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Trade Openness and Gender Inequality in the High Human Development Countries

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Abstract

The objective of the study was to investigate the influence of trade openness on gender inequality in countries characterized by high levels of human development. The sample consisted of 39 countries during the period from 2015 to 2019. The study employed panel data analysis using the generalized least squares. The findings reveal the role of trade in promoting gender equality, as indicated by the inverse relationship between trade openness and the gender inequality index, in line with previous findings. Furthermore, the results show that the decrease in gender inequality was primarily driven by the increase in imports as a percentage of GDP. Specifically, the impact of trade openness and imports accounted for approximately 17% of the decline in the gender inequality index. The paper emphasizes the need to assess the effects of trade policy on both women and men and recommends conducting sector-specific studies and having a holistic approach that considers global value chains and finance chains in trade-related policies.

الانفتاح التجـــاري وعدم العدالة بين الجنسين في الــدول ذات التنميـــة البشريـــة المرتفعة

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ملخص

هدفت الدراسة إلى فحص تأثير الانفتاح التجاري على عدم العدالة بين الجنسين في البلدان ذات التنمية البشرية المرتفعة، حيث اشتملت العينة على 39 دولة للفترة 2015 - 2019. بحيث تم تحليل نماذج الدراسة وفقًا الصيغة الزمنية المقطعية باستخدام طريقة المربعات الصغرى المعممة (GLS) .أظهرت النتائج دور التجارة في تعزيز العدالة بين الجنسين، من خلال التأثير العكسي للانفتاح التجاري على مؤشر عدم العدالة بين الجنسين. وهذا يؤكد النتائج السابقة، كما أظهرت النتائج أن الانخفاض في عدم العدالة بين الجنسين نابع بشكل كامـل تقريبًا من زيـادة الواردات كنسبة مئويـة من الناتج المحلي الإجمالي، حيث أن تأثير الانفتاح التجاري وتأثير الواردات متماثل تقريبًا في انخفاض مؤشر عدم العدالة بين الجنسين بنسبـة 17%. أوصت الورقة بأهمية تقييم تأثير السياســة التجاريـة وخاصـة الجزء المتعلـق بالواردات على كل من النساء والرجـال، بالإضافـة إلى إعداد دراسات على مستوى القطاعات الصناعية واعتماد نهج شامل يأخذ في الاعتبار سلاسل القيمة العالمية وسلاسل التمويل في السياسات المتعلقة بالتجارة.

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1. Introduction

Reducing gender discrimination is a crucial and prominent issue that many countries and governments are actively addressing, aiming to ensure women receive their full rights. This approach stems from humanitarian and moral considerations, emphasizing the importance of justice and equality between men and women. Women play an undeniable role in our societies, excelling in various jobs and tasks, assuming positions of leadership, and making significant contributions to the labor market while also fulfilling their roles as mothers or homemakers.

Countries increasingly recognize the significance of women's participation across social, economic, and political spheres. They acknowledge the effective role women play in all areas of life, leading to a growing belief that women are an essential component of society that cannot be ignored. The focus is not merely on achieving equality in participation but also extends to financial and material rights and gains. Governments and organizations now consider competency and merit as the basis for equitable distribution, rather than relying on gender as a determining factor.

This ambitious pursuit of gender equality holds tremendous benefits for society as a whole. The global community has widely recognized the numerous advantages that come with achieving gender equality, as it encompasses the rights and responsibilities of every human being, regardless of their gender. This acknowledgment is reflected in various institutions, organizations, and religious beliefs, for instance, being recognized for its emphasis on honoring human beings and delineating the rights and obligations of both men and women. Additionally, multiple international frameworks have underscored the central importance of gender equality in promoting human rights and sustainable development.

The Beijing Declaration and Platform for Action, adopted unanimously by 189 countries in 1995, stands out as a significant inter-state consensus in the modern era, aiming to promote equality, justice, and protection for girls and women. This landmark agreement recognizes the imperative of taking all necessary measures to eliminate discrimination against women and girls, and it emphasizes the importance of removing barriers that hinder gender equality and impede the progress and empowerment of women. It acknowledges that eradicating poverty and achieving sustainable development necessitates the active participation of women in economic and social advancement, along with the provision of equal opportunities and full participation for both women and men.

By recognizing women as essential contributors and beneficiaries of sustainable development efforts, which encompass steady economic growth, social development, environmental protection, and social justice, the declaration underscores the significance of gender equality in working towards a society that serves all individuals. (Women U.N, 2015)

The other aspect addressed in the document focuses on international trade, a significant economic matter that has been present throughout history and stands as one of the key drivers of economic growth in countries worldwide, particularly in this era characterized by advanced technology and accessible diverse media. International trade has far-reaching effects on various dimensions of political, economic, and social life. Given these impacts, the shifts in global economic policies have made trade liberalization a crucial component of development strategies.

Numerous economic theories have emerged to support and explain foreign trade, outlining how to derive benefits from it and navigate its intricacies. Among these theories, Adam Smith's absolute advantage theory, David Ricardo's comparative advantage theory, and the Heckscher-Olin theory hold significant importance. These theories delve into the concepts of advantages in production and trade, exploring how nations can optimize their participation in international trade. They offer insights into the mechanisms and factors that shape trade patterns and associated intricacies.

As for the relationship between trade expansion and gender inequality has been previously explored, initially through Becker's 1957 study on the economics of discrimination. Becker highlighted that companies and employers who engage in discrimination unrelated to productivity will bear the costs associated with such discrimination (Kimura, 2016). Consequently, this study aims to investigate whether trade liberalization contributes to the reduction of gender inequality. This inquiry is based on the premise that trade liberalization fosters trade expansion and, subsequently, enhances productivity growth. In turn, this increased productivity is expected to mitigate the costs of discrimination, resulting in a decrease in gender inequality according to this theory. The examination focuses on countries with high levels of human development, as determined by the United Nations Development Program's Human Development Index (UNDP). The UNDP index considers health, education, and income as indicators of human development.

Becker's theory primarily focuses on examining discrimination within the labor market, specifically analyzing the correlation between racial prejudice among white individuals and discrimination against racial minorities (Kerwin

and Guryan, 2007). The theory suggests that employers' actions are not solely driven by economic factors but are also influenced by their personal preferences. For instance, employers who possess a dislike for female workers may prefer to hire women if they can pay them lower wages. Conversely, employers who harbor strong biases against female workers may choose to hire male workers, even if there is a wage disparity. Consequently, gender-biased employers tend to favor male workers, even when their market wages are equivalent to those of competent female workers. This bias leads to the creation of a gender wage gap, exacerbating the division between female workers and less biased employers. However, it is important to note that discrimination is not a financially advantageous strategy. Biased employers must sacrifice potential profits to accommodate their prejudices. Consequently, the competitive mechanisms of the market should ideally replace discriminatory employers with those who exhibit fewer biases (Weber and Zulehner, 2009).

This paper examines the relationship between trade openness (calculated as exports + imports over GDP), a crucial economic indicator representing trade liberalization and indicating the proportion of trade intensity (Leamer, 1988), and gender inequality in countries characterized by high human development level. The aim of this study is to contribute to the existing literature by addressing the following question: Does trade openness have a reducing effect on gender inequality in high human development countries, including certain Arab countries?

In order to investigate this inquiry, panel data analysis is employed for a selected group of high human development countries spanning the years 2015 to 2019. The primary focus of this research centers around the examination of the trade openness index, which is calculated as the ratio of exports and imports to the gross domestic product, with the aim of assess the overall influence of this index as well as its individual components on gender equality. It is worth noting that this empirical study contributes to the limited body of research exploring the relationship between trade openness and gender inequality for these countries.

The paper is structured as follows. Section 2 provides a comprehensive literature review that explores the intersection of international trade, gender inequality and the differentiation between men and women in the business sphere. Section 3 presents the trade openness index and gender inequality data for the selected countries characterized by high human development, over the period 2015-2019. Section 4 outlines the models that establish the relationship between trade openness and gender inequality, while also detailing the data sources and methodology employed in the study. Section 5 presents the empirical findings

derived from the analysis. Finally, Section 6 presents the concluding remarks of the paper.

2. Literature Review

Numerous empirical studies have extensively investigated the relationship between international trade and gender inequality. These studies are well-documented, and their findings consistently align with economic theory. The prevailing argument suggests that trade openness serves to diminish discrimination costs, consequently contributing to the reduction of gender inequality gaps. In the following section, we provide an overview of these empirical studies, shedding light on their examination of the intricate relationship between international trade and gender inequality.

In order to explore the impact of trade liberalization on gender inequality in labor markets, well-being, and empowerment within emerging economies, the study conducted (Fatima and Islam, 2017) acknowledges the importance of addressing gender inequality as part of the Sustainable Development Goals (SDGs). The research utilized the Global Gender Gap Index (GGGI) along with its sub-indexes, which include economic participation and opportunity, education, health, and politics, to assess gender inequality across various dimensions. To address concerns related to endogeneity and the presence of time-invariant variables, the study employed the Hausman-Taylor estimation technique on a panel dataset comprising 40 countries over the period of 2006-2014. The findings of the study indicate that trade openness has a significant effect in reducing gender inequality within labor markets in high-growth EAGLE and NEST countries. However, in other emerging economies, trade openness appears to contribute to an increase in gender inequality.

In a study conducted by (Mujaheed and Begum, 2017), the focus is on examining the influence of trade openness on gender inequality within the context of Pakistan, over the period from 1985 to 2015. The researchers considered multiple factors, including the gender inequality index developed by Ahmed and Bukhari (2007), foreign direct investment, trade openness, female labor force participation, enrollment ratio of females, and government spending on the health and education sectors. To analyze the data, the Autoregressive Distributed Lag Model (ARDL) was employed for co-integration, along with the Vector Error Correction Estimation (VECM) technique. The results of the study indicate that the time series variables exhibited signs of stationarity and revealed both short-term and long-term equilibrium relationships among the variables.

Additionally, the study suggests that an increase in government spending on health and education can indirectly impact women's health and their ability to enhance.

In the study implemented by (Kimura, 2016), the focus is on elucidating the impact of international trade on the gender pay gap. The research examines the relationship between trade openness and the gender pay gap by analyzing wage data across six sectors and three skill levels (high, medium, and low skills) in 19 developed countries from 1995 to 2005. To assess whether increased trade openness has influenced the gender wage gap, both static and dynamic data models were applied to dynamic dashboard data. The fixed effects model results indicate that trade openness contributes to a reduction in the wage gap between male and female workers in medium and low-skilled occupations. However, there is no significant relationship between trade openness and the wage gap in high-skilled jobs. Furthermore, when employing the two-step generalized moments method (GMM), the study reveals that trade openness diminishes the wage gap in medium-skilled jobs. However, the effect of trade openness on the wage gap is not statistically significant in high- and low-skilled occupations.

Furthermore, the study conducted by (Kuete and Voufo, 2016) investigate the relationship between increased openness to international trade, resulting from trade liberalization, and its effects on employment opportunities and earnings for both men and women in Cameroon. The study utilizes data from two sources provided by Cameroon's National Institute of Statistics: the 2005 and 2010 waves of the Employment and Informal Sector Survey, as well as trade statistics from the Supply and Use Tables. To assess trade openness, the researchers employ three indicators: import penetration, export intensity, and trade share. The findings of the study indicate that greater trade openness did not result in the expansion of exports within sectors predominantly employing women, and it did not appear to significantly enhance job opportunities for women. However, trade openness did contribute to a reduction in the gender wage gap.

In a separate study conducted by (Gupta, 2015) in India, the focus was placed on examining the impact of trade openness on the proportion of female employment in the country. The study utilized panel data encompassing establishments in the manufacturing industrial sector, categorized based on the number of workers, during two specific time periods: 1989 and 1998. The estimation of the reduced-form equation was carried out using the ordinary least squares method. The findings of the study revealed that establishments exposed to greater reductions in output tariffs and faced import competition experienced a decline in the proportion of female workers. Interestingly, contrary to the expectations of a taste-based discrimination model, the results also indicated that

reductions in input tariffs did not have a significant impact on the share of female employment, either increasing or decreasing it.

In Mexico, a study conducted by (Juhn et al., 2013) examines the impact of trade liberalization on gender inequality, an aspect that has received limited attention in the literature on wage inequality and trade. The study employs a model that takes into account variations in firm productivity as well as the qualifications and gender of workers. The data used in the study is derived from a field survey conducted in the industrial sector, covering large, small, and micro companies for the years 1992 and 2001. By estimating the models, the study finds that the reduction in tariffs prompts more productive firms to modernize their technology and enter the export market. These new technologies involve computerized production processes and reduce the demand for physically demanding skills. The study tests this model using a panel dataset of establishment-level data from Mexico, specifically examining the tariff reductions associated with the North American Free Trade Agreement (NAFTA). Consequently, the tariff cuts have led to an increase in the number of jobs and the wage bill for female workers.

The primary objective of the study performed by (Sajid and Ullah, 2012) was to investigate the influence of trade openness on gender equality in employment within the D8 group of countries, comprising Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan, and Turkey. The study covers the period from 1980 to 2012. The estimation of panel data was performed using the Random Effect Model, employing the feasible generalized least squares method, which accounts for the presence of heteroscedasticity and autocorrelation issues. The main model of the study focuses on the relationship between trade openness and gender equality in employment, specifically examining the labor force participation rate. The results demonstrate that trade openness has a highly significant and positive impact on the level of gender equality in employment. The coefficients of trade openness are found to be significant at a 1% level in each equation, with a positive effect on the ratio of female to male labor force participation rates. Based on the empirical analysis, it can be concluded that trade liberalization policies are beneficial for women in the developing D8 countries.

In a research paper by (Klein et al., 2010), the impact of international trade on wage inequality, including factors such as skills, gender, and nationality, is examined. The study focuses on workers employed by western German manufacturing plants engaged in export activities during the period from 1993 to 2007. International trade has been cited as a source of widening wage inequality observed in industrialized nations. The analysis of the results is based on estimates derived from a fixed effects model and relies on matched employer-employee data.

The study concludes that there is a notable export wage premium for highly skilled workers in German manufacturing, while lower skilled workers face an export wage discount. The export wage premium for high-skilled workers accounts for a substantial portion, up to one third of their overall skill premium. Interestingly, the study reveals that while an increase in exports contributes to wage inequality based on skill levels, it simultaneously mitigates wage inequality associated with gender and nationality. Therefore, international trade plays a role in reducing wage gaps and alleviating wage inequalities within the German manufacturing industry.

Examining economic globalization as an indicator of international trade, (Meyer, 2007) investigates the impact of economic globalization on gender wage inequalities. The study utilizes the measure of gender wage inequality as the dependent variable in both cross-sectional and panel OLS regression analyses, encompassing data from 1975 to 1998 across fifty-five nations. The findings of the study indicate that trade openness has led to an increase in the female share of earned income in specific models. Additionally, trade risk and transnational corporate penetration are found to be significantly associated with gender wage differentials, displaying both positive and negative relationships. However, these effects are contingent upon a country's position within the world system and its geographical region. The analyses conducted shed light on the fact that global economic restructuring is a gendered process that alters and exploits existing gender inequalities and national economic conditions.

Taiwan and Korea, both countries known for their openness to international trade, are examined by (Berik, 2004) to investigate the impact of international trade competition on gender-based wage discrimination. The study specifically tests Becker's theory, which suggests that discrimination is incompatible with increasing competitiveness. To empirically analyze this relationship, the study employs a comprehensive panel dataset covering residual wage gaps, trade ratios, and alternative measures of domestic concentration for the two highly open East Asian economies during the period from 1981 to 1996. The findings of the study reveal that competition from foreign trade in concentrated industries is positively linked to wage discrimination against female workers. In Taiwan (China), greater trade openness in concentrated industries is associated with wider residual wage gaps between men and women. Import competition appears to exacerbate the wage gap by negatively impacting women's employment prospects, leading to a decrease in their bargaining power. In the case of Korea, a slight reduction in export openness seems to be correlated with a decrease in gender-based wage discrimination in concentrated industries.

Through an examination of existing literature, this study effectively contributes to our understanding of how trade openness can address the issue of gender inequality within a group of countries characterized by high human development. These countries have been categorized based on shared characteristics and convergence, as classified by the United Nations Development Program (UNDP). Additionally, this study delves into the intricacies of the impact of trade openness, specifically exports and imports, on gender inequality. By using a sample of 39 countries over a five-year period spanning from 2015 to 2019, the study aims to mitigate the influence of unforeseen factors associated with the global COVID-19 pandemic. In essence, this study fills a crucial gap in the literature by shedding light on the extent and nature of the impact of trade openness on gender inequality within a select group of countries, while carefully considering the specific components of trade and utilizing a time frame that predates the pandemic.

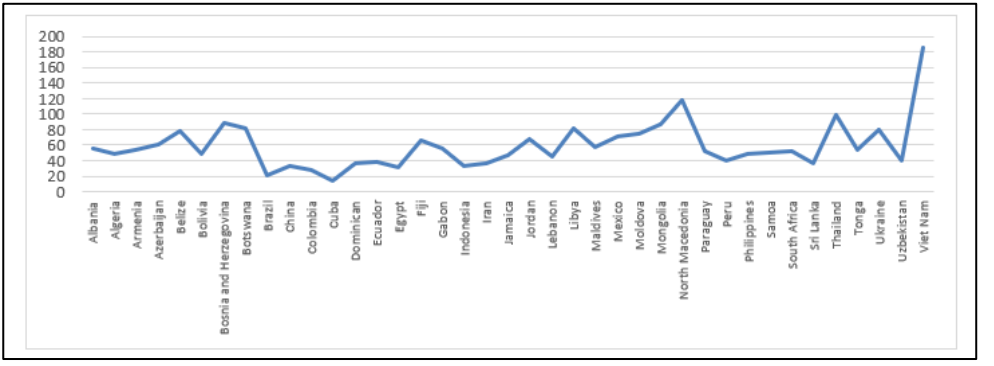
3. Description of Trade Openness and Gender Inequality Index

Figure 1 presents a comparative analysis of trade openness in high human development countries from 2015 to 2019. Vietnam emerges as the leader with the highest trade openness rate of 185%, while Cuba exhibits the lowest rate at 13.9%. Notably, the overall trade openness rate for these countries averages at 59%.

Among the Arab countries on the list, Jordan, Algeria, Egypt, Lebanon, and Libya can be identified. Libya takes the lead among these Arab nations with an average trade openness rate of 82%, closely followed by Jordan with a rate of 67%. On the other hand, Egypt demonstrates the lowest level of trade openness among the Arab countries, with an average rate of 32%.

Furthermore, the data highlights that Armenia, Azerbaijan, North Macedonia, Uzbekistan, and Vietnam are the sole countries from the list that consistently experienced growth in their trade openness rates throughout the specified period. It is worth noting that most high human development countries witnessed a decline in trade openness in 2019.

Figure (1): The average of Trade Openness index for high human development countries over (2015-2019) period



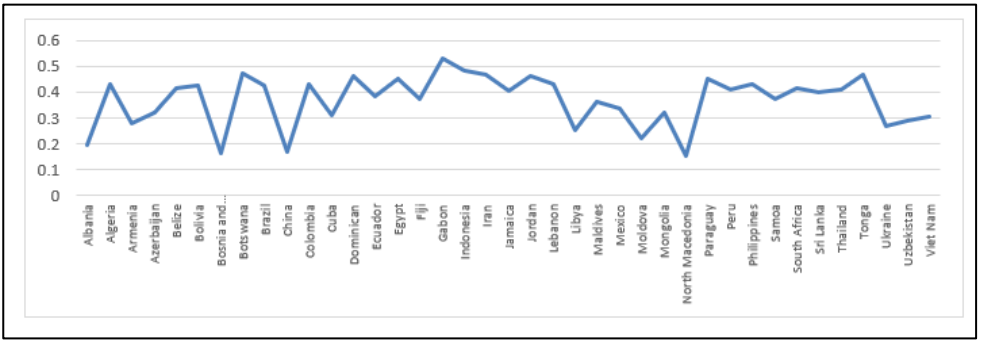
Source: World Bank database

Figure 2 illustrates a comparative analysis of the average Gender Inequality Index (GII) among high human development countries from 2015 to 2019. Gabon emerges as the country with the highest average GII, standing at 0.53, whereas Northern Macedonia exhibits the lowest average GII of 0.15. The overall GII for these countries, on average, is 0.37.

Among the Arab countries included in the list, Jordan attains the highest average GII of 0.46, closely followed by Egypt with an average GII of 0.45. Conversely, Libya demonstrates the lowest average GII among these Arab nations, with a score of 0.25.

Furthermore, the data indicate that Azerbaijan is the sole country in the list that experienced consistent growth in the GII during the specified period, albeit the increase was modest. Additionally, half of the countries on the list made improvements in reducing their gender inequality index. Notably, Jordan and Lebanon stand out among the Arab countries in terms of progress. However, the remaining countries in this group exhibit fluctuating GII values over the period, with these fluctuations generally revolving around each country's respective average.

Figure (2): The average of gender inequality index for high human development countries over (2015-2019) period



Source: HDI reports, UNDP database

4. Data and Methodology

The study employed an empirical analysis approach by estimating multiple regression models. These models were applied to panel data encompassing 39 selected countries over the period of 2015 to 2019. The focus of this study was primarily to examine countries with high human development, which totaled 53 countries in 2019. However, the study sample was limited to 39 countries based on the availability of data for all variables in the study model.

Regarding the time frame, the study spanned five consecutive years, commencing in 2015 due to a significant methodological change in the Human Development Report. The study period concluded in 2019 to avoid confounding effects associated with the global COVID-19 pandemic.

Econometric tests were conducted to identify the suitable methodology for estimating each model based on economic theory. The chosen functional forms for the models are as follows. It is worth mentioning that natural logarithm was employed in the study to directly calculate elasticities, enabling analysis in terms of percentages. Additionally, utilizing natural logarithm helps mitigate data fluctuations within each variable and reduces variations between different variables. This was particularly useful as some study variables were expressed as percentages or had small values, such as the Gender Inequality Index, while others represented large values, such as Gross Domestic Product per capita.

$$Firstmodel: \quad GII_{it} = \beta_0 + \beta_1 TO_{it} + \beta_2 FLP_{it} + \beta_3 WSM_{it} + \beta_4 WSF_{it} + \beta_5 GDPP_{it} + \varepsilon_{it}$$

$$SecondModel: \quad GII_{it} = \beta_0 + \beta_1 XG_{it} + \beta_2 MG_{it} + \beta_3 FLP_{it} + \beta_4 WSM_{it} + \beta_5 WSF_{it} + \beta_6 GDPP_{it} + \varepsilon_{it}$$

The analysis focused on the following countries: Jordan, Albania, Algeria, Armenia, Azerbaijan, Belize, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, China, Colombia, Cuba, Dominican Republic, Ecuador, Egypt, Fiji, Gabon, Indonesia, Iran, Jamaica, Lebanon, Libya, Maldives, Mexico, Moldova, Mongolia, North Macedonia, Paraguay, Peru, Philippines, Samoa, South Africa, Sri Lanka, Thailand, Tonga, Ukraine, Uzbekistan, and Vietnam. The analysis covers the period from 2015 to 2019. Descriptive and correlational statistics are presented in Tables 1 and 2.

Table (1): Descriptive statistics

Variables	Obs.	Mean	SD	Min	Max
Log_GII	195	-1.046291	0.3223446	-1.944911	-0.4588659
Log_TO	195	3.958274	0.4876061	2.448113	5.286447
Log_XG	195	3.448509	0.482992	2.336548	4.670916
Log_MG	195	3.617118	0.4878524	2.36155	4.65114
Log_FLP	195	4.102833	0.3621984	3.054675	4.511199
Log_WSM	195	4.088326	0.2101092	3.435921	4.432244
Log_WSF	195	4.086253	0.2911519	3.293241	4.581902
Log_GDPP	195	8.544588	0.3836926	7.375925	9.264981

Source: Prepared by the researchers, using STATA

Table (2): Correlation matrix

Variabl	Log_	Log_	Log_	Log_	Log_F	Log_W	Log_	Log_G
Log_GI	1.000							
Log_T	-	1.000						
Log_X	-		1.000					
Log_M	-		0.787	1.000				
Log_FL	-		0.226	0.037	1.0000			
Log_W	-		0.061	0.057	-	1.0000		
Log_W	-	-	-	0.051	-	0.7843	1.0000	
Log_G		-	-	-	0.0896	0.1719	0.2593	1.0000

Source: Prepared by the researchers, using STATA

The study models incorporate several variables sourced from the UNDP database, World Bank database, and ILO database. These variables are as follows:

1. Gender Inequality Index (GII): This index, as defined by Gutiérrez et al. (2012), captures the human development costs associated with gender inequality across three components: reproductive health, economic status, and empowerment.
2. Gross Domestic Product per Capita in current U.S. dollars (GDPP): This variable measures the economic output per person in a country, expressed in current U.S. dollars.
3. Female-to-Male Labor Force Participation Ratio (FLP): This ratio, estimated by the ILO model, represents the proportion of females to males participating in the labor force.
4. Percentage of Male Wage and Salary Workers (WSM): Estimated by the ILO model, this variable indicates the percentage of male workers engaged in wage and salary employment out of the total male employment.
5. Percentage of Female Wage and Salary Workers (WSF): Also estimated by the ILO model, this variable signifies the percentage of female workers engaged in wage and salary employment out of the total female employment.
6. Trade Openness (TO): This variable denotes the sum of exports and imports of goods and services, expressed as a share of the country's GDP.

7. Exports of Goods and Services as a Percentage of GDP (XG): This variable represents the proportion of a country's GDP comprised of exports of goods and services.
8. Imports of Goods and Services as a Percentage of GDP (MG): This variable indicates the proportion of a country's GDP constituted by imports of goods and services.

Among the various regression methods available for panel data analysis, the pooled ordinary least squares (OLS) method is often considered the simplest and initial option for estimating econometric models. However, this method has been subject to criticism due to its susceptibility to several violations (Ramón and Gabriel, 2014), resulting in questionable results.

In this study, the models were estimated using the generalized least squares (GLS) method. This technique was employed to address the issues of autocorrelation an

d heteroscedasticity. The estimation of the models using pooled OLS, fixed effects models, or random effects models would not yield more efficient estimations due to the presence of autocorrelation and heteroscedasticity. Therefore, Greene (2011) recommends the use of the GLS method to overcome these problems and ensure more efficient estimation of the models. It is also worth noting that cointegration exists for each of these models, further supporting the choice of the GLS method for estimation.

5. Empirical Results

To determine the suitable regression estimation method, it was necessary to evaluate multicollinearity, autocorrelation, and heteroscedasticity. This evaluation aimed to ensure the appropriateness of employing the ordinary least squares (OLS) method for estimation. The presence of a linear relationship between variables is crucial for accurate estimation using OLS. If this linear relationship is absent or incomplete, it can lead to undefined coefficients or large standard errors for those variables (Gujarati, 2004). Therefore, conducting tests for multicollinearity, autocorrelation, and heteroscedasticity is essential to ascertain the validity and accuracy of utilizing the OLS method in estimating the regression models.

To ensure the absence of multicollinearity, the study employed the Variance Inflation Factor (VIF) test, which is suitable for panel data represented in the study sample. This test involved regressing each independent variable against

the remaining independent variables within each model. The resulting coefficient of determination (R^2) was then calculated, and the process was repeated for the other independent variables. Subsequently, the coefficient of determination was used to determine the VIF value in the equation (Greene, 2011). A VIF value exceeding 10 indicates the presence of potential multicollinearity issues (O'brien, 2007).

The results of this test for the study models are presented in Table (3) and Table (4). These results indicate that none of the independent variables in either model exhibit a linear relationship with other variables. This is evident from the VIF values, which are all below 10 for each independent variable.

Table (3): Multicollinearity results using VIF test (First model)

Variables	**VIF**	**1/VIF**
Log_WSF	2.89	0.346025
Log_WSM	2.66	0.376382
Log_FLP	1.28	0.781923
Log_GDPP	1.22	0.822709
Log_TO	1.14	0.878017
Mean VIF	1.84	

Source: Prepared by the researchers, using STATA

Table (4): Multicollinearity results using VIF test (Second model)

Variables	**VIF**	**1/VIF**
Log_MG	3.66	0.273283
Log_XG	3.60	0.277605
Log_WSF	3.30	0.302906
Log_WSM	2.89	0.346501
Log_GDPP	1.40	0.713238
Log_FLP	1.31	0.766060
Mean VIF	2.69	

Source: Prepared by the researchers, using STATA

To assess heteroscedasticity, the study employed the panel data test proposed by Cameron and Trivedi (2009). This test aimed to ensure that the study models did not exhibit heterogeneity in the variance of the residual series (Gil-García and Puron-Cid, 2014). The null hypothesis of the test assumes homogeneity

of variance for the residual series (homoscedasticity), while the alternative hypothesis suggests heterogeneity of variance in the residual series (heteroscedasticity).

The results of this test are presented in Table (5) and Table (6). These results indicate that the models exhibit heterogeneity in the variance of the residual series, as evidenced by the p-value being lower than the 5% significance level. Consequently, the null hypothesis cannot be accepted, and the alternative hypothesis of heteroscedasticity is accepted.

Table (5): Heteroscedasticity results using Cameron and Trivedi test

(First model)

Cameron and Trivedi's decomposition of IM-test	
chi2	**77.01**
D.F	**20**
p-value	**0.0000**

Source: Prepared by the researchers, using STATA

Table (6): Heteroscedasticity results using Cameron and Trivedi test

(Second model)

Cameron and Trivedi's decomposition of IM-test	
chi2	92.24
D.F	27
p-value	0.0000

Source: Prepared by the researchers, using STATA

The study employed the Wooldridge test, as proposed by Drukker (2003), to examine autocorrelation in the study models. This test aimed to ensure that there was no correlation among the random errors that could lead to misleading estimates. It is important to note that the null hypothesis assumes no first-degree autocorrelation, while the alternative hypothesis suggests the presence of correlation among the random errors.

The results of this test are presented in Table (7) and Table (8). These results indicate that both models exhibit autocorrelation issues, as evidenced by the probability (Prob) values being lower than the 5% significance level. Consequently, we cannot accept the null hypothesis, and the alternative hypothesis confirming the existence of autocorrelation is accepted.

Table (7): Autocorrelation results using Wooldridge test (First model)

Wooldridge test for autocorrelation in panel data	
F-test	666.933
Prob.	0.0000

Source: Prepared by the researchers, using STATA

Table (8): Autocorrelation results using Wooldridge test (Second model)

Wooldridge test for autocorrelation in panel data	
F-test	872.681
Prob.	0.0000

Source: Prepared by the researchers, using STATA

Previous findings have indicated that the study models do not exhibit multicollinearity issues. However, they do suffer from the problems of Autocorrelation and Heteroscedasticity. Consequently, employing the ordinary least squares (OLS) method for estimation will not yield consistent estimates, as this method fails to meet the necessary requirements for producing reliable estimators. To address these issues and ensure appropriate estimation of the models, the use of generalized least squares (GLS) has been recommended (Greene, 2011). GLS has proven to be effective in generating estimates that are devoid of Autocorrelation and Heteroscedasticity problems. Therefore, employing GLS as the estimation method will help overcome these challenges and provide more accurate estimates for the study models.

The primary objective of the first model is to examine the effects of trade openness, gross domestic product per capita, the ratio of female to male participation in the labor force, the percentage of male wage and salary workers out of total male employment, and the percentage of female wage and salary workers out of total female employment on gender inequality. The findings presented in Table (9) reveal several noteworthy observations.

Firstly, trade openness, the ratio of female to male participation in the labor force, and the percentage of female wage and salary workers out of total female employment exhibit statistically significant negative effects on gender inequality at a 1% level of significance. This suggests that an increase in trade openness, a higher ratio of female to male participation in the labor force, and a greater percentage of female wage and salary workers out of total female employment led to reduced gender inequality.

On the other hand, the percentage of male wage and salary workers out of total male employment demonstrates a statistically significant positive effect on gender inequality at a 10% level of significance. This implies that an increase in the percentage of male wage and salary workers out of total male employment is associated with higher levels of gender inequality.

Notably, the gross domestic product per capita does not have a statistically significant effect on gender inequality. However, other variables in the model show significant impacts.

The estimated coefficient of trade openness aligns with economic theory and previous research, indicating that a 1% increase in trade openness results in a 0.17% decrease in the gender inequality index. Similarly, a 1% increase in the ratio of female to male participation in the labor force leads to a 0.28% reduction in gender inequality. Furthermore, a 1% increase in the percentage of female wage and salary workers out of total female employment corresponds to a 0.40% decrease in gender inequality. Conversely, a 1% increase in the percentage of male wage and salary workers out of total male employment leads to a 0.29% rise in the gender inequality index.

Table(9): Estimations results for the first model (using GLS)

Variables	Coefficients	Std. err.	Prob.
Log_TO	-0.1741106	0.0452192	0.0000
Log_FLP	-0.2822229	0.0645082	0.0000
Log_WSM	0.2917282	0.1602818	0.0690
Log_WSF	-0.4099089	0.1206341	0.0010
Log_GDPP	0.0380919	0.0593659	0.5210
Constant	0.9576323	0.6765181	0.1570

Source: Prepared by the researchers, using STATA

The second model focuses on examining the impact of the same independent variables on gender inequality. However, it takes a more detailed approach to the trade openness index by considering its individual components, namely exports and imports as a percentage of GDP. The objective is to gain a deeper understanding of their specific effects. The findings, presented in Table (10), reveal several key insights.

Importantly, imports as a percentage of GDP demonstrate a statistically significant negative effect on gender inequality at a 5% level of significance. This suggests that an increase in the proportion of imports relative to GDP leads to a reduction in gender inequality.

Additionally, the ratio of female to male participation in the labor force and the percentage of female wage and salary workers out of total female employment exhibit statistically significant negative effects on gender inequality at a 1% level of significance. This indicates that a higher ratio of female to male participation in the labor force and a greater proportion of female wage and salary workers out of total female employment are associated with reduced gender inequality.

However, the exports as a percentage of GDP, the percentage of male wage and salary workers out of total male employment, and the gross domestic product per capita do not show statistically significant effects on gender inequality.

The results demonstrate that a 1% increase in imports as a percentage of GDP is linked to a 0.17% decrease in the gender inequality index. Similarly, a 1% increase in the ratio of female to male participation in the labor force corresponds to a 0.32% reduction in gender inequality. Furthermore, a 1% increase in the percentage of female wage and salary workers out of total female employment leads to a 0.34% decrease in gender inequality.

Table (10): Estimations results for the second model (using GLS)

Variables	Coefficients	Std. err.	Prob.
Log_MG	-0.1735604	0.0820629	0.0340
Log_XG	0.0431376	0.082241	0.6000
Log_FLP	-0.3228169	0.0660183	0.0000
Log_WSM	0.1889315	0.1692172	0.2640
Log_WSF	-0.3378152	0.1306075	0.0100
Log_GDPP	0.0319141	0.0645864	0.6210
Constant	1.092493	0.741494	0.1410

Source: Prepared by the researchers, using STATA

6. Conclusion

One of the most significant challenges faced by the global economy, particularly in developing countries, revolves around women's participation in the labor market. This challenge is influenced by a combination of social norms, legal constraints, and market failures. Factors such as cultural expectations, demographic and familial responsibilities, and varying skill sets contribute to the prevailing gender bias in overall business reliance on men over women.

Recognizing the importance of addressing these barriers, global trends are focused on reducing their impact through changes in legal frameworks and the development of scientific and practical competencies. Technological advancements also play a crucial role in improving women's participation in the labor market. It is essential to ensure equal opportunities for women to engage in economic activities, express their perspectives, and achieve their aspirations, as this is vital for achieving growth, prosperity, peace, and stability.

The findings of this study align with previous research conducted by the World Bank Group and the World Trade Organization, as highlighted in their paper titled "Women and Trade: The Role of Trade in Promoting Gender Equality." This study confirms that trade creates opportunities that significantly enhance the lives of both men and women, leading to the creation of new jobs and empowering women in society. It establishes a clear link between trade and gender. The analysis of relevant models reveals that increased trade openness, particularly through imports, has contributed to a 17% reduction in the gender inequality index in countries with high levels of human development.

Countries with high levels of human development should carefully evaluate the potential impact of trade policies, especially concerning imports, on both women and men. It is crucial to adopt evidence-based trade policies that aim to achieve equality for all segments of society to maximize the benefits of such equality. Furthermore, conducting sector-specific studies to examine exports and report on the value added obtained can shed light on the nature of those exports and their influence on various economic and social indicators.

Moreover, it is important to recognize the dynamics of international trade, which have far-reaching effects on value chains and global finance chains. The traditional understanding of trade as a simple exchange of goods and services between countries is no longer sufficient. Global value chains have transformed the production process, with different stages occurring across multiple countries. This transformation significantly impacts the distribution of value added and the allocation of profits along the value chain.

Considering this perspective, the study recommends examining the interconnections between industries and countries within value chains. This approach enables policymakers to identify opportunities for upgrading and diversification, promote higher value-added activities, and enhance competitiveness. Understanding the dynamics of value chains also helps identify potential bottlenecks or vulnerabilities that may arise from disruptions in global supply chains. Policymakers should prioritize strengthening resilience and fostering flexibility within value chains to mitigate these risks.

In addition to value chains, analyzing global finance chains is crucial for a comprehensive understanding of international trade. Financial flows play a vital role in facilitating trade by providing capital for investment, supporting innovation, and enabling risk management. The integration of financial markets across countries has created complex networks of capital flows closely intertwined with business activities. Recognizing the interdependencies between trade and finance is essential to comprehend how changes in financial conditions, such as exchange rates, interest rates, and credit availability, affect trade flows and the functioning of value chains.

Finally, the paper recommends adopting a holistic approach that takes account of global value chains and financing chains in trade-related policies. This involves promoting knowledge sharing and ensuring access to finance for all participants along the value chain. In addition, efforts should be made to improve transparency, reduce information asymmetry, and strengthen regulatory frameworks to ensure the stability and integrity of global financial chains.

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