Compliance and Risk Management Officer, Gate to Pay, Jordan. [ali\\_awartany@hotmail.com](mailto:ali_awartany@hotmail.com)

<sup>3</sup> Head of Best Practice Department, Social Security Corporation, Jordan. [Hourani.alaa@icloud.com](mailto:Hourani.alaa@icloud.com).

Received: 18/3/2023

Revised: 13/5/2023

Accepted: 22/8/2023

Published: 1/7/2024

Citation: Warrad, T. A., Awartany, A. I. ., & Al Hourani, A. S. . (2024). The Impact of Trade Openness on Gender Pay Gap. *Jordan Journal of Economic Sciences*, 11(2), 102–112. <https://doi.org/10.35516/jjes.v11i2.1016>

### Abstract

**Objective:** The objective of this study is to assess the impact of trade openness (among other variables) on gender pay gap in twenty selected Arab and non-Arab countries. A panel data covering the period 2010-2019 is utilized..

**Method:** A two panel regression models are employed. One model examines the impact of trade percentage of GDP, foreign direct investment (FDI) percentage of GDP, women's labor participation, and women's participation in parliament on the gender pay gap. The same model is applied first to all countries in the sample, and second to the sample dividing countries according to size as large and small countries.

**Results:** The findings indicate that, in the overall sample, trade percentage of GDP positively and significantly influences the gender pay gap percentage, while FDI percentage of GDP has a negative and significant impact. Additionally, women's participation in parliament is found to have a negative and significant effect on the gender pay gap, whereas women's labor participation shows no significant correlation. In the context of large countries, trade percentage of GDP has a positive and significant impact on the gender pay gap, and women's labor participation is negatively associated with the gap. However, FDI percentage of GDP and women's parliamentary participation are not statistically significant in these countries. For small countries, only women's participation in parliament exhibits a negative and significant relationship with the gender pay gap.

**Conclusion:** The study's results highlight the complex dynamics between trade openness and gender wage inequality, emphasizing the varying effects based on country size. Policymakers should consider these findings to develop targeted strategies addressing gender pay disparities within the context of trade openness

**Keywords:** Trade openness, Gender pay gap, Foreign direct investment, Women Participation in Labor Force.

### تأثير الإنفتاح التجاري على فجوة الأجور بين الجنسين

طالب عوض وراذ<sup>1</sup>، علي إبراهيم عورتاني<sup>2</sup>، آلاء صابر الحوراني<sup>3</sup>

<sup>1</sup> أستاذ في الاقتصاد وعضو لكرسي منظمة التجارة العالمية، قسم اقتصاد الاعمال، كلية الأعمال، الجامعة الأردنية.

<sup>2</sup> رئيس دائرة الامتثال وإدارة المخاطر، شركة إيلاف الأردنية للحلول المتكاملة.

<sup>3</sup> رئيس قسم أفضل الممارسات، المؤسسة العامة للضمان الاجتماعي.

### ملخص

**الأهداف:** يهدف هذا البحث إلى تقييم تأثير الإنفتاح التجاري على عدم المساواة في الأجور بين الجنسين في 20 دولة مختارة عربية وغير عربية. وقد تم استخدام السلاسل الزمنية المقطعية التي تغطي الفترة من 2010 إلى 2019، وتم توظيف نموذجي انحدار مقطعي زمني. المنهجية: وقد تم تقدير النموذج باستخدام العينة كاملة لقياس تأثير نسبة التجارة من الناتج المحلي الإجمالي ونسبة الاستثمار الأجنبي المباشر من الناتج المحلي الإجمالي ومشاركة النساء في سوق العمل ومشاركة النساء في البرلمان على فجوة الأجور بين الجنسين، وتم إعادة التقدير لنفس النموذج بعد تقسيم دول العينة إلى فئتين: الدول الكبيرة والصغيرة.

**النتائج:** تشير النتائج إلى أن نسبة التجارة من الناتج المحلي الإجمالي تؤثر إيجاباً وبشكل ملحوظ على فجوة الأجور بين الجنسين في العينة الكلية، بينما كان تأثير نسبة الاستثمار الأجنبي المباشر من الناتج المحلي الإجمالي سلبياً ومعنوياً. وبالإضافة إلى ذلك، تبين أن مشاركة النساء في البرلمان لها تأثير سلبى ومعنوياً على فجوة الأجور بين الجنسين، بينما لا تظهر مشاركة النساء في سوق العمل أي ترابط معنوياً. فيما يتعلق بالدول الكبيرة، فقد وجد الباحثون أن نسبة التجارة من الناتج المحلي الإجمالي تؤثر إيجابياً وبشكل معنوياً على فجوة الأجور بين الجنسين، ومشاركة النساء في سوق العمل مرتبطة بشكل سلبى بالفجوة بين الجنسين. ومع ذلك، فإن نسبة الاستثمار الأجنبي المباشر من الناتج المحلي الإجمالي ومشاركة النساء في البرلمان لم تظهر تأثيراً معنوياً في هذه الدول. بالنسبة للدول الصغيرة، فقد وجد الباحثون أن مشاركة النساء في البرلمان فقط لها تأثير سلبى ومعنوياً على فجوة الأجور بين الجنسين.

**الخلاصة:** تسلط نتائج الدراسة الضوء على الديناميات المعقدة بين الإنفتاح التجاري وعدم المساواة في الأجور بين الجنسين. مؤكدة التأثيرات المتباينة استناداً إلى حجم الدول. يجب على صانعي القرار أخذ هذه النتائج بعين الاعتبار أثناء وضع استراتيجيات مستهدفة للتعامل مع اختلافات الأجور بين الجنسين في سياق الإنفتاح التجاري.

**الكلمات الدالة:** الإنفتاح التجاري؛ فجوة الأجور بين الجنسين؛ الاستثمار الأجنبي المباشر؛ مشاركة النساء في سوق العمل.



© 2024 DSR Publishers/ The University of Jordan.

This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY-NC) license <https://creativecommons.org/licenses/by-nc/4.0/>

## 1. INTRODUCTION

In the recent years it's noticed that the women higher education and school's enrollment increased, many countries changed their regulations toward more equality between males and females, it's also noticed that the women participation in politics, business boards, and trade unions is greater than any time before, but it's also noticed that the practices of discrimination against women are still exist in many countries specially the poor and developing. This discrimination can be partially justified by the human capital differences between males and females, but still there is a main part of the discrimination and wage gap that need to be explained (Levine, 2003). Based on Becker's theory (1971), The discrimination between males and females will not remain for long-run due to the competition. As the increasing competition caused by the international trade is expected to reduce any wage gaps between males and females in the long run. (Wood, 1991) mentioned that the growth of trade will increase the number of available job opportunities which will lead to more women participation in the labor market. trade openness might increase the wage gap as the multinational corporations will be able to access a lower wage resource in many countries instead of hiring the females.

It is well-known that female workers are in a disadvantaged position against their male peers in terms of both earnings and employment status. The 2018 Jordan department of statistics report estimated the gender pay gap in the public sector at 18%, and 14.1% in the private sector. The average monthly earnings of males in the public sector are around 642 JOD compared to JOD 544 for females. It's also well noted that the gender pay gap is different between public and private sectors. As the median wage in the private sector for males is 7% higher than the median wage for females, according to estimates. In the public sector, however, the median wage for females is 13% higher than the median wage for males.

This paper aims to answer the following questions: is there any effect of trade openness on gender wage gap? What is the impact of social conditions such as female participation in the parliament and in the labor force on gender wage gap? What is the impact of human development index (HDI) on gender wage gap? What is the impact of foreign direct investment on gender wage gap?

To answer these questions, The researchers employed and estimated a Panel regression for a sample of 20 countries covering the period 2010 - 2019 which have been selected based on the available data. The panel regression conducted on all countries and on the two separate sets of data one for large countries and one for small countries to test the relationship between the dependent variable (gender wage gap) and other independent variables based on the country size.

## 2. LITERATURE REVIEW

The theoretical background which focusses on the relationship between trade openness and gender wage gap is mainly based on two mainstream theories, Heckscher-Ohlin-Samuelson (HOS) theory (1991) and Becker's theory (1971) of discrimination. Both theories focus on the positive impact of trade openness on gender wage gap.

Based on Heckscher-Ohlin-Samuelson model, countries which focus on unskilled labor will end in an unskilled labor-intensive export, they will cause a significant demand for lower-skilled labor, accordingly the wages of unskilled labor will increase relative to skilled labor, this relationship explains the gender wage gap in developing countries opening to trade as women usually employed in lower-wage, lower skilled jobs than men.

The effect of trade on the wage gap between males and females depends on several sub factors. The wage gap may be narrowed because of trade, other factors such as deregulation can increase competition between the companies, this will impose those companies to reduce the costs which will end up with less discrimination against females with comparable skills to males as this will lead to more wage equality. This impact will vary between sectors as it will be higher in the sectors

that are dominated by a few numbers of companies (higher market concentration).

Trade usually requires a higher and specialized skills as this usually results in widening the wage gap between skilled and unskilled employees which might have a relationship with gender wage gap assumed that the average males have a higher level of labor market skills than females in most countries, most previous studies argued that technological changes that depend on the skills rather than the trade itself is important factor that determining the required enhancements in the skills, noting that such technological change often takes place by the integration between trade and capital market Greenaway and Nelson (2000). Low skills workers are often employed on a temporary basis, females lack of skills relative to males increase the possibility for them to be hired in a temporary basis they also will not be able to negotiation the salary or other work conditions. A large inclusion of low skills women workers in the labor force because of the expansion in the export sectors, may have a negative impact on their salary.

Hailat, A. and Hailat, M. (2021), the study explored the influence of an individual's educational level on their employment opportunities and income in Jordan. The investigation utilized micro-data from the Jordan Labor Market Panel Survey conducted in both 2010 and 2016. By employing Probit and Standard Linear Regression Models, the primary findings were outlined as follows: Attaining higher levels of education is linked to heightened employment prospects and increased earnings. As an individual's educational attainment level advances, their probability of employment and monthly earnings also rise. Although the impact of educational attainment on employment and wages exhibited a decline in 2016 compared to 2010, the trend remained positive and held statistical significance. Furthermore, work experience and household wealth displayed a favorable association with both employment and wages, with these effects displaying gender-based variations. It's noteworthy that while wage disparities across different sectors exist, there is no substantial evidence indicating wage discrepancies based on nationality.

Ileri and Ulu (2021) investigated the impact of trade openness on female workers earnings in manufacturing sector inside Turkey's. They used the export intensity of the manufacturing sector as a measure for trade openness by dividing the export value to production value. They collected earning survey data for 2010 and 2014 and assessed the effect of the export intensity on the wage gap between males and females, the researchers found that an increase of one percentage in the export intensity will lead to 0.17 percent increase in the wage gap, they also analyzed the relationship between gender wage gap and trade by grouping the sectors into four groups based on the export intensity for each group based on that analysis the researchers found the same negative impact of the trade intensity on the gender wage gap.

Gedik and Gunel (2021) Analyzed the impact of factors that affecting gender pay gap for a sample which related to selected OECD countries covering the period of 1996-2016, the researchers found that there is a negative impact of life expectancy at birth, female's participation in the labor force, higher level of education on gender wage gap. They also proved that the increase in the employment rates of females in the industrial sector affecting gender wage gap negatively. They also found that the low education level of females and the increase in women population over 65 years age have a positive impact on the gender wage gap.

Yousef, E. and Warrad, T. (2020) conducted a study exploring key determinants of economic growth in Arab countries (AC). Using panel data from 1998 to 2017, they found that factors such as labor force growth, capital formation, trade openness, economic freedom, and governance indicators significantly contribute to AC's economic growth. Recommendations include increased investment in human and fixed capital, leveraging comparative advantages in manufacturing and exports, and fostering political and social stability through unity and the rule of law.

Kim (2020) examined the effect of the export on the wage gap between males and females in South Korea manufacturing

sector using a panel data, the researcher measured the impact of output growth using exports on both female employment and the real gender wage gap from 1994 to 2017. According to the used variables and data the researcher found that there is significant impact of output or export growth the real gender wage gap.

Warrad (2018) evaluated the impact of trade openness on one of the main socioeconomic challenges (unemployment) for Arab countries. The study main objective is to assess the impact of economic growth and liberalizing international trade (trade openness) in reducing the unemployment rate by creating more job opportunities. The researcher used a cross time series sample of the period 1990-2015 for seven Arab countries. the study found a significant impact of trade openness on unemployment rates in the selected Arab countries.

Assaf (2018) Evaluated the relationship between trade openness as a result of liberalization policies and its impact on employment opportunities for females in 16 Middle East countries, the researcher measured the trade openness as the trade share (%) of GDP, the researcher also used gender inequality in education (gender parity index (GPI)) which reflect the enrolment ratio of females to males in the primary and secondary schools, and active female participation in the labor force as an indicators to measure gender inequality, the study used simple linear regression to measure the effect of trade openness on the women employment opportunities in the study countries. The researcher proved that there is a significant effect of trade openness on females' employment rate for all countries included in the study except (Jordan, Egypt, and West Bank and Gaza). The study also showed that there is a significant impact of trade openness on the women employment ((% of Total Labor Force) for all countries covered in the study except (Jordan, Egypt, Lebanon, Saudi Arabia, Oman, Qatar, Jordan, Turkey, and West Bank and Gaza). The results showed also a significant positive effect (in favor of males) of trade openness on Gender inequality for (Lebanon, Iran, Oman, Syrian Arab Republic, and Turkey) and a significant negative effect (in favor of females) for (Kuwait) While there is no significant effect of trade openness on Gender equality in (Jordan, Qatar, and Egypt).

Mukhopadhyay (2018) analyzed the labor market consequences of trade liberalization by considering gender equality from a supply side. He examined the impact of trade liberalization on gender wage gap and women participation in labor force. The researcher developed a three-sector general equilibrium model in which women labor supply is identified as a group household decision and depends on the earning of males and females and the power distribution intra-household. In addition, the impact of the social norms in the distribution women power. The research found that the reduction of tariff may have a negative impact on female labor force participation and increase gender wage gap. The research results highlighted that the trade liberalization impact depend on two factors, the intensity conditions and the relative work preferences of males and females, that also created by social norms. The study explained the gendered labor market consequences in India after the trade liberalization.

Alhawarin and Kreishan (2017), focused on the characteristics of wage and salary workers earning below the minimum wage (MW) in Jordan's private sector. The findings revealed widespread violation of MW regulations by employers. Around 16.5% of private sector workers receive wages below the prevailing MW rate, with a MW-gap of approximately 27% (about 41 JD). The study showed that violations are more prominent in informal occupations (about 27%), but it extends beyond to formal activities (almost 6%). Female, younger, less educated workers, and those employed in micro and small firms are more likely to earn below the applicable MW rate.

Al-Tarawneh & Al-Assaf (2014), examined the relationship between trade openness and real investment in Jordan from 1976 to 2010. Using an Autoregressive Distributed Lag (ARDL) approach, the study explored how trade openness affects investment in the Jordanian economy. The empirical results revealed a stable long-run investment function. In the short-run, trade openness had a positive and significant impact on real investment, which aligns with previous literature findings using cointegration techniques.

Rasekhi & Hosseinmardi (2012) studied the impact of trade openness on gender pay gap they have collect panel data for 21 selected developing countries covering the period of 2000-2007. The researchers concluded that trade openness has a positive impact on gender wage gap, they also found that HDI and education level have a negative impact on gender wage gap. Also, they found a significant negative relationship between the participation of women in legislative institutions and gender wage gap, in addition, the study showed that the wage gender gap can be decreased with increasing freedom society rights.

### 3. STUDY SAMPLE AND METHODOLOGY

#### 3.1. Study Sample

This study used imports and exports flows covering the period 2010- 2019 for twenty countries including Egypt, France, Germany, Greece, Guatemala, Iceland, Japan, Jordan, Portugal, Qatar, Romania, Saudi Arabia, Singapore, Slovakia, Spain, Turkey, United Kingdom, United States, Uruguay, and Vietnam. Data was extracted from data bases of ILO department of statistics, World Bank, and Jordanian Department of Statistics (DoS). The study variables are defined as follows: foreign direct investment (FDI) net inflows as percentage of GDP, trade openness as percentage of GDP, female labor participation is measured as women percentage of labor force, and proportion of seats held by women in national parliaments were all extracted from World Bank Database. Average monthly earnings of employees extracted from ILO department of statistics and missing data extracted from DOS.

The study used panel data sample to estimate the econometric model, due to its advantages over both cross-section and time- series data sets, as it has less multicollinearity and more degrees of freedom that leads to a better estimate and provide additional flexibility in modelling differences in behavior across countries which enables to control for unobserved heterogeneity.

#### 3.2. Methodology

The key objectives of this study are to investigate the impact of trade openness on gender wage inequality, to see whether the earnings difference between male and female will be narrowed or widened. A conceptual framework is developed based on a review of the literature on trade openness and gender pay gap, that showing the relationship between the trade openness and gender pay gap, therefore this study will be based on the following conceptual framework:

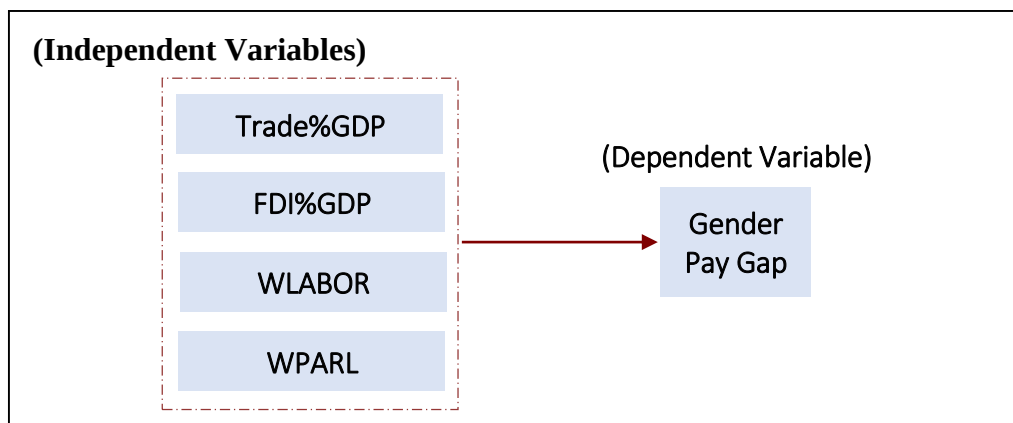


Figure (3.1): Diagram of the conceptual framework.

Based on economic theory and literature review the following model is adopted:

$$GPG_{it} = c(1) + c(2) * (TRADE\%GDP)_{it} + c(3) * (FDI\%GDP)_{it} + c(4) * (WLABOR)_{it} + c(5) * (WPARL)_{it} + \varepsilon_{it}$$

Where, i and t indicate country and year respectively, GPG is the gender pay gap and all other variables are as defines earlier.

The researchers used two indicators to measure a country's degree of liberalization: first trade openness which is measured by total trade (sum of exports and imports of goods and services) as percentage of Gross Domestic Product (GDP), second, the and the percentage of FDI inflow as percentage of GDP. In this study, the gender pay gap is measured by subtracting the average wage level for women from that for men, and then dividing the remainder by the average wage level of men.

Regarding the Foreign direct investment, net inflows percentage of GDP, we consider foreign direct investment the net inflows of investment to acquire a lasting management interest in an enterprise as a share of gross domestic product.

To measure women's absolute employment rate, we used female employment rate data. Labor force participation rate is the proportion of the population ages 15 and older that is economically active which represent all people who supply labor to produce goods and services during a specified period.

About the proportion of seats held by women in national parliaments percentage, women in parliaments are the percentage of parliamentary seats in a single or lower chamber held by women.

We've employed two variables to measure the gender inequality including the percentage of women in labor force (WLABOR) and the percentage of women in parliament (WPARL).

#### 4. THE RESEARCH HYPOTHESES

Within this framework, the following research hypotheses are developed and tested to comprehensively address the study's objectives and research questions.

**H1:** The Trade percentage of GDP has no statistically significant impact on the gender pay gap percentage.

**H2:** The Foreign Direct Investment percentage of GDP has no statistically significant impact on the gender pay gap percentage.

**H3:** The percentage of worker women in labor market has no statistically significant impact on the gender pay gap percentage.

**H4:** The percentage of women participation in parliament has no statistically significant impact on the gender pay gap percentage.

**Table (1): Variables Averages in the countries of study sample.**

| Variables<br>Country | (%) of<br>Gender Pay<br>Gap<br>(Current) | (%) of<br>Openness<br>in GDP | (%)<br>of<br>FDI<br>in<br>GDP | (%) Female<br>participation<br>rate in labor<br>market | (%) of<br>Female in<br>Parliament | GDP per<br>capita<br>(Current<br>JOD) | Country<br>Classification |
|----------------------|------------------------------------------|------------------------------|-------------------------------|--------------------------------------------------------|-----------------------------------|---------------------------------------|---------------------------|
| Egypt                | 10.1                                     | 41.3                         | 2.1                           | 22.7                                                   | 9.5                               | 2,152                                 | Small                     |
| France               | 17.2                                     | 60.8                         | 1.5                           | 47.7                                                   | 28.8                              | 28,704                                | Large                     |
| Germany              | 19.5                                     | 85.6                         | 2.2                           | 46.1                                                   | 33.7                              | 31,772                                | Large                     |
| Greece               | 14.0                                     | 66.3                         | 1.2                           | 43.5                                                   | 19.6                              | 14,927                                | Large                     |
| Guatemala            | 3.7                                      | 53.7                         | 2.0                           | 34.0                                                   | 13.8                              | 2,724                                 | Small                     |
| Iceland              | 21.7                                     | 94.0                         | -0.8                          | 47.3                                                   | 40.5                              | 40,476                                | Large                     |
| Japan                | 27.9                                     | 33.3                         | 0.3                           | 42.8                                                   | 9.6                               | 29,459                                | Large                     |
| Jordan               | 8.2                                      | 102.1                        | 4.5                           | 17.9                                                   | 13.0                              | 2,900                                 | Small                     |
| Portugal             | 17.6                                     | 79.3                         | 4.6                           | 48.6                                                   | 32.5                              | 15,400                                | Large                     |
| Qatar                | 15.9                                     | 94.9                         | 0.4                           | 13.0                                                   | 2.9                               | 50,361                                | Large                     |
| Romania              | 6.6                                      | 82.3                         | 2.4                           | 43.5                                                   | 15.3                              | 7,083                                 | Small                     |

| Variables<br>Country | (%) of Gender Pay Gap (Current) | (%) of Openness in GDP | (%) of FDI in GDP | (%) Female participation rate in labor market | (%) of Female in Parliament | GDP per capita (Current JOD) | Country Classification |
|----------------------|---------------------------------|------------------------|-------------------|-----------------------------------------------|-----------------------------|------------------------------|------------------------|
| Saudi Arabia         | 1.3                             | 74.2                   | 1.6               | 15.6                                          | 13.9                        | 15,955                       | Large                  |
| Singapore            | 16.9                            | 344.3                  | 23.0              | 41.2                                          | 23.6                        | 40,865                       | Large                  |
| Slovakia             | 22.8                            | 178.9                  | 2.6               | 45.0                                          | 18.6                        | 12,639                       | Small                  |
| Spain                | 22.3                            | 62.8                   | 2.5               | 45.8                                          | 38.7                        | 20,477                       | Large                  |
| Turkey               | 10.1                            | 53.9                   | 1.5               | 31.5                                          | 14.6                        | 7,774                        | Small                  |
| United Kingdom       | 35.3                            | 60.1                   | 3.0               | 46.5                                          | 26.7                        | 30,489                       | Large                  |
| United States        | 24.7                            | 28.5                   | 1.8               | 46.0                                          | 19.4                        | 39,751                       | Large                  |
| Uruguay              | 23.6                            | 49.7                   | 4.5               | 45.1                                          | 15.7                        | 11,513                       | Small                  |
| Vietnam              | 10.3                            | 179.0                  | 5.9               | 47.8                                          | 25.4                        | 1,446                        | Small                  |

Source: Prepared by the Researchers

Table (1) reveals several noteworthy observations and differences among the countries. Firstly, there is significant variation in the Gender Pay Gap, ranging from as low as 1.3% in Saudi Arabia to as high as 35.3% in the United Kingdom, indicating varying levels of gender wage disparity across the nations. Secondly, the Female Participation Rate in the Labor Market ranges widely, from 13.0% in Qatar to 47.8% in Vietnam, highlighting disparities in women's involvement in the workforce. Additionally, the Percentage of Female in Parliament varies significantly, with Iceland leading at 40.5%, while Jordan and Qatar have comparatively low female representation at 13.0% and 2.9%, respectively. Economically, countries like Singapore and Vietnam demonstrate remarkably high levels of openness in GDP and FDI in GDP, suggesting their strong engagement in international trade and foreign investments. Furthermore, there is substantial variation in GDP per capita, with Qatar boasting the highest at \$71,131, and Vietnam at the lower end with \$2,042. Overall, these disparities reflect the diverse socio-economic and gender-related landscapes among the countries in the table.

## 5. ECONOMETRIC ANALYSIS

To investigate the relationship between the gender pay gap (dependent variable) and trade openness, FDI, percentage of women in labor force (WLABOR) and the percentage of women in parliament (WPARL) (independent variables). Greene (2018). We conducted Panel Fully Modified Least Squares (FMOLS) analysis using Eviews as the following:

- 1) Panel Fully Modified Least Squares (FMOLS) for all the twenty countries.
- 2) Panel Fully Modified Least Squares (FMOLS) for the countries, where the GDP per capita is equal or greater than 20,000 US\$.
- 3) Panel Fully Modified Least Squares (FMOLS) for the countries, where the GDP per capita is less than 20,000 US\$.
- 4) Levin, Lin & Chu unit root test to test the variables stationarity.
- 5) Pedroni Residual Co-integration Test

### 5.1. Empirical Results

Before estimating the model, the unit root test is used to test the stationarity of all study variables. There are different tests used to test the variables stationarity. This study used Levin, Lin & Chu unit root test to test the variables stationarity.

Table 2 shows the results of applying the unit root test for the study variables. It shows that most of the study variables

(GPG%, TRADE%GDP, WLABOR, WPARL) are stationary at the level since the P-values for them is less than 5%, but the (FDI%GDP) is non-stationary variable which is I(1).

**Table 2: Unit Root Test Using (Levin, Lin and Chu) Test**

| Variable         | Statistics Value | P-Value | Decision       |
|------------------|------------------|---------|----------------|
| <b>GPG%</b>      | -4.34161         | 0.0000  | Stationary     |
| <b>TRADE%GDP</b> | -2.11511         | 0.0172  | Stationary     |
| <b>FDI%GDP</b>   | 0.08956          | 0.5357  | Non-Stationary |
| <b>WLABOR</b>    | -2.69536         | 0.0035  | Stationary     |
| <b>WPARL</b>     | -1.67042         | 0.0474  | Stationary     |

At first difference

| Variable                                      | Statistics Value | P-Value | Decision   |
|-----------------------------------------------|------------------|---------|------------|
| <b>GPG%</b>                                   | -10.7309         | 0.0000  | Stationary |
| <b>TRADE%GDP</b>                              | -7.56443         | 0.0000  | Stationary |
| <b>FDI%GDP</b>                                | -5.91890         | 0.0000  | Stationary |
| <b>WLABOR</b>                                 | -4.87857         | 0.0000  | Stationary |
| <b>WPARL</b>                                  | -2.72597         | 0.0000  | Stationary |
| Source: Researchers calculation using EViews. |                  |         |            |

There are many tests to determine whether there is a cointegration among study variables, such as the Johansen test (Johansen and Juselius, 1990) and the Johansen, 1988-1991 test. The Granger-Engle method is also used for this purpose.

To assert the existence of long-run equilibrium relationship among the model variables a cointegration test is conducted and the results are shown in table (3):

**Table 3: Pedroni Residual Cointegration Test, Sample: 2010 2019, 20 countries.**

| within - dimension         | Statistic         | Prob.  | Weighted Statistics | Prob.         |
|----------------------------|-------------------|--------|---------------------|---------------|
| <b>Panel v-Statistic</b>   | -1.717516         | 0.9571 | -2.326467           | <b>0.9900</b> |
| <b>Panel rho-Statistic</b> | 3.241750          | 0.9994 | 3.385041            | <b>0.9996</b> |
| <b>Panel PP-Statistic</b>  | -6.780106         | 0.0000 | -6.780992           | <b>0.0000</b> |
| <b>Panel ADF-Statistic</b> | -2.576154         | 0.0050 | -2.399071           | <b>0.0082</b> |
| <b>Between - dimension</b> | <b>Statistics</b> |        | <b>Prob.</b>        |               |
| <b>Rho - Statistic</b>     | 5.423287          |        | <b>1.0000</b>       |               |
| <b>PP - Statistic</b>      | -11.06722         |        | <b>0.0000</b>       |               |
| <b>ADF - Statistic</b>     | -3.128280         |        | <b>0.0009</b>       |               |

**Source:** Researchers calculation using E-Views

Table (3) shows that the model variables are cointegrated according to both panel PP and panel ADF statistics. However, the null hypotheses of no cointegration is accepted by both panel-rho and panel- v statistics. In light of inconclusivity of Pedroni panel test, a second Kao Residual Cointegration Test is performed, and the result is shown in table (4):

**Table 4: Kao Residual Cointegration Test, Sample: 2010 2019, 20 countries.**

| ADF               | Prob.     | t-Statistic |
|-------------------|-----------|-------------|
|                   | -3.340765 | 0.0004      |
| Residual variance | 14.13846  |             |
| HAC variance      | 14.12680  |             |

**Source: Researchers calculation using EViews.**

As shown in table (4) the hypothesis of no cointegration is rejected by Kao Residual Cointegration Test at more than 1% significance level. In light of the cointegration analysis, the fully modified OLS (FMOLS) will be used for estimating the model parameters. FMOLS is suitable because it deals automatically with endogeneity and autocorrelation problems and produces more efficient estimates compared to OLS in large sample, furthermore FMOLS allows standard hypotheses testing.

Table 5 shows the estimation results from the regression for all the countries (twenty countries). The coefficient of the (TRADE%GDP) is positive and significant, and the coefficient of the (FDI%GDP) is negative and significant. Thus, we can conclude that the trade openness and foreign direct investment have a significant effect on the gender pay gap.

The obtained results are remarkably consistent with the fundamental principles of Heckscher-Ohlin-Samuelson's (1991) and Becker's (1971) seminal theories, lending strong support to the theoretical underpinnings of this study. Moreover, our findings align closely with the empirical observations made by Mukhopadhyay (2018), Ileri and Ulu (2021), and the insightful studies conducted by Rasekhi and Hosseinmardi (2012).

As shown from table 5 the coefficient of the (WLABOR) is positive and insignificant, it seems that there is no impact of increasing the percentage of working women in the labor market and pay wage gap.

Women's share of legislators (WPARL), which is the indicator of the presence of women in decision-making, is consistently negatively associated with the gender wage gap and significant.

**Table (5): Model Estimation Results Applying FMOLS, Sample all Countries.**

| <i>TRADE%GDP</i>                   | <i>FDI%GDP</i>               | <i>WLABOR</i>                | <i>WPARL</i>                 |
|------------------------------------|------------------------------|------------------------------|------------------------------|
| <b>0.128611</b><br><b>(0.0000)</b> | <b>-0.074928</b><br>(0.0391) | <b>-0.278265</b><br>(0.1412) | <b>-0.082947</b><br>(0.0049) |
| 180                                | 180                          | 180                          | 180                          |
| <b>R-squared</b>                   | 0.920175                     | <b>Adjusted R-squared</b>    | 0.908406                     |

**Source: Researchers calculation using EViews.**

Table (6) shows the estimation results for the countries where the GDP per capita is equal or greater than 20,000 US\$ (twelve countries). The coefficient of the (TRADE%GDP) is positive and significant. The results align with Heckscher-Ohlin-Samuelson (1991), Becker (1971), Mukhopadhyay (2018), Ileri & Ulu (2021), and Rasekhi & Hosseinmardi (2012).

The coefficient of the (FDI%GDP) is insignificant thus we can conclude that the trade openness has a significant effect on the gender pay gap. Also as shown from table (6) the coefficient of the (WLABOR) is negative and significant for the large countries, it seems that an increase in women labor in large countries may increase the women wage as expected from labor market and it may consequently enhance the bargaining power of the workers and finally reduce the pay gap, but Women's share of legislators (WPARL) is insignificant in relation to gender pay gap for the large countries.

**Table (6): Model Estimation Results Applying FMOLS, Sample Large Countries.**

| <i>TARDE%GDP</i>                   | <i>FDI%GDP</i>               | <i>WLABOR</i>                | <i>WPARL</i>                |
|------------------------------------|------------------------------|------------------------------|-----------------------------|
| <b>0.155644</b><br><b>(0.0000)</b> | <b>-0.064630</b><br>(0.3650) | <b>-2.783298</b><br>(0.0000) | <b>0.135855</b><br>(0.0509) |
| 108                                | 108                          | 108                          | 108                         |
| <b>R-squared</b>                   |                              | <b>0.936705</b>              |                             |
| <b>Adjusted R-squared</b>          |                              | <b>0.926386</b>              |                             |

**Source: Researchers calculations of present study using EViews.**

Table (7) shows the estimation results from the regression for the countries where the GDP per capita is less than 20,000 US\$ (eight countries). The coefficient of the (TRADE%GDP), (FDI%GDP) and (WLABOR) are insignificant thus we can conclude that there are no impact of trade openness or foreign direct investment or percentage of working women in the labor market on gender pay gap for the small countries. Women's share of legislators (WPARL) for small countries is consistently negatively associated with the gender wage gap and significant.

**Table (7): Model Estimation Results Applying FMOLS, Sample Small Countries.**

| <i>TARDE%GDP</i>                   | <i>FDI%GDP</i>              | <i>WLABOR</i>               | <i>WPARL</i>                 |
|------------------------------------|-----------------------------|-----------------------------|------------------------------|
| <b>0.060865</b><br><b>(0.2929)</b> | <b>0.329129</b><br>(0.3256) | <b>0.468558</b><br>(0.5140) | <b>-0.402480</b><br>(0.0167) |
| 72                                 | 72                          | 72                          | 72                           |
| <b>R-squared</b>                   |                             | 0.874098                    |                              |
| <b>Adjusted R-squared</b>          |                             | 0.851016                    |                              |

**Source: Researchers calculation using EViews.**

## 6. CONCLUSIONS

Based on a sample covering the period 2010-2019, two panel regression models have been estimated to test the impact of trade percentage of GDP, foreign direct investment FDI percentage of GDP, women participation in labor, and women participation in the parliament on gender pay gap one for all 20 countries of the selected sample and one for large and small countries separately.

As a result of this process, for the first regression the trade percentage of GDP has a positive significant impact on gender pay gap percentage and that the FDI percentage from GDP has a negative significant impact on gender pay gap, and women participation in the parliament has a negative significant impact on gender pay gap, but the women participation in labor is insignificant.

The results also indicated that there are differences between large and small countries, as the two groups' countries test (small and large) showed that for large countries trade percentage of GDP has a positive significant impact on the gender pay gap, but women participation in labor has a negative significant impact on the gender pay gap.

For small countries the researchers noticed that only women participation in the parliament has a negative significant impact on the gender pay gap. Future studies can address the relationship between trade openness and gender pay gap for small countries by using a sectoral analysis of the gender pay gap.

## REFERENCES

- 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, 2018, pp. 99 - 110 e-ISSN 2519-9293, p-ISSN 2519-9285 Available online at [http:// www.refaad.com](http://www.refaad.com).
- Alhawarin I. and Kreishan F. (2017). Minimum Wage Compliance in the Private Sector: The Case of Wage and Salary Workers in Jordan. *Jordan Journal of Economic Sciences*, Volume 4, No. 2.
- Al-Tarawneh and Al-Assaf G. (2014). Trade Openness and Real Investment in Jordan an ARDL Bound Testing Approach. *Jordan Journal of Economic Sciences*, Volume 1, No.1.
- Becker, G. (1971). The economics of discrimination. *University of Chicago Press*.
- Gedik, M. and Gunel, T. (2021). Factors Affecting Gender Wage Gap: Empirical Evidence from Selected OECD Countries. *academic Review of Economics and Administrative Sciences Year: 2021*. Vol-Issue: 14(3) pp: 1051–1061, ISSN: 2564-6931, DOI: 10.25287/ohuibf.823479, Yayın Tarihi/Published: 31.07.2021.
- Greenaway, D. and Nelson, D. (2000). The assessment: globalization and labour-market adjustment. *Oxford Review of Economic Policy*, Volume 16, Issue 3, September 2000, Pages 1–11, <https://doi.org/10.1093/oxrep/16.3.1>
- Greene, W. H. (2018). Econometric Analysis (8th ed.). *Pearson New York NY*.
- Hailat, A. and Hailat, M. (2021). The Impact of Educational Attainment on Employment Opportunities and Wages in Jordan. *Jordan Journal of Economic Sciences*, Volume 8, No.2, 2021
- Heckscher, E. and Ohlin, B. (1991). Heckscher Ohlin Trade Theory. *Cambridge (Mass.), MIT Press*.
- Ileri, S. and Ulu, M. (2021). Is Trade Against or in Favor of Women? Empirical Evidence from Manufacturing Sector in Turkey. *Marmara Üniversitesi İktisadi ve İdari Bilimler Dergisi, Cilt: 43, Sayı: 1, Haziran 2021*, ISSN: 2587-2672, ss/pp. 213-230 DOI: 10.14780/muiibd.960340.
- Johansen, S. and Juselius, K. (1990). Maximum Likelihood Estimation and Inference on Cointegration with Applications to the Demand for Money. *Oxford Bulletin of Economics and Statistics*, 52, 169-210.
- Kim, S. (2020). The Impact of Trade Liberalization on Gender pay gap of South Korea's Labor Market. *Honors Thesis*. 117. <https://red.library.usd.edu/honors-thesis/117>.
- Levine, L. (2003). The Gender Wage Gap and Pay Equity: Is Comparable Worth the Next Step?. *Report for Congress, Congressional Research Service*.
- Mukhopadhyay, U. (2018). Trade liberalization and Gender Inequality: Role of Social Norms. *Indian Growth and Development Review*. Vol. 11 No. 1, 2018 pp. 2-21, Emerald Publishing Limited 1753-8254 DOI 10.1108/IGDR-07-2017-0051.
- 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, (2012) pp.27-40.
- Wood, A. (1991). North-South trade and female labour in manufacturing: An asymmetry. *Journal of Development Studies*, 27(2): 168-89.
- Warrad, T. (2018). Trade Openness, Economic Growth and Unemployment Reduction in Arab Region. *International Journal of Economics and Financial Issues*. ISSN: 2146-4138, available at [http:// www.econjournals.com](http://www.econjournals.com) International Journal of Economics and Financial Issues, 2018, 8(1), 179-183.
- Yousef, E. and Warrad, T. (2020). The Determinants of Economic Growth in Selected Arab Countries over the Period 1998-2017. *Jordan Journal of Economic Sciences*, Volume 7, No.1,2020