International Trade under Gender Lens:
Paving a Way for Equality

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List of Acronyms

AR	Autoregression of Order
CUE-GMM	Continuously Updated Estimation Generalized Methods of Moment
EPZ	Export Processing Zones
FDI	Foreign Direct Investment
FE	Fix-effects
GDP	Gross Domestic Product
GMM	Generalized Methods of Moment
GVC	Global Value Chain
HOS	Heckscher-Ohlin-Samuelson model
ICT	Information and Communication Technology
ILO	International Labour Organization
IV	Instrument Variable
NAFTA	North American Free Trade Agreement
ODA	Official Development Assistance
OLS	Ordinary Least Squares
PPP	Purchasing Power Parity
PTA	Preferential Trade Agreement
TO	Trade Openness
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Program
VIF	Variance Inflation Factors
WDI	World Development Indicator
2SLS	Two-stage Least Squares

Abstract

This research focuses on the relationship between international trade and gender equality in employment, extending beyond conventional quantity metrics to incorporate employment quality, which is a crucial dimension that remains unexplored in existing literature. By employing the Continuous Updated Estimator Generalized Method of Moments (CUE-GMM) model on cross-country data from 2000 to 2022, the study reveals the multidimensional nature of the relationship between trade and women's employment. The findings indicate that increased female force participation, coupled with trade expansion, catalyzes the "*feminization of labour*" phenomenon. However, viewing from the quality of employment dimension, this employment growth is disproportionately concentrated in informal work arrangements. These patterns align with feminist economic theory's proposition that women represent competitive advantages in international trade. To enhance productivity and maintain flexibility in international markets and global value chains, export-oriented firms might leverage the disadvantaged position of female labour to offer them informal jobs. The findings imply that considering trade's contribution to gender equality in employment necessitates a nuanced approach that transcends the simplistic metric of job creation, with the joint consideration of the quality of these jobs. This study contributes to a more comprehensive understanding of international trade through a gender-responsive lens, aiding in developing gender-sensitive economic policies, which are essential for promoting both equity and inclusive development.

Relevance to Development Studies

This topic is highly relevant to Development Studies, as it seeks to identify and address the root causes of gender inequality and promote inclusive growth. By reframing international trade through a gender-responsive lens, it can significantly contribute to the formulation of more gender-sensitive economic policies. These policies are not only crucial for promoting equity but also for fostering inclusive development, which is a central goal of the field. In addition, research on the gender-trade nexus is expected to yield valuable policy implications that can help advance gender equality, thereby contributing to the realization of Sustainable Development Goal 5 (UN 2024). The findings of this research can inform policymakers and development practitioners, enabling them to design and implement more effective strategies for empowering women and reducing gender disparities in the context of an increasingly globalized economy.

Keywords

Trade openness; gender equality; sustainable development; competitive advantage; feminization of labour force

Chapter 1 Introduction

Research on the gender-trade nexus is expected to yield policy implications for advancing gender equality, thereby contributing to the realization of Sustainable Development Goal 5 (UN 2024). In particular, economic relations and systems are suggested to be intrinsically intertwined with societal norms and cultural expectations that shape the gender roles within society. Therefore, international trade as an economic phenomenon, in fact, affects genders differentially. The impacts of trade on women's economic empowerment vary based on their different roles within the market structure. For instance, trade liberalization can provide female entrepreneurs access to expanded market opportunities, as well as generate employment prospects for female workers in export-oriented sectors. However, trade also potentially have adverse outcomes for women, either as employees or producers, if import competition leads to the displacement of domestic production in female-intensive sectors (UNCTAD 2019: 5). Given the multiplicity of channels through which trade influences gender-based disparities and women empowerment, it is crucial to analyze international trade dynamics through a gender-responsive lens (UNCTAD 2014, UNDP 2016).

From the theoretical perspective, there are two main stands that explain this topic. The first strand aligns with the mainstream trade theories, i.e. the neo-classical perspective, including the Heckscher-Ohlin-Samuelson model (HOS) and the theory of discrimination (Becker 1971). These theories view the relationship between trade and gender more straightforwardly, focusing primarily on economic outcomes like wages and employment. The second strand includes feminist economic standpoints (Çağatay 1996, Çağatay 2001) and other heterodox economic theories, such as post-Keynesian and Marxist approaches (Shaikh and Nell 1980, Milberg 1994). In contrast to the mainstream, these theories examine the trade-gender relationship from a broader institutional, social, and historical perspective. This group emphasizes the mechanisms of international trade based on "*competitive advantage*" rather than "*comparative advantage*". In other words, incentives for international trade in this regard refer to a cost-driven approach instead of a price-driven approach. Accordingly, the relationship between trade and gender is perceived as more intricate and interdisciplinary.

From the empirical evidence, a substantial body of research has emerged, grounded in the aforementioned theoretical frameworks, to examine the multifaceted impacts of trade on gender equality. These studies employ diverse metrics to assess gender-related outcomes, ranging from broad equality indices to specific labor market outcomes. The results, however, present inconsistency as trade-gender relationship exhibits not only negative and positive linear relationships but also non-linear associations. This may partially arise from the research approach of previous studies, which emphasize mainly the quantity perspective of women's economic outcomes, such as wages and employment opportunities.

Given the multidimensional nature of the trade-gender nexus, examining trade's impacts solely through the quantity lens of labour market outcomes provides an incomplete picture and may yield biased assessments. For instance, although trade expansion generates employment for women, the concentration of these jobs in low-quality, informal sectors may still impede genuine progress toward gender equality. Therefore, incorporating the quality perspective, particularly quality of employment, is likely to offer a more nuanced understanding of whether trade truly promotes gender equality or perpetuates existing disparities. However, this dimension remains empirically understudied, both independently and jointly with the quantity aspect. There are only a few studies that followed this approach under an industry-specific or country-specific context, such as research on Export Processing Zones (EPZ) in India (Ghosh 2004, Prasad 2018) and Global Value Chains (GVC) in Mauritius and Cambodia (Otobe 2015).

Given this dearth of empirical study, this thesis aims to conduct a comprehensive examination of the effects of international trade on gender equality in employment on a cross-country panel sample, encompassing both quantity and quality perspectives. The paper seeks to answer the question: "To what extent does international trade impact gender equality in employment?". To answer that question, the following two sub-questions will be explored:

- To what extent does international trade impact women's job opportunities?
- To what extent does international trade impact on quality of female employment?

In terms of contribution, from an academic perspective, the study endeavours to enrich the literature on the trade-gender linkages with a more comprehensive understanding of gender equality in employment. From a policy perspective, by reframing international trade through a gender-responsive lens, the paper is expected to contribute to formulating more gender-sensitive economic policies, which advance both gender equity and inclusive development outcomes. From a development perspective, research on the gender-trade relationship is expected to generate policy recommendations for promoting gender equality.

Despite such contributions, certain limitations warrant acknowledgment. Firstly, due to data constraints, the examined dataset does not cover enough years to accurately reflect the phenomenon of (de)feminization of labour derived from trade openness. Secondly, the paper only addresses employment in general and does not analyze deeply specific groups, such as women as entrepreneurs. Finally, the findings may not fully reflect how trade affects women's employment across different regions, groups of countries, or sectors due to the bounded nature of the country sample. However, the research results can provide valuable references regarding the multifaceted impact of trade on gendered-based employment equality, with an emphasis on not only the quantity but also the quality of employment of women that matters. This can pave the way for future research, which is encouraged to focus on more specific analyses of particular occupations, groups of countries, and specific regions. Furthermore, given the multidimensional trade-gender relationship, the paper calls for future research to further explore the impact of trade on women in various roles in the economy, such as entrepreneurs or customers.

The remainder of the thesis is structured as follows. Chapter 2 presents a comprehensive literature review, covering both the theoretical framework and empirical research related to the linkage between trade and gender equality. Chapter 3 describes the data and methodology employed, followed by Chapter 4, which presents the results and discussion of the findings. Finally, Chapter 5 concludes the thesis by summarizing the key insights and offering policy implications based on the research outcomes.

Chapter 2 Literature Review

To provide a comprehensive overview of the discussion in the literature regarding this relationship, two key theoretical frameworks that underpin the research in this field will be initially examined. Following this, empirical studies which were conducted to test these theories, will be analyzed. In summary, the academic literature on the relationship between trade and gender presents divergent perspectives.

2.1 Theoretical Framework

Based on the research approaches of the gendered impact of trade, it can be categorized into two main strands of theories. The first strand follows the mainstream neo-classical trade theories, including the HOS model and Becker's discrimination theory (1971), positing a more straightforward relationship between trade and gender through quantitative economic indicators such as wages and employment. The second strand derives from heterodox economics, comprising post-Keynesian, Marxist approaches (Shaikh and Nell 1980, Milberg 1994) and feminist economic perspectives (Çağatay 1996, 2001). In contrast to the mainstream, these theories offer a more nuanced understanding of the interdisciplinary between trade and gender equality with a broader institutional, social, and historical approach. By emphasizing "competitive advantage" rather than "comparative advantage", it frames international trade mechanisms through a cost-driven rather than price-driven approach, thus suggesting more complex and potentially adverse implications for gender equality.

2.1.1 Gender and Trade within The Mainstream: Neo-classical theory strands

Mainstream trade theory predicts that trade liberalization contributes to reducing gender inequality in developing countries since trade results in deregulation and labour market reform. Such policies weaken the ability of predominantly male trade unions to restrict labour supply and maintain wages above the market equilibrium rate, which disproportionately disadvantaged female workers who were marginalized or excluded from the labour market. Consequently, overall employment is expected to expand, which paves the way for unemployed or underemployed women to find jobs (Çağatay 2005: 8-9).

Moreover, Becker's theory of discrimination (1971) also hypothesizes that any form of wage discrimination between different groups of workers becomes too costly when the level of competition increases. Under this theory, imperfect competition is a prerequisite for gender-based wage discrimination. As competition intensifies due to trade liberalization, the wage premium favouring male workers becomes unsustainable (Black and Brainerd 2004, Özay 2011). This leads to the closure of wage gaps and improved employment opportunities for women, consequently enhancing greater gender equality (Becker 1971: 59-61).

As opposed to the previous theories, the HOS model suggests that the impact of trade liberalization on gender inequality is asymmetric, depending on the type of country. Moreover, instead of the role of discrimination, this approach attributes the gender wage gap to variations in skills and human capital between men and women (Çağatay 2005: 9). This model posits that when a country opens up its economy, it affects the distribution of labour mobility from developed to developing economies. If a country has a comparative advantage in goods produced with intensive use of unskilled labour, trade liberalization is expected to close the wage gaps between skilled and unskilled labour. Since women are more likely to be

low-skilled workers in developing countries, employment for women will expand more rapidly than for men, thus closing the gender wage gap (Samuelson 1948, Çağatay 2005, Özay 2011). However, due to the labour mobility assumption, the opposite effect may occur in industrialized countries if women are excessively represented among unskilled workers, thus widening the gendered wage gap (Çağatay 2005: 9).

2.1.2 Gender as "Competitive Advantage" of International Trade: Feminist Economist Approach and heterodox economist strands

In contrast to mainstream economists, the second strand prefers an inductive approach rather than mere deductive theorizing based on such unrealistic assumptions as full employment. In addition, this group views "absolute advantage" or "competitive advantage" to be a more pertinent concept in the context of explaining international trade than "comparative advantage" (Milberg 1994: 232). This alternative framework also leans on heterodox post-Keynesian and Marxian analyses of uneven development with respect to trade and capital flows (Hymer 1979, Emmanuel 1972, Shaikh 1979, Edwards 1985). It also draws on theories of unequal exchange developed by Prebisch (1950), Singer (1950), and Maizels (2000).

Besides, this school of thought adopts a broader institutional and historical perspective in addition to standard economic considerations. The heterodox approach hypothesizes that the substantive divergences apparent in countries' composition of trade, as well as their comparative competitiveness in international trade, are shaped by institutionally and historically embedded factors related to technological capabilities, labour market dynamics, and structures. In this schema, educational gaps, political institutions, and social constructs are inextricably intertwined with economic hierarchies (Osterreich 2019: 2). International trade, therefore, impacts genders differently due to these underlying gendered inequalities (Staritz and Reis 2013: 3).

Feminization of labour and women as a competitive advantage

In terms of the effect of trade on gendered patterns of employment, feminist economists generally agree with neoclassical approaches in recognizing the general process of the "feminization of labour" – that is, increased women's participation in paid work as well as the deterioration of working conditions in previously male-dominated jobs (Anker 1998, Standing 1999). However, feminist economists offer different interpretations and explanations from the neoclassical perspective. While neoclassical economists may consider this phenomenon as "good for women", feminist economists see it as a more "contradictory" phenomenon since it potentially disguises several complications and countervailing trends that are not beneficial, especially for poor women (Çağatay 2001, Çağatay and Ertürk 2004).

The main argument of feminist economic theories for the feminization of labour is that women seem to be perceived as a "competitive advantage" that helps firms enhance export competitiveness and GVC participation. Particularly, gender inequality is considered a source of competitiveness because the gendered segregation of jobs tends to keep wages of female labour low, thereby stimulating investment and export growth (Çağatay 2001: 7). In addition, women workers are less inclined to join labour unions, engage in industrial unrest, and have limited bargaining power to demand higher wages even when productivity increases (Seguino 2017: 11). These low wages of women thus create a cost-based competitive edge for semi-industrialized countries in price-sensitive global markets (Çağatay 2005, Elson et al. 2007, Busse and Spielmann 2006, Williams 2003). Furthermore, the same pattern can be observed in GVCs, where firms could leverage existing gender relations to access cheap, high-quality female labour (Barrientos 2001: 85). Based on these aforementioned points, feminist

economists suggest that increased competition may reinforce gender discrimination if it bolsters economic competitiveness, which is contrary to Becker's discrimination theory.

Quality of employment

Furthermore, feminist economists attribute the contradicting view on the phenomenon of the feminization of labour to the "quality of employment" that women gained from trade expansion (Otobe 2015: 8). It is indicated that demand for low-cost, flexible labour in export-oriented sectors has often driven the relatively low wages and poor-quality working conditions of these "feminized jobs". For instance, firms seeking lower risk and higher flexibility to increase competitiveness would opt for informal and home-based work, mainly performed by women, while employing fewer formal workers (Standing 2006: 323). This is evident in export processing zones (EPZs), where the bulk of the labour force is female and labour standards have eroded (Çağatay 2005: 14). Similarly, in GVCs, if the objective is to save costs solely through cheaper resources, the outsourced production phases tend to be labour-intensive and low value-added. This has been the dynamic wherein, due to perceived lower educational attainment or gender discrimination, women's concentration at the low end of the chain occurs (Sayeed and Balakrishnan 2004: 111). Additionally, labour laws, social insurance, and gender norms create conditions, under which GVCs are usually embedded that largely contribute to the development of informal labour markets such as subcontracting and home-based work, where women are highly represented.

According to feminist economists, such "suitability" of female labour for low-income and often temporary work in export-oriented sectors could also be explained by the role of institutions and a broader view that combines the reproductive economy with unpaid jobs (Bamber and Fernandez-Stark 2013, Barrientos 2001). It is the gender norms, alongside women's reproductive responsibilities, that have acted to restrict women's high-quality employment opportunities. To illustrate, it is gendered stereotypes that view women as better suited for dexterous, "female" tasks such as sewing and caretaking rather than higher-skilled positions. Also, the perception that women typically have lower levels of education makes them pigeonholed into lesser-skilled and lower-paid jobs when entering the labour market (Joekes 1995, no page). Furthermore, as women bear a disproportionate burden and are time-constrained by unpaid domestic and care work, flexible and temporary jobs are considered to be more suitable for them (Ferrant et al. 2014: 6). These gender-based biases, in turn, crowd women into particular labour market segments where the imbalance in supply and demand maintains lower wage levels.

Defeminization of labour

While acknowledging the feminization of labour, feminist economists argue that this phenomenon tends to be temporary and can be reversed, which is referred to as the "defeminization of trade" phenomenon. This can be explained by several hypotheses. Firstly, the defeminization of labour might occur as production moves up the skill ladder at later stages of export promotion (Joekes 1995, Pearson 1998, Fussel 2000). Specifically, when export industries become more skill-intensive, women might lose their jobs due to the restriction of their ability to advance into more sophisticated activities within the industry or transition to higher-tech sectors given their barriers to accessing the necessary capital and technical expertise (Ahmed 2013: 91). Secondly, as firms move away from intense price competition, they might become less reliant on the lowest labour costs. Consequently, they no longer need to prioritize hiring women, who are often paid lower wages compared to men (Osterreich 2019: 6).

Based on the points discussed above, feminist economists have indicated that examining the impact of trade on gender equality necessitates an approach beyond the surface of

quantity economic outcomes. Gender equality, such as women's empowerment and increased household bargaining power, may not be improved despite greater paid employment for women resulting from international trade (Elson 1999: 614-616). This concern stems from the potentially exploitative nature of women's increased workforce participation rather than representing equitable gains. As stated by Carr and Chen (2002, 2004), despite engagement in paid (informal) jobs, women remain disproportionately vulnerable to poverty compared to men due to their overrepresentation in low-income positions, such as casual wage workers and industrial outworkers. Additionally, examining women's employment growth under the reproductive economy context, it seems that greater earnings for women do not necessarily alleviate the unpaid job burden, and their overall workload may increase.

2.2 Empirical Studies on Trade and Gender Equality

Looking into empirical research, studies have demonstrated inconsistencies with respect to the assumptions posited by neo-classical and feminist economist theories. Extant literature is systematically reviewed and categorized according to each of the indicators of gender equality articulated by these two theoretical frameworks. This spans from gender equality in its broader context to specific economic outcomes, encompassing wage differentials and employment patterns. Table 1 presents a summary of selected reviewed studies.

2.2.1 Trade and Gender Equality Indices

Regarding the impact of trade openness and gender equality in general, the results were mixed. On the one hand, the study of Neumayer and Soysa (2011) revealed a positive correlation between trade openness and gender equality, as measured by women's economic and social rights. The scholars employed Generalized Methods of Moment (GMM) estimation on the cross-national sample spanning 1981-2007 to address endogeneity issues. Results indicated that increased trade openness and its associated spatial dependence and spillover effects generally improved women's rights, except in low-income countries (Neumayer and Soysa 2011: 24). This seemed to be consistent with the assumption of mainstream theories.

On the other hand, some studies demonstrated context-dependent relationships between trade and gender equality, which aligns with the HOS model. For instance, Busse and Speilmann (2003: 3) examined this link in labour-intensive sectors across 115 countries in the 1999-2001 period using the Standardised Index of Gender Equality. Here, gender equality was reflected through four dimensions, including education, longevity, parliamentary representation, and labour market participation. Their findings showed that gender discrimination positively correlates with comparative advantage in goods produced with a heavy reliance on unskilled labour. However, they also suggested that industrialized nations might benefit from gender inequality in developing economies from which they could potentially "profit" with access to lower-priced unskilled labour (Busse and Speilmann 2003: 22). This is in line with the feminist economist standpoint.

Furthermore, Fatema et al.'s (2017) study also corroborated these context-dependent findings. Examining emerging economies from 2006 to 2014 with Hausman-Taylor's estimation, they used the Global Gender Gap Index to measure gender equality across various dimensions, including economic participation and opportunity, health, education, and political empowerment. The results showed that increased trade openness reduced gender inequality in labour markets of high-growth countries but had opposite effects in other emerging economies. While trade openness generally improved welfare and empowerment equality, it widened health gaps in some emerging economies (Fatema et al. 2017: 1083).

Table 1

Summary of selected empirical research in the literature review

Study	Effect	Scope of research	Gender indicator	Trade Measurement	Method	Findings	Outlet
Neumayer and Soysa (2011)	(+)	Cross-country; 1981-2007	Social rights and economic rights of women	Trade Openness	Econometric - Ordered logit and GMM	Greater trade openness improved women's rights, except in low-income countries	World Development
Busse and Speilmann (2003)	(x)	Cross-country; 1999-2001	Standardized Index of Gender Equality	▪ Trade Openness ▪ Trade competitive	Econometric - OLS	Gender discrimination are linked to comparative advantage in unskilled labour-intensive goods; suggesting industrialized nations benefit from gender inequality in developing economies	HWWA Discussion Paper, Hamburg Institute of International Economics
Fatema et al. (2017)	(x)	Cross-country; 2006-2014	Global Gender Gap Index	Trade openness	Econometric - Hausman and Taylor estimator	Trade openness reduced gender inequality in high-growth countries but increased disparities in some emerging economies	Asian Economic and Financial Review
Ahmad et al. (2023)	(+)	Cross-country; 1990-2021	Wage gaps	▪ Trade Openness ▪ Signing of PTAs	Econometric –FE	Trade openness and PTAs with strong labour provisions reduced gendered wage gaps	Economics Working Paper Series, U.S. International Trade Commission
Nikulin and Wolszczak-Derlacz (2022)	(-)	EU countries; 2002-2014	Wage gaps	Companies in GVCs	Econometric - OLS-weighted	GVC involvement widens gender wage gaps only in less competitive sectors. The gender wage gap may stem from women's lower bargaining power and sector gender composition.	Journal of Structural change and economic dynamics
Wei et al. (2013)	(-)	Household; 2002-2007	Wage gaps	▪ Trade openness	Econometric - OLS	Greater foreign trade competition worsened wage discrimination	European Scientific Journal

Study	Effect	Scope of research	Gender indicator	Trade Measurement	Method	Findings	Outlet
				▪ Export/ Import dependence		against women, contrary to some neoclassical predictions	
Hendy and Zaki (2013)	(x)	Household; 1998	Wage gaps	Tariff reduction	CGE and Microsimulation	Trade expansion in textiles and services reduced inequality for urban and rural skilled workers, but increased it for unskilled men and skilled rural women	The International Trade Journal
Sajid and Ullah (2014)	(+)	Cross-country; 1980-2012	Employment rate of women and men	Trade openness	Econometric - Random Effect	Trade openness increased female employment	Journal of Asian Development Studies
Iqbal et al. (2020)	(+)	Cross-country; 1990-2013	Employment rate of women and men	Trade Openness	Econometric - Random Effect	Trade openness improves gender equality in employment in developing countries, spreading egalitarian values through globalization	Journal of Engineering, Management, & Applied Sciences & Technologies
Zaki (2016)	(+)	Firm; 1960-2009	Employment rate of women	Trade Openness	Econometric - Probit model	Trade openness increased female employment in women-dominated sectors like textiles and garments in Egypt	OECD Publishing
Gaddis and Pieters (2014)	(-)	Sectoral in Brazil; 1991 and 2000	The female/ male (un)employment rate	Nominal Tariff reduction	Econometric - 2SLS	Trade reforms hurt employment for both genders, but more for men. Gender gap is narrow but due to men's worsening outcomes rather than women's gains	Policy Research Working Paper, World Bank

Study	Effect	Scope of research	Gender indicator	Trade Measurement	Method	Findings	Outlet
Giorgia et al. (2021)	(-)	Individual/ Sectoral in Ethiopia; 1994-2013	Number of female/male employment	Tariff reduction	Econometric - OLS, FE	Tariff cuts hurt female employment more than male. Women left the primary sector for services faster, but segregation persisted. Reforms may have discouraged women's higher education and pushed them into low-value household work.	WIDER Working Paper, United Nations University World Institute for Development Economics Research
Gupta (2021)	(-)	Firm/Sectoral in India; 1989 & 1998	Share of female workers	Tariff reduction (import competition)	Econometric - OLS	Establishments with larger tariff cuts and import competition had fewer female workers, contradicting taste-based discrimination predictions	IMF Economic Review
Baliamoune-Lutz (2020)	(x) - non-linear	Developing economies	Share of female in wage employment	Trade openness	Econometric - FE, GMM	Trade openness generally increased women's participation in wage employment but with diminishing returns	Research Paper 20/21. Morocco: Policy Center for the New South
Aguayo-Tellez et al. (2010)	(+)	Firm; 1990-2000	Wage ratio and employment	Tariff reduction	Econometric - OLS, FE	Post-NAFTA trade liberalization boosted women's relative wages and employment, driven by growth in female-intensive industries. Lower export tariffs increased women in skilled blue-collar jobs, suggesting exports and technology affect gendered skill premiums	Working paper 16195. Cambridge: National Bureau of Economic Research.
Luomaranta et al. (2020)	(+)	Firm in Finland; 2019	▪ Share of women employed ▪ Wage gaps	Type of firms	Econometric - OLS, FE	MNEs and foreign firms employ fewer women in top-paying roles but show smaller gender wage gaps in high-level white-collar positions	NBER Working paper series

Study	Effect	Scope of research	Gender indicator	Trade Measurement	Method	Findings	Outlet
Vo and Truong (2023)	(x)	Household; 2002-2016	▪ Wage gaps ▪ Working hours	Trade index for household	Econometric - 2SLS and Tobit model	Trade narrowed gender gap in work hours, but young kids still limit women's participation. Gap shrinks at age 6. Trade may widen pay gap in concentrated industries.	Economic Analysis and Policy
Ghosh (2004)	(+) quantity (-) quality	Household in India; 1977-1998	Export-oriented employment of women		Descriptive data analysis	Despite increased female employment in export sectors, particularly in EPZs, much of this work was low-quality, informal, or home-based	Book Chapter, in Globalization, Export-oriented Employment and Social Policy
Prasad (2018)	(-) quality	Qualitative data in Delhi	Quality of female employment in EPZs		Qualitative - ethnographic study	Weak labour standards and lack of unions in EPZs led to more casual, informal, and vulnerable conditions for women workers	Indian Journal of Women and Social Change
Otobe (2015)	(+) quantity (-) quality	Firm in Mauritius and Cambodia	Quantity and Quality of Female Employment in EPZ		Qualitative	Despite increased employment, women globally face higher rates of unemployment, vulnerability, informality, and working poverty than men	Working paper No. 197, ILO
Bamber and Hamrick (2019)	(+) quality	Firm in Costa Rica and Dominican Republic	Women Employment in Medical Device GVCs		Semi-structured interview and Descriptive Data Analysis	In Costa Rica and the Dominican Republic's medical device GVCs, women accessed quality high-tech jobs, including professional and technical roles, not just production	Background paper for the WBG-WTO Global Report on Trade and Gender

Note: (+):positive correlation; (-) Negative correlation; (x) Mix results; For those that have the merged cell for gender and trade indicator, their methodology is not the econometric regression, but using qualitative or descriptive analysis.

Source: Author's synthesize

2.2.2 Trade and Gender Equality in Labour Market Outcomes

The existing literature has also exhibited studies on trade on women's economic outcomes, such as wage gaps and employment, which are crucial channels to gender equality as identified by both mainstream and feminist economic frameworks. In general, the results were also inconsistent.

Trade and gendered wage gaps

The empirical evidence for the argument of Becker's discrimination theory regarding the positive correlation between trade and wage gaps was inconsistent. Ahmad et al. (2023: 1) found support for this theory when investigating the role of trade and trade policy in improving wage gaps in developing economies. The study utilized the Labour Provisions in Preferential Trade Agreements dataset, encompassing 51 protocols or amendments ratified by 21 countries between 1990 and 2021. To address unobserved country-specific effects, the authors implemented a fixed effects estimator. The findings showed that trade openness and strong labour provisions in trade agreements reduced gendered wage disparities in developing countries.

Not only country level, Nikulin and Wolszczak-Derlacz (2022) reported similar findings in European countries with micro-evidence. Unlike previous studies, the authors reflected international trade through the involvement of companies in GVCs instead of trade openness or tariff reductions. Using a dataset of 18 European countries from 2002-2014 and weighted Ordinary Least Squares (OLS) estimation, they found that greater involvement in GVCs only resulted in a higher gender wage gap in less competitive sectors. Additionally, this wage disparity might stem from women's lower bargaining power or the gender composition in GVC-intensive sectors, aligning with feminist economic perspectives (Nikulin and Wolszczak-Derlacz 2022: 278).

Conversely, the opposite result was confirmed by Wei et al. (2013) in China during the 2002-2007 period, with evidence of household level. By using the OLS estimation, Wei et al. (2013: 37) found that increased foreign trade competition worsened wage discrimination against women rather than alleviating it, as predicted by neoclassical models. At the same data level, the microsimulation analysis of Hendy and Zaki (2013) proposed a mixed result in Egypt, which seems to be consistent with the HOS model. While trade expansion in sectors like textiles and services reduced wage inequality for skilled urban and rural individuals of both genders, it exacerbated inequality for unskilled men and skilled women in rural areas (Hendy and Zaki 2013: 83).

(De)feminization of the labour

Regarding the relationship between trade and the quantity of women's employment, evidence revealed a complex and context-dependent association. Studies have documented both linear patterns, such as "feminization" or "defeminization of labour" as well as non-linear patterns, underscoring the multifaceted nature of trade's impact on gender-specific employment dynamics.

At the macro level, the feminization of labour, a phenomenon aligned with neoclassical theory and partially supported by feminist economic perspectives, was corroborated by the research of Sajid and Ullah (2014). The authors studied the impact of trade openness on gender equality in employment using data from 8 developing countries for the period 1980 to 2012 and found a positive correlation (Sajid and Ullah 2014: 101). Furthermore, Iqbal et al. (2020) also found consistent results using the random effect regression model over data from 12 Asian developing countries in the 1990-2013 period. This was attributed to the spread of more egalitarian values from Western countries through globalization (Iqbal et al. 2020: 8).

Zooming in further to the single-country context of Egypt, Zaki (2016) examined the relationship between trade and equality in employment using evidence from 1960 to 2009. By employing a probit time-series model, findings showed that some sectors that used women intensively, such as textiles and garments, experienced an increase in female employment (Zaki

2016: 27-28). Under the micro data level, Shepherd (2018, p.11) analyzed firm-level data for 138 countries and found that participation in GVCs was associated with stronger absolute demand for female production and non-production workers, as well as stronger relative demand for female production workers.

However, the literature also showed that the *defeminization of labour* also existed in some countries, which was in line with feminist economic standpoints. Gaddis and Pieters (2014) examined the effects of trade liberalization on labour force participation and employment rates in Brazil between 1991 and 2000. The authors used a two-stage least square (2SLS) model to address potential endogeneity from unobserved factors correlating with trade patterns in non-tradable sectors. The findings indicated that trade reforms reduced participation and employment for both genders, but the negative impacts were significantly greater for men (Gaddis and Pieters 2014: 25).

The defeminization of labour was also observable in research by Giorgia et al. (2021) on Ethiopia, where tariff reductions revealed a more detrimental effect on female employment compared to male employment. Women tended to exit the primary sector more rapidly and shift into services. The authors also suggested the tariff reforms discouraged women from gaining higher education and pushed them towards low-value-added household work (Giorgia et al. 2021: 19). Moreover, Gupta's (2021) study on India's 1991 trade liberalization episode also uncovered a negative link between tariff cuts, import competition, and the share of female workers employed. Using an OLS estimation over panel data from the annual survey of industries, the findings revealed that establishments exposed to larger output tariff reductions and import competition experienced a decline in female employment share. The author attributed this to legal restrictions on women working long hours or night shifts, which constrained their ability to benefit from the increased shift work in exporting firms (Gupta 2021: 710-711).

Apart from linear relationships, Baliamoune-Lutz (2020) identified a nonlinear correlation between trade and women's employment by using fixed-effect (FE) and GMM estimations on panel data of developing economies. Trade liberalization was found to increase women's participation in paid employment, but with diminishing returns as the gains could turn into losses at high levels of trade openness (Baliamoune-Lutz 2020: 16). This nonlinear pattern was likely to be consistent with the "*gender-equality paradox"* in the Middle East and North Africa regions, where rising female education has not translated into commensurate gains in women's labour force participation.

Quality of employment

The extant literature also presented a more sophisticated approach that simultaneously examined employment outcomes alongside other gendered labour market indicators, including wage disparities, work hours, job quality, and reproductive factors. This approach resonated with the feminist economic framework, yet empirical findings remained diverse due to varied country-specific contexts.

For example, Aguayo-Tellez et al. (2010) sought to explore the effect of trade liberalization, notably after the signing of the North American Free Trade Agreement (NAFTA), on the gender wage ratio from 1990 to 2000 with FE estimation. The results showed that during the period of trade liberalization following NAFTA, the relative wages and number of employment of women increased. This appeared to be linked to the expansion of initially female-intensive industries in response to the tariff cuts. However, regarding the type of job, the research suggested that tariff liberalization was positively correlated with increased hiring of women in skilled blue-collar occupations within industries. This implied that the export channels and embedded technologies might play an important role in explaining the gendered dynamics of skill premiums (Aguayo-Tellez et al. 2010: 19). Likewise, Juhn and Ujhelyi (2013) reported this pattern in the same context for only blue-collar workers, but not for white-collar ones.

At the micro level, Luomaranta et al. (2020) also indicated similar findings in Finland in 2019 in terms of white-collar worker employment by applying the FE model over firm-level data. The evidence suggested that multinational enterprises and foreign firms tended to have a lower share of women employed in the best-paying professions, such as management roles and jobs requiring scientific, technological, or digital skills. However, the gendered wage disparity in these top-tier white-collar positions appeared to be smaller in companies engaged in international trade (Luomaranta et al. 2020: 235).

Separately, studies from Vietnam yielded mixed results on the linkages between trade, employment opportunities, gender wage inequality, and differences in working hours. Vo and Truong (2023: 1704) employed 2SLS and Tobit models over household data from the 2002-2016 period and found that international trade helped reduce the gender gap in working hours. However, when considering jointly with reproductive factors, the presence of young children continued to constrain women's labour force participation despite increased job prospects from trade. This gap only began to narrow once children reached six years of age. Moreover, the researchers suggested that international trade might exacerbate the gender pay gap. This could result from competitive pressures compelling businesses to reduce wages for female workers, particularly in industries with high concentration and low domestic competition (Vo and Truong 2023: 1704). These findings align with feminist economic perspectives that view women as a source of competitive advantage in international trade.

Alongside relative wages and working hours, job quality also emerges as a crucial consideration, particularly in the context of the feminization of labour driven by international trade, as highlighted by feminist economic perspectives. However, only a limited number of studies have addressed this issue. To illustrate, Ghosh (2004) researched the effect of globalization on export-oriented employment outcomes for women, including wage and job quality. Using only descriptive data, the author suggested that although the feminization of labour occurred in export-oriented sectors, especially in India's EPZs, there was a trend of low-quality work, such as home-based and informal jobs, in these sectors (Ghosh 2004). This was compatible with the feminist economist standpoint, which highlighted problematic underpinnings of the feminization of labour regarding employment quality for women.

In the same context, Prasad (2018) also found consistent findings by using qualitative data collected through an ethnographic study of the women workers in the garment factories in Delhi. It seemed that it was the lack of labour standards or unions in EPZs that have made women workers more casualized, informal, and vulnerable. A similar pattern could also be observed in the study of Otobe (2015), which examined the impact of export-led development of EPZ from case studies of Mauritius and Cambodia. The author suggested that despite the overall increasing levels of employment, women tended to be more affected than men by higher unemployment and vulnerability, which implied higher informality and working poverty (Otobe 2015: 20).

However, Bamber and Hamrick (2019) revealed the opposite findings in the context of Costa Rica and the Dominican Republic. The authors used both qualitative and quantitative data at the firm level to explore the gender dynamics and upgrading of GVCs in the medical devices sector. The result proposed that women were able to access strong employment opportunities in high-tech sectors in the medical devices GVC in Costa Rica and the Dominican Republic. These jobs for women were not limited to just production line work but also encompassed professional and technical positions. Furthermore, these jobs offered competitive compensation and job security. This finding contradicted to feminist economic perspectives that characterize women's GVC employment as precarious and poorly compensated (Bamber and Hamrick 2019: 33).

To summarize, the multifaceted linkages of trade and gender equality have been studied extensively in the literature. Scholars have employed diverse metrics to assess gender-related indicators through which trade influences, ranging from broad dimensions of gender equality to specific measures in the labour market. Regarding the findings, the relationship of trade on gender equality

revealed heterogeneous results, positing both linear and non-linear correlations. This inconsistency might stem from the existing literature's disproportionate emphasis on the quantity dimension of economic outcomes for women, particularly wages and employment opportunities. According to feminist economists, the exclusive focus on the quantity dimension might also yield biased assessments of gender equality progress. Therefore, it is necessary to incorporate the job quality perspective. For instance, despite increasing women's employment opportunities due to trade expansion, the prevalence of low-quality, poorly compensated positions may ultimately impede meaningful advances in gender equality.

On such basis, job quality represents a crucial dimension for understanding trade's true impact on gender equality, particularly in determining whether trade liberalization genuinely empowers or exploits women. However, this dimension has not been thoroughly investigated, either independently or jointly, with quantitative metrics in the literature. Only a limited number of studies have examined these dynamics within particular national contexts, such as India, Mauritius, or Cambodia. In light of these research gaps, this thesis aims to advance the understanding of trade-gender equality linkages in employment through a comprehensive analysis that examines the effects of international trade on both the quantity and quality of women's employment. Furthermore, given such a research approach, this research seeks to contribute more insightful implications for developing more gender-inclusive trade and development policies, which are not only essential for equity but also to promote inclusive development.

Chapter 3 Methodology

3.1 Data Description

According to the United Nations (UN) (1999: 17), the feminization of labour has emerged in almost all regions of the world since the early 1980s. However, in many middle-income countries or economies like Puerto Rico, Singapore, and Taiwan, the demand for women's labour in manufacturing weakened in the late 1980s as export production became more skill- and capital-intensive (UN 1999: 33). Therefore, the data was initially expected to be collected from 1980 to 2022 covering 192 countries to capture the effects of international trade on gender parity in employment. Nevertheless, due to the limited availability of employment indicators, the thesis is restricted to 76 countries given the requirement for panel data analysis from 2000 to 2022 to examine the linkages between trade and quantity of female jobs, and 48 countries from 2005 to 2022 to capture the quality perspective (see Appendix 1).

Table 2

Summary of Variables

Variable	Aspects	Sub-dimension	Indicator	Unit	Source
Dependent	Gender Equality in employment	Women's employment opportunities	Number of female employment	Thousand people	ILO
		Quality of women employment	Proportion of informal employment in total female employment	%	
Independent	International Trade	Trade openness	Share of total imports and exports of a country over the country's GDP	%	WDI
Control	Legal	Law and Regulation	World Women Business and the Law Index Score	-	WDI
	Economic	GDP per capita	GDP per capita based on PPP at constant 2017	USD	
		Labour force participation of female	Share of labour force participation of female	%	UNDP
		Foreign Direct Investment	FDI stock inflow	Million USD	UNCTAD
	Social	Population growth	Population annual growth	%	WDI
		Education	Percentage of female population ages 25 and over that attained or completed upper secondary education	%	UNDP

Variable	Aspects	Sub-dimension	Indicator	Unit	Source
		Information and Communication Technology (ICT)	Share of individuals using the Internet over the population	%	WDI

3.1.1 Gender equality in employment Measurement

This thesis utilizes two key dependent variables to assess the gendered outcomes resulting from the impact of international trade, including the number of female employment and the informal employment rate among women.

Number of female employment

The quantity perspective of employment is measured by the number of female employment, referring to all women of employable age who earned income either by working for an employer or being self-employed (ILO 2024). This measurement has frequently been used to reflect job opportunities for women created by international trade in the existing literature (Sajid and Ullah 2014, Gaddis 2014, Giorgia et al. 2021, Gupta 2021). The data on the employment of females is from the International Labour Organization (ILO) (2024).

Share of informal employment of female

To examine the quality of women's employment, the thesis utilizes the percentage of female informal employment in total employment for the following reasons. Informalization of work, referring to the increasing prevalence of non-standard, flexible, and often precarious forms of employment, has been well-documented in the literature to become more prevalent due to increased trade openness, especially within GVCs. Accordingly, women considered a "competitive advantage" for trade tend to be clustered into these types of informal, low-quality jobs, as highlighted by feminist economists. In addition, given the insufficiency of research examining this angle of job quality, this thesis seeks to use the aforementioned indicator as a proxy of the potential for trade-induced shifts towards more precarious and unprotected forms of work for female workers. This indicator is published by ILO, which refers to:

> persons who in their main or secondary jobs were (a) own-account workers, employers and members of producers' cooperatives employed in their own informal sector enterprises; (b) own-account workers engaged in the production of goods exclusively for own final use by their household; (c) contributing family workers, regardless of whether they work in formal or informal sector enterprises; or (d) employees holding informal jobs, whether employed by formal sector enterprises, informal sector enterprises or as paid domestic workers by households (ILO 2003: 3-4).

3.1.2 International Trade Measurement

Regarding the measurement of international trade, trade openness data are collected from the World Development Indicator (WDI), which refers to "*the share of total imports and exports of a country over the country's gross domestic product (GD*P)" (WDI 2024). This measurement is commonly used in the literature to reflect trade openness (Afesorgbor and Demena 2022, Busse and Christian 2003, Fatema et al. 2017, Ghosh 2004, Iqbal et al. 2020, Neumayer and Soysa 2011, Nikulin and Wolszczak-Derlacz 2022, Sajid and Ullah 2014, Wei et al. 2013).

3.1.3 Control Variables

The thesis controls for some legal and socio-economic factors that independently influence gender equality. These control variables are important since not only do they help to capture the impact

of the interest variable but they also represent mediator factors for the magnitude and sign of trade-gender linkages. However, due to the limited availability of data, the number of countries and the period for each control indicator is different.

Regarding the political perspective, the thesis controls the *laws and regulations* promoting women's economic opportunities with the data of "*World Women Business and the Law Index Score"* obtained from WDI. Better performance in areas measured by this index is linked to higher females in the labour force with higher income and improved development outcomes (WDI 2024).

In addition, the thesis controls for some *economic conditions,* such as *the country's level of GDP per capita.* This indicator can have both positive and negative on women's employment. On the one hand, higher incomes tend to stimulate production aggregate demand, leading to economic expansion that generates new employment opportunities, including those for women (Rahman 2013, Maitah et al. 2015). On the other hand, rising income levels could potentially reduce women's jobs, including informal jobs (Loayza and Rigolini 2006, La Porta and Schleifer 2008). This occurs when consumption patterns shift toward goods and services that require more skilled labour in response to rising income (Caron et al. 2020: 2). Such transitions often foster the development of capital-intensive and high-skill industries, which may restrict job opportunities for women who lack necessary qualifications and training. Per capita income is measured as "*GDP per capita based on purchasing power parity (PPP) at constant 2017*" (WDI 2024).

The percentage of *labour force participation of females* is also controlled for this case. It is expected to have a positive correlation with female employment. Furthermore, this is an important variable when examined together with trade openness, which implies female labour's role in trade. It is expected to determine the extent of the trade's impacts on both the quantity and quality of female jobs. This data is collected from the United Nations Development Programme (UNDP) database.

Moreover, *Foreign Direct Investment* (FDI) is controlled in this study. FDI is suggested to affect women's employment in various ways. For instance, FDI can offer employment and working conditions for local women due to the requirement for favourable legal conditions in the host country (OECD 2008, Blanton and Blanton 2012, La Porta and Shleifer 2014, McCaig and Pavcnik 2015). However, FDI inflows might be associated with female informal employment and the gender wage gap (Ouedraogo and Marlet 2017: 32). The data is referred to as "*FDI stock inflow*", which is accumulated value at period end (UNCTAD 2024). This data is drawn from the database of the UN Conference on Trade and Development (UNCTAD).

Regarding the social perspective, the thesis first controls "*population growth"* sourced from WDI since it is expected to hurt women's employment. Women's ability to participate in the formal labour market and pursue higher education might be limited due to the increase in the demand for care work derived from population growth, which often falls disproportionately on women (Peek 1975, Behrman and Gonalons-Pons 2020).

Additionally, the *female education level* is also controlled since it is considered a critical factor in promoting women's job opportunities as well as a mediating factor that defines the magnitude and sign of trade on gendered disparity. Evidence shows that higher educational attainment enhances women's engagement in all types of jobs (Taymaz 2010: 13). Also, when trade expansion creates opportunities in high-skilled, technology-intensive sectors, women's ability to access these jobs may be heavily influenced by their educational attainment and skills (Tzannatos 1999: 24). The data for education was derived from the database of UNDP (2024), which is measured by "*the percentage of the female population ages 25 and over that attained or completed upper secondary education".*

Besides, *Information and Communication Technology* (ICT) is expected to positively impact women's employment (Arun et al. 2004, Rathi and Niyogi 2015, Verma et al. 2022). By reducing geographical barriers, transaction costs, and uncertainties, ICT can pave the way for women to access more job opportunities. Additionally, it expands educational access for women through distance learning, especially in rural areas, thus allowing more chances for them to get a job (Rathi and

Niyogi 2015: 519). The country level of ICT is proxied with the measurement of "*the share of individuals using the Internet over the population"*. This data is collected from WDI (2024).

3.2 Econometric Estimation

3.2.1 Model Design

A panel regression for 76 countries from 2000 to 2022 is estimated for empirical analysis using econometric research techniques. This is considered to be the most useful method to describe the relationships between economic phenomena. Particularly, by using both statistical and mathematical theories, econometrics allows researchers to convert economic theories into quantifiable metrics, thereby establishing trends between datasets (John 2021, no page).

The thesis seeks to explore the impact of international trade on gender equality with a joint consideration regarding the number of employment and job quality. Departs from those previous studies in that the paper interacts trade openness with the female labour force participation rate. The objective of using this specification is to assess whether an increase in openness may affect depending on the increasing women's participation in the workforce, reflecting the assumption that *"female labour as a competitive advantage in trade*". An initial examination of the impact of trade on women's number of employment is conducted with the following regression form:

$$Employ_{it} = \alpha + \beta_1 Trade\ Openness_{it} + + \beta_2 Female\ labor\ market\ participation_{it} + \beta_3 (Trade\ Openness_{it} * Female\ labor\ market\ participation_{it}) + \gamma X_{it} + \delta_t + \varepsilon_{it} \quad (1)$$

where $employ_{it}$ (in natural logarithm form) represents the number of employment of female labour for country (i) and at time (t). As mentioned above, the interaction term between trade openness (in natural logarithm form) and female labour force participation rate is added. The main coefficients of interest in regression (1) are β_1 , $\beta_{2,}$ and $\beta_{3,}$ which shows the average effects of international trade on women's job opportunities in relation to female labour force participation. If there is any significant result in the interaction term, it means that women's employment is correlated with international trade in the condition of the presence of females in the labour market.

To tackle the potential omitted variable bias, vectors of time-varying controls at the country level are added (γX_{it}). These variables include the GDP per capita (in natural logarithm form), the FDI stock inflow (in natural logarithm form), female educational level, ICT level, and population growth. In addition, the thesis adds year-fixed effects (δ_t) to control for common shocks affecting all countries.

Next, the thesis continues to test the effects of trade on the quality of women's employment, proxied by the female informal employment rate, with the following regression:

$$informal_{it} = \alpha + \beta_1 Trade\ openness_{it} + \beta_2 Female\ labor\ market\ participation_{it} + \beta_3 (Trade\ openness_{it} * Female\ labor\ market\ participation_{it}) + \gamma Z_{it} + \delta_t + \varepsilon_{it} \quad (2)$$

where $informal_{it}$ refers to the proportion of informal jobs of female labour for country (i) and at time (t). Similar to (1), the interaction term between trade openness and female labour force participation rate is included, measuring the impact's magnitude of international trade given the presence of female labour force participation. The coefficients of interest of this equation are β_1 , $\beta_{2,}$ and β_3. If there is any significant result in the interaction term, it suggests that the share of informal work of women is correlated with international trade in the condition of the presence of females in the labour market. For control variables (γZ_{it}), GDP per capita (in natural logarithm form), the FDI stock inflow (in natural logarithm form), and female educational level are added. In addition, year-fixed effects (δt) are added.

Endogeneity Problems

The functions presented above for both employment perspectives raise endogeneity concerns, which stem from the potential correlation between the error term and variables such as GDP per capita, trade openness, FDI, and the female labour force participation rate.

For GDP per capita, the source of endogeneity is derived from its potential reverse causality with the dependent variables. According to the neoclassical endogenous growth theory, GDP per capita growth is endogenous, driven by factors like employment growth and technological change (Setterfield 2009: 5). Conversely, a higher employment rate unambiguously increases GDP per capita (Carone et al. 2006: 10). In addition, trade openness variables may also suffer from endogeneity sourced from the same problem mediated by income. Trade openness can affect women's income by creating or eliminating jobs due to structural changes. In turn, income from women's employment can influence consumption patterns, impacting trade flows and the demand for certain goods and services (Hallak 2010, Chai 2018).

Furthermore, the error term accounts for unobservable characteristics such as tradition and employer preferences, including stereotyping and prejudice. The literature suggests that these factors may be correlated with FDI and trade openness, particularly in exporting firms and those participating in GVCs, which potentially exacerbate labour segmentation and favouring cheap female labour (Çağatay 2001, Barrientos 2001). Likewise, the female participation rate may be correlated with omitted variables, such as societal expectations related to gender roles, which often influence women's labour force participation and the prevalence of informal work (Bamber and Hamrick 2019, Elgin and Elveren 2021, Joekes 1995, Osterreich 2019).

Instrument Variables (IV) Approach

To address the endogeneity issues, some previous studies have employed fixed effects to control for unobserved heteroskedasticity (Aguayo-Tellez et al. 2010, Ahmad et al. 2023, Giorgia 2021, Iqbal et al. 2020, Luomaranta et al. 2020). However, these models may not adequately resolve endogeneity stemming from time-varying omitted variables or reverse causality. In the current study, endogeneity potentially arises from unobserved time-varying effects, such as cultural norms and societal expectations.

Some studies have acknowledged this issue and followed the instrumental variable (IV) approach (Gaddis and Pieters 2014, Vo and Truong 2023), which helps isolate the variation in the endogenous variable that is not associated with the error term. IV methods rely on two key assumptions. First, the instruments should be distributed independently of the error term of the main function. Second, the IV should be sufficiently correlated with the included endogenous variables, through which the IV indirectly affects the dependent variable (Hill et al. 2020: 20).

However, a significant limitation of this approach is the difficulty in finding suitable external IVs that satisfy both conditions mentioned above, especially in the case of multiple endogenous variables. Therefore, this study combines the use of both external and internal IVs, utilizing lagged variables of both independent and dependent variables to instrument the endogenous variables. This approach was also widely applicable in the literature (Bellemare et al. 2017, Bussmann 2009, Gaddis and Klasen 2014).

For the external IV, the study employs *forest rent per GDP* as an instrument for GDP per capita. It is proposed that higher forest rents indicate more economic value and benefit gained from associated resources, including timber, non-timber products, and ecosystem services, thereby enhancing the GDP positively. In contrast, as rent from forests is much more directly tied to natural resource management, it may not have a direct effect on women's employment. Additionally, cultural norms in many societies may dictate the types of jobs women can pursue, leading to higher female employment in low-skilled, low-valued, and dexterity-demanding sectors (Joekes 1995, Sayeed and Balakrishnan 2004) rather than sectors related to forestry or environmental resources.

The study also selects lags of the endogenous variables, such as FDI, trade, and GDP itself. This approach was also employed in the research of Bussmann (2009), who used lags of trade openness as an instrument for itself, and Gaddis and Klasen (2014), who utilized lags of GDP as instruments with the GMM estimation. Regarding the choice of lag length, it is essential to consider a trade-off between the lag length and the requirement that it must be strongly correlated with the endogenous variable. Specifically, the lag length should be distant enough in time for the instrument to avoid correlation with the regressand while remaining correlated with the endogenous variable (Wintoki et al. 2012: 600). Consequently, this study selects a lag of 4 years for both models.

Furthermore, the study also employs lagged dependent variables as IVs for the endogenous variables, following the method proposed by Arellano and Bond (1991). The standard estimation procedure for dynamic panels with unobserved individual-specific heterogeneity involves the first-difference transformation of the model. Sequential moment conditions are then used, where lagged variables serve as instruments for the endogenous differences, and the parameters are estimated using the GMM (see the next section). Some studies in the literature also employed this approach with system GMM estimation, with its superior efficiency in addressing finite sample bias to difference GMM (Baliamoune-Lutz 2020, Neumayer and Soysa 2011).

Regarding lag length, for the model measuring the linkage of trade and the number of women jobs, the study employs a lag of five and six years of dependent variables, while that measuring the nexus of trade and quality of women's employment is processed with the lags of three and four years of the dependent variables. This choice is based on the consideration of the validity of instruments and GMM estimation. According to Roodman (2009: 119), to ensure the validity of the GMM model, instruments are suggested to be set to lag three and higher time units for the dependent variable (y). However, if the second-order serial correlation is detected, even longer lags (four or beyond) must be used to maintain the exogeneity of the instruments and the consistency of the GMM estimator.

3.2.2 Continuous Updated Estimator GMM

Since there are endogeneity issues, OLS estimation will yield biased results. Moreover, FE estimation is also inefficient in this case, as it does not account for time-variant unobserved factors. Given the IV approach, 2SLS or GMM estimation would be more appropriate. However, according to Hausman et al. (2011: 45), 2SLS might suffer from a considerable finite sample (second-order) bias in over-identified models with weak first-stage partial r-squared values. Therefore, GMM estimation, which is more robust to weak instruments and over-identification, emerges as the preferred choice for addressing endogeneity in this context.

GMM estimation for dynamic panel data was developed by Arellano and Bond (1991) and Blundell and Bond (1998). Here, endogeneity is mitigated through an *"internal transformation"* process, where there is a subtraction between the variable's past value and its present value (Roodman 2009: 86). This process results in a reduction in the number of observations but enhances the efficiency of the GMM model. There are two transformation techniques used as GMM estimators, including first-difference transformation (one-step or difference GMM) and second-order transformation (two-step or system GMM). The first-difference GMM estimator, introduced by Arellano and Bond (1991), utilizes the first-differenced equation with suitable lagged variables as instruments. This approach removes the source country-specific effect. However, one-step GMM estimators have limitations. The first-difference transformation possibly leads to considerable data loss if a variable's recent value is missing (Roodman 2009: 104). Additionally, as stated by Blundell and Bond (1998: 131), difference GMM may perform poorly if a dependent variable approximates a random walk since historical levels offer minimal information about future variations.

Given such problems, a two-step GMM estimation is recommended by Arellano and Bover (1995: 10). This method employs "*forward orthogonal deviations"*, which involves subtracting the

average of all future available observations of a specific variable rather than using past observations (Roodman 2009: 86). Accordingly, the variables are made exogenous to the fixed effects and prevents unnecessary data loss, thereby providing more efficient and consistent estimates for the involved coefficients (Arellano and Bover 1995: 48). Besides, the system-GMM estimators also offer several advantages for examining economic growth models. By applying a first difference, it reduces bias derived from omitted time-invariant country-specific effects variables (Bond et al. 2001: 3). Furthermore, system GMM offers robust standard errors to tackle heteroskedasticity issues (Roodman 2009: 94). However, system-GMM estimation is shown to suffer from weak instrument problems (Bun and Windmeijer 2010, Han and Phillips 2006). The two-step GMM process first estimates parameters and calculates a weighting matrix, which is then used in the second step. This approach can sometimes lead to unpredictable outcomes and may have a "*nondegenerate limit distribution*" (Han and Phillips 2006: 176). Hence, consistent estimation is still possible even with irrelevant instruments when using system GMM estimation (Han and Phillips 2006: 149).

In light of that limitation, a more efficient estimation, known as Continuous Updated Estimator GMM (CUE-GMM), has been proposed (Hansen et al. 1996, Han and Phillips 2006, Newey and Windmeijer 2009) under many weak instrument asymptotics. The CUE-GMM continuously updates the weighting matrix, making it more consistent under numerous weak moments. Several studies have demonstrated the efficiency of the CUE-GMM in addressing endogeneity issues (Atkinson and Tsionas 2018, Murugappa et al. 2020). Therefore, this paper employs the CUE-GMM to estimate the impact of trade openness on women's employment from both quantity and quality perspectives with the IV approach.

Although CUE-GMM has advantages in terms of efficiency over weak instruments, particularly in finite samples, this estimation still has some drawbacks, such as computational complexity, sensitivity to starting values, and challenges with instrument selection. Therefore, this thesis also employs some related post-estimation tests to ensure the robustness of the model. Firstly, to assess whether the IVs are satisfied with the conditions in the CUE-GMM estimation, this study conducts a series of Weak IV tests, drawing upon the approach proposed by Wintoki et al. (2012). The process entails two primary tests. Initially, a first-stage regression is performed, regressing the endogenous variables on the instruments, followed by a thorough examination of the resulting F-statistics. As a rule of thumb, an F-value exceeding 10 is indicative of instrument validity (Staiger and Stock 1997: 557).

Next, Cragg-Donald statistics are calculated, as they may provide more informative insights than the first-stage regression F-statistics when dealing with multiple endogenous variables. These statistics are derived under weak instrument asymptotics, where reduced-form parameters are local to zero in each equation, and they reject the null hypothesis of weak instruments less frequently than warranted when the null is true (Stock and Yogo 2005: 8). However, this approach relies on the assumption of independent and identically distributed errors. When this assumption is relaxed and robust standard errors are employed, the correspondingly robust Kleibergen-Paap Wald rk F statistic is utilized for comparison with the critical value. To establish that the IVs are not weak, this statistic must surpass the tabulated critical value at a specified size.

Given the utilization of multiple instruments, the overidentification test is also imposed, which is the Hansen-J test in this context. This assumption is also crucial for the validity of the GMM estimator. Rejection of their null hypothesis suggests that the exclusion restrictions for these instruments may be inappropriate. Besides, the validity of the CUE-GMM model hinges on the assumption that the residuals are not serially correlated. To address this, the paper conducts the Arellano-Bond test for no autocorrelation to the first differential error term, with the null hypothesis being the absence of correlation up to the second order (AR2). A failure to reject the null hypothesis lends support to the model specification (Ramzan et al. 2019: 7). Lastly, the thesis employs a sensitivity analysis to provide an evaluation of the robustness of the CUE-GMM estimation by using alternative trade openness proxy variables.

Chapter 4 Results and Discussion

4.1 Descriptive Statistics

The Variance Inflation Factors (VIF) test has been conducted and shown no sign of multicollinearity in the model (See Appendix 2). In addition, to mitigate the influence of outliers and reduce the stability of the variance, this study applies the Winsorizing technique, trimming the bottom 5% and top 5% of observations for trade openness, number of female employment, the share of informal employment among women, population growth rate and FDI stock inflow. This results in a regression analysis based on 1,547 observations for examining the quantity impacts of trade on women's employment and 774 observations for assessing quality dimensions within the context of increasing female labour force participation. Table 3 presents the summary statistics for all variables used in the paper.

Table 3

Descriptive Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
Number of Employment of female (Thousand people)	1547	4561.962	5507.33	70.149	26181.34
Proportion of informal employment of female (%)	774	35.541	27.261	3.622	90.695
Trade openness (%)	1574	86.754	33.998	32.93	187.71
Education of Women	1746	67.143	24.953	6.75	100
World Women Business and the Law	1599	78.752	12.992	44.375	97.5
FDI stock inflow (Million USD)	1568	141333.6	212080.1	1880	1038034
GDP per capita, 2017PPP (USD)	1748	26560.04	19783.87	1486.107	112445.4
Share of Labour Force Participation of female (%)	1748	50.654	12.83	13.05	85.5
Population Growth Rate (%)	1574	.878	.712	-.574	2.639
ICT (%)	1748	48.57	31.41	.047	100

Source: Author's calculation

The result reveals that the percentage of informal female employment shows significant variability, ranging from 3.622% to 90.695%. Moreover, the number of female employment also shows a relatively varied distribution, with a mean of 4561.962 thousand people and a standard deviation of 5507.33. Additionally, the minimum and maximum values, which are 4.251 and 10.173, respectively, reflect a wide range of female employment levels across countries. Regarding trade openness, although there is no sign of multicollinearity, the original percentage values exhibit considerable variability, with a mean of 86.754% and a standard deviation of 33.998%. Moreover, trade openness appears to have an exponential relationship with female employment. Consequently, both the data are transformed into log form to stabilize variance and linearize this relationship, thereby enhancing the accuracy of the analysis of how trade openness affects female employment levels.

The control variables exhibit significant disparities across countries. For instance, the education level of women seems to underscore notable inequalities with a standard deviation of 24.953% and a minimum value of 6.75%. The same patterns are also observable in ICT, population growth, and FDI stock inflow. Interestingly, on average, men and women tend to equally access the job markets since the share of labour force participation of females has a mean of 50.654%. Nevertheless, its standard deviation of 12.83% indicates variability across different countries. Furthermore, women are likely to have favourable legal environment as indicated by a mean score of 78.752 and a standard deviation of 12.992 of the World Women, Business and the Law Index.

4.2 Trade Openness and Women's Employment

Table 4 presents the CUE-GMM estimation results examining how trade openness affects employment opportunities for women when considering their labour force participation. The interaction term is positive and significant at a 1 % level of significance, which exhibits a complex dynamic between trade openness and the quantity of female employment (See Figure 1).

Table 4

Female Employment and Trade Openness

Variable	Number of women employment (log)
GDP per capita (log)	-1.313***
	(0.291)
Trade openness (log)	-38.01***
	(6.865)
Labour force participation rate of female	-3.064***
	(0.574)
Trade openness* Labour force participation rate of female	0.711***
	(0.132)
FDI (log)	0.544***
	(0.136)
Educational level	0.007
	(0.007)
Population growth rate	-0.088
	(0.174)
ICT	0.0142
	(0.01)
Regulation	0.073***
	(0.028)
Observations	801

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

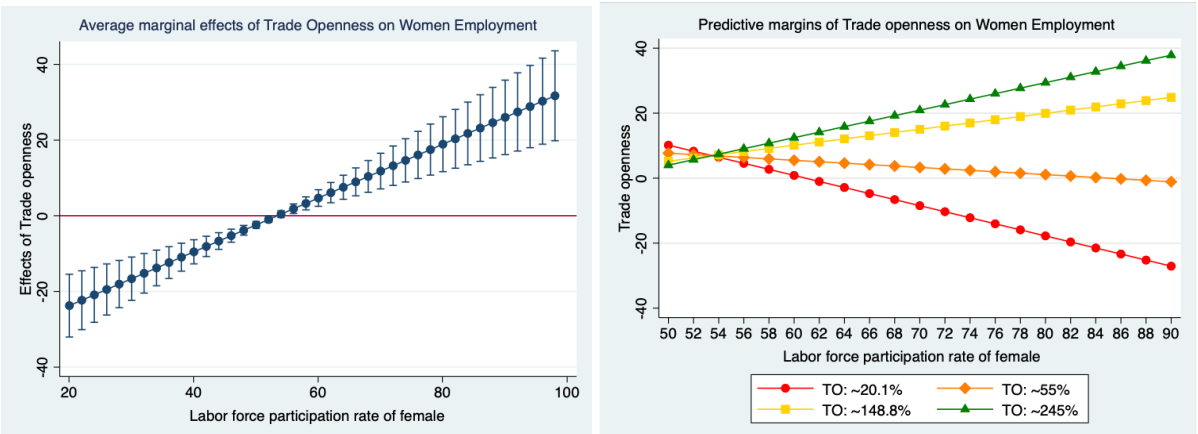
Source: Author's calculation

As shown in Figure 1a, although the marginal effect is initially negative (correlated) with the number of employed women, it gradually shifts to a positive correlation as more of them enter the workforce. The turning point is when female participation in the labour market rate reaches nearly 53.6%. In addition, Figure 1b reveals that the positive effects of trade on employment for women become more pronounced at a higher level of trade openness, which is around 148.8% and 245%.

Figure 1

Marginal effect of trade openness Impacts on women's employment depending on the female labour force participation rate

(a) (b)



Regarding the control variables, FDI is positively significant at 1%. This suggests that for every 1% rise in FDI stock inflow, the quantity of female employment grows by 0.54%. Similarly, the regulatory variable shows a positive correlation with the number of employed women, with its

significance at a 1% level, despite the relatively small effect's magnitude. This result indicates that a one-unit increase in the regulation index is associated with a 0.07% increase in the number of employed women. On the contrary, GDP per capita is negatively significant at the 1% level, meaning that a 1% surge in GDP per capita leads to the reduction of the number of employed women by 1.31%. Lastly, although education, ICT, and population growth demonstrate anticipated signs, none of these variables yield statistically significant impacts on women's employment levels.

4.3 Trade Openness and Women's Informal Jobs

Table 5 displays CUE-GMM estimation results exploring the effects of trade openness on women's informal employment rates under the context of women joining the labour force. Similar to the quantity perspective, the statistically significant and positive results of interaction terms at the 1% level reveal a multifaceted relationship between trade and job quality of women's employment, which is illustrated in Figure 2.

Table 5

Female Informal Employment and Trade Openness

VARIABLES	Proportion of informal employment of women (%)
Trade openness (log)	-653.1***
	(153.0)
Labour force participation rate of female	-50.28***
	(12.39)
Trade openness* Labour force participation rate of female	12.45***
	(3.030)
GDP per capita (log)	2.768
	(7.684)
FDI	-7.421***
	(2.244)
Educational level	-0.835***
	(0.244)
Observations	498

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Author's calculation

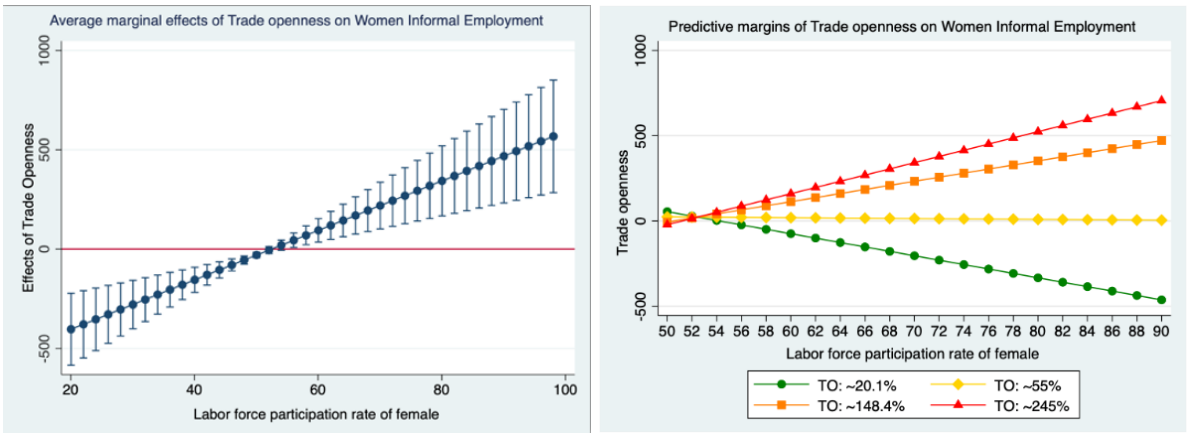
Figure 2a demonstrates how trade's impact on women's informal employment shifts with growing female labour market participation. While trade initially reduces the share of informal jobs of female labour, this effect becomes positive once more women enter the labour force. Here, the turning point is when the participation rate of females surpasses 52.5%. Also, Figure 2b further shows that this positive correlation of trade strengthens at a higher level of trade openness, which is at nearly 148.8% and 245%.

Furthermore, the results also show a significant and negative correlation between educational attainment and FDI and women's informal employment rate at the 1% level. Specifically, a 1% rise in female secondary and higher education enrollment leads to a 0.84 percentage point decline in informal employment. Similarly, if FDI stock inflow increases by 1%, the proportion of female informal employment reduces by 7.42 percentage points. In contrast, the result of GDP per capita is not statistically significant.

Figure 2

Marginal effects of trade openness on the percentage of women's informal jobs depending on the female labour force participation rate

(a) (b)



4.4 Discussion

The results underscore the intricate relationship between trade openness and both the quantity and quality of women's employment with the increasing presence of women in the labour force. Firstly, the initial negative correlation between trade and the number of women employed potentially aligns with the situation exhibiting the adaptation of industries to the early stage of trade expansion with new competitive pressures, especially in import-competing sectors. In such conditions, industries tend to scale down or even eliminate less profitable activities to boost efficiency. This often disproportionately affects women in certain sectors (Tuhin 2015, Rashidi 2022), which might result in the temporary "defeminization of labour" phenomenon, which includes informal employment. Moreover, increasing the market's competitiveness possibly necessitates exporting firms and those engaged in GVCs to upgrade their technological capabilities to compete in the international market. Accordingly, women might lose jobs since their barriers to accessing essential capital, technical expertise, and professional networks hinder their ability to progress into more advanced positions within the industry or shift to higher-tech sectors (Ahmed 2013: 91). This finding is also consistent with those proposed by Giorgia et al. (2021) and Gupta (2021), with evidence showing that tariff cuts and import competition diminished the share of female workers employed.

Nevertheless, once more women enter the workforce, the negative impact of trade on women's employment changes to a positive correlation, resulting in the emergence of the "*feminization of labour*" phenomenon. However, as can be seen from the results from the quality of employment dimension, a significant portion of these women's employment growth tends to come from informal jobs. Also, a higher level of trade openness magnifies this pattern. It seems that while trade openness has expanded employment opportunities for women, there are concerns about job quality since these positions are largely informal. Previous studies have also documented the adverse effects of trade on women's job quality, such as that of Ghosh (2004) and Prasad (2018) with evidence in India or Otobe (2015) in Mauritius and Cambodia.

The intricate trade and women's employment nexus aligns with feminist economist standpoints. Women represent a "competitive advantage" in export-oriented, enabling firms to enhance their international competitiveness for the following reasons. As businesses adapt to increased trade openness, those seeking to minimize risk and maximize flexibility tend to favour informal and home-based employment while reducing their formal workforce (Standing 2006: 323). In this case, women's growing labour force participation, coupled with their perceived characteristics as

cheap and flexible work, make them particularly attractive candidates for these positions. In addition, GVCs, driven by the need for production flexibility, tend to favour informal employment arrangements without labour benefits, allowing companies to rapidly adjust their workforce in response to demand fluctuations. Therefore, women, often positioned as secondary workers in the labour market or "reserve labour forces," are readily hired and dismissed according to production needs (Standing 1989, Elson and Pearson 1997). Accordingly, the "feminization of labour" is considered a strategic response for GVC's participators to external shocks and cost management within global production networks (Elson 1999, Hossain et al. 2013, Standing 1989) in this regard. Besides, the surge in women's participation in the labour force might also result in an exceeded supply of labour in the labour market. This, combined with the perception of being low-skilled workers, might lead to diminished women's bargaining power, leading to women's easier acceptance and concentration in informal employment.

Looking from both quantity and quality perspectives, the effects of trade on gender equality in employment presents a multifaceted picture with counterproductive outcomes. Women seem to be exploited rather than empowered by trade under the lens of quality of employment, which is contrary to the views of neoclassical economists. The reports of UNCTAD (2021: 9) reported that despite women's increasing participation in the labour force, gender equality in the job market might still not have shown significant improvement. Women are often regarded as a 'competitive advantage' and remain concentrated in low-skilled industries, such as garments and textiles, as well as in informal jobs that are poorly paid, insecure, and highly susceptible to layoffs (UNCTAD 2021: 9). Furthermore, this situation might also adversely affect gender equality in a broader sense. For instance, working in low-skilled jobs leaves little room for women to enhance their skills or advance in their careers (Otobe 2015, Prasad 2018). Low-quality working conditions such as home-based or subcontract might have effects on women's health due to inadequate workspaces and equipment. Also, the income gained from these jobs might not be substantial enough to improve their living standards.

In addition to trade openness, control variables' results offer additional insights into the factors influencing women's employment. On the one hand, GDP per capita is found to have adverse effects on women's employment, which is consistent with the findings proposed by Caron et al. (2020). Rising income tends to drive demand for goods and services required for skilled workers, which potentially limits jobs for women without advanced skills due to barriers to access to higher education. On the other hand, FDI seems to enhance career prospects for women, particularly in formal and high-quality jobs, which is in line with the findings of La Porta and Shleifer (2014), and McCaig and Pavcnik (2015). The reduction in employed females in informal jobs is likely to stem from the favourable legal framework, including high labour standards and requirements of sustainable development (OECD 2008, Blanton and Blanton 2012), which countries promote to attract FDI. This hypothesis is further strengthened by the positive correlation found in the index of regulations promoting women's economic opportunities. Apart from labour standards, enhanced legal protections for women's workplace safety and paternity leave provisions might also expand women's access to job opportunities.

4.5 Robustness check

4.5.1 Weak Instrument, Overidentification and Serial Autocorrelation Test

To ensure the robustness of the findings, the study conducted tests to assess the validity of the instruments, overidentification, and serial autocorrelation. Table 6 displays the post-estimation test results, with columns (1) and (2) presenting the findings of the model that examines the quantity and quality dimensions, respectively.

Table 6

Post-estimation tests results

Post-estimation test		(1)	(2)
Weak-instruments	**F-test in the first stage**		
	GDP per capita	2286.70	3767.93
	Trade openness	1131.56	802.72
	Labour force participation rate of female	33.31	11.50
	FDI	1992.68	2228.23
	Stock-Yogo weak ID F test - Critical value		
	10% maximal LIML size: 4.45		
	15% maximal LIML size: 3.34		
	20% maximal LIML size: 2.87		
	25% maximal LIML size: 2.61		
	Kleibergen-Paap rk Wald F statistic	5.49	3.82
Overidentification	**Hansen-J Test**	0.991	0.621
Autocorrelation	**AR(2)**	0.08	0.104

Source: Author's calculation

First, the weak instrument test indicates that the used instruments are not weak. Specifically, the results show that the F-test value of the first stage exceeds 10. Regarding the Kleibergen-Paap rk Wald F-test results, the test statistic of 5.49 of the model examining the quantity of employment surpasses the critical value of 4.45 at the 10% maximal LIML size. This indicates that the instruments used are unlikely to be weak at this level of significance. Similarly, in the model assessing the quality of employment, the test statistic of 3.82 exceeds the 15% maximal LIML size critical value of 3.34, suggesting that the evidence against weak instruments is limited.

After confirming that the chosen instruments are not weak, the study employed the overidentification test to examine the robustness of both the IV approach and the validity of the CUE-GMM estimation. According to the Hansen-J test results, the null hypothesis cannot be rejected at the 5% level of significance for both models, which yielded p-values of 0.991 and 0.621, respectively. This suggests that the models are correctly identified.

Furthermore, the test for autocorrelation is conducted, given that the key assumption for the validity of the CUE-GMM estimation is the absence of autocorrelation up to the second order. The results demonstrate that both models show no sign of autocorrelation, as the null hypothesis cannot be rejected at the 5% level of significance, with p-values of 0.08 and 0.104, respectively.

To sum up, these post-estimation tests provide evidence support for the robustness and validity of the instruments used and of the CUE-GMM estimations, thereby strengthening the credibility of the findings presented in the paper.

4.5.2 Sensitivity Analysis

To further assess the robustness of the findings, the paper conducts a sensitivity analysis for the econometric specifications with alternative measures of trade openness. According to the literature, trade openness can be assessed using not only the conventional measure of total exports and imports as a share of GDP but also through export intensity and import intensity. These indicators capture the share of exports over GDP and the share of imports over GDP, respectively (Afesorgbor and Demena 2022, Marceta and Bojnec 2022). These data are obtained from the WDI dataset, aligning with the scope of the two models. To ensure consistency with the original model, the alternative trade openness indicators are subjected to the Winsorization technique at the bottom 5% and top 95% of the values.

Table 7

Results of models with alternative proxy-variables of Trade Openness

Model	Quantity of employment			Quality of employment		
Variables	**(1)**	**(2)**	**Main**	**(3)**	**(4)**	**Main**
Export/GDP (in log)	-34.931*** (6.570)			-575.14*** (151.35)		
Export/GDP * Labour force participation rate of female	0.637*** (0.123)			11.03*** (3.039)		
Import/GDP (in log)		-47.55*** (10.522)			-779.39*** (187.257)	
Import/GDP * Labour force participation rate of female		0.908*** (0.205)			14.829*** (3.656)	
Trade openness (in log)			-38.01*** (6.865)			-653.1*** (153.0)
Trade openness * Labour force participation rate of female			0.711*** (0.132)			12.45*** (3.030)
Labour force participation rate of female	-2.225*** (0.435)	-3.385*** (0.776)	-3.064*** (0.574)	-35.951*** (10.31)	-50.674*** (12.58)	-50.28*** (12.39)
GDP per capita (in log)	-0.725*** (0.311)	-2.146*** (0.447)	-1.313*** (0.291)	3.612 (8.822)	4.692 (7.985)	2.768 (7.684)
FDI	0.766*** (0.118)	0.130 (0.245)	0.544*** (0.136)	-6.336*** (2.443)	-9.352*** (2.738)	-7.421*** (2.244)
Education level	0.012 (0.008)	0.016 (0.010)	0.007 (0.007)	-0.910*** (0.300)	-0.816*** (0.242)	-0.835*** (0.244)
Population growth	-0.432*** (0.169)	0.374 (0.299)	-0.088 (0174)			
ICT	-0.016 (0.010)	0.051*** (0.017)	0.014 (0.010)			
Regulation	0.037 (0.023)	0.156*** (0.054)	0.073** (0.547)			
Observations	785	795	801	491	491	498

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculation

Table 7 presents the results of the sensitivity analysis. Columns (1) and (2) employ the quantity of employment model, while columns (3) and (4) examine the quality of employment model, with export/GDP and import/GDP ratios, respectively. The results of the main model are also included for comparison. In general, the coefficients of the main variables of interest of both models remain consistent with the original results, as well as the evidence shown by Ghosh (2004), Prasad (2018), and Otobe (2015). However, the magnitude is larger when using import intensity as a proxy for trade openness compared to that of export intensity and the main model. Additionally, GDP per capita and educational level also exhibit similar patterns to the original analysis.

However, the employment quantity model reveals differences in the results for FDI, population growth, ICT, and regulations. These disparities may be due to the distinct characteristics of import and export activities, which could differentially influence the extent to which these variables impact women's employment. The FDI coefficient maintains the same sign but loses significance only in the model where trade is measured by the imports-GDP ratio. This suggests that FDI may have a more direct impact on employment in export-oriented sectors as compared to import-oriented ones, possibly due to technology transfer and expansion in export-focused industries that could further enhance women's employment.

Conversely, the regulation variable maintains the same sign but gains significance in the import-proxied and main models. This implies that regulations promoting women's economic rights may align more easily with efforts to enhance women's job opportunities in import-driven sectors,

where market access and growth are prioritized over intense global competition. In export-driven sectors, such regulations may face resistance due to concerns about maintaining cost competitiveness and gender equality initiatives, making their impacts on women's employment dilute. This pattern is also proved in the studies of Çağatay (2005) and Prasad (2018) when exploring female employment in the EZP context.

For ICT variables, significant and positive correlations are only shown in the model using import tensity reflecting trade openness. ICT's role in import-driven situations tends to involve providing women with resources to enhance their access to jobs or expand their businesses. For instance, ICT imports enable remote work, virtual collaboration, and digital communication, increasing job opportunities for women. However, in export-driven situations, rapid technological advancements driven by ICT may necessitate higher-skilled labour to adapt to the changing landscape. Therefore, women, often perceived as having lower skill levels, might face a greater risk of job displacement in such scenarios, which is also pointed out by Ahmed (2013).

Lastly, only the population growth in the model using export tensity is significant and exhibits the same sign as the original model, while changing the sign in that using import tensity. This might be because export-led growth can alter migration patterns, potentially increasing population density in certain regions and making it harder for women to secure jobs. In import-driven economies, population growth, in contrast, may boost consumer demand and production levels, creating more job opportunities for women as businesses expand to meet growing market needs.

Table 8

Result of post-estimation test for models with alternative proxy-variables of Trade Openness

Post-estimation test		Quantity of employment			Quality of employment		
		(1)	(2)	Main	(3)	(4)	Main
Weak instrument test	**F-test in the first stage**						
	GDP per capita	2210.18	2339.54	2286.70	3699.12	3607.78	3767.93
	Trade openness	944.56	695.33	1131.56	465.60	833.68	802.72
	Labour force participation rate of female	32.03	32.54	33.31	11.81	10.58	11.50
	FDI	1913.88	2038.17	1992.68	2119.23	2059.52	2228.23
	Stock-Yogo weak ID F test - Critical value 10% maximal LIML size: 4.45 15% maximal LIML size: 3.34 20% maximal LIML size: 2.87 25% maximal LIML size: 2.61						
	Kleibergen-Paap rk Wald F statistic	4.75	3.55	5.49	3.23	3.34	3.82
Overidentification	**Hansen-J Test**	0.713	0.372	0.991	0.848	0.436	0.621
Autocorelation	**AR(2)**	0.087	0.120	0.079	0.183	0.06	0.104

Source: Author's calculation

Table 8 presents the validity test results for all models, revealing consistently robust outcomes that substantiate the efficacy of these analytical frameworks. Particularly, the weak IV tests demonstrate overall robust results for both main models. The first-stage F-tests for weak IV exceed 10 in all cases. In addition, the Kleibergen-Paap F-statistic provides weak evidence against weak identification at the 15% maximal LIML size, except for one case in the quality model using export/GDP, where the statistic is slightly lower than the threshold. Moreover, the Hansen-J test for overidentification yields p-values that do not reject the null hypothesis, suggesting that all of the models do not suffer from overidentification issues. Lastly, serial autocorrelation tests are satisfied in all models at a 5% level of significance, showing robustness for CUE-GMM estimation.

In summary, the sensitivity analysis demonstrates the robustness of the original model under different specifications. Although there are some changes in the results for a few control variables in the quantity of employment model, the main relationships that the study investigates remain valid.

Chapter 5 Conclusion

This study explores the connection between international trade and gender equality in employment, extending beyond the conventional quantity of jobs with the joint examination of the quality of employment, which is a critical aspect being overlooked in the existing literature. By doing this, this paper aims to explore whether trade genuinely leads to inequitable advancement or exploitation of women's employment. As suggested in the literature, women tend to be clustered in trade-derived informal employment, such as home-based work and subcontracts. Therefore, this study reflects the quality of employment through the percentage of informal employment of women. Furthermore, drawing from the feminist economic theory, trade's impacts are considered together with the female labour force participation rates to determine whether women are being viewed as competitive advantages in trade.

Given the endogeneity concerns arising from reserve causality and omitted variables, this study follows an IV approach. Here, both external and lagged variables are utilized to tackle the challenges of identifying sufficient valid instruments, especially in the context of multiple endogenous variables. Regarding the estimation, CUE-GMM is employed over the cross-country data from 2000 to 2022 for its superior efficiency in handling the problems of overidentification in the case of multiple IVs as compared to 2SLS. In addition, CUE-GMM proves particularly more advantageous than one- and two-step GMM when dealing with the risk of weak instruments, given the lagged IVs and finite samples bias.

The findings reveal the multidimensional nature of the relationship between international trade and women's employment in the context of females joining the labour force. During the early stages of trade expansion with lower female labour force participation, trade appears to reduce women's employment across both formal and informal sectors. This phenomenon can be attributed to industrial adaptation to new competitive pressures, particularly in import-competing sectors. This results in the emergence of temporary "*defeminization of labour*" phenomenon due to firms' efficiency-driven restructuring and downsizing (Tuhin 2015, Rashidi 2022). Firms also tend to upgrade technological capabilities in this context which potentially leads to job losses for women, given their limited access to essential capital and resources that constrain their advancement in higher positions or into higher-tech sectors (Ahmed 2013: 91).

However, as female workforce participation surges, trade's impact shifts to a positive correlation, manifesting in the "*feminization of labour*" phenomenon. Moreover, a significant portion of this employment growth seems to mainly come from informal jobs. This reflects trade's paradoxical effects on women's labour market outcomes. While trade openness enhances job opportunities for women, the predominance of low-quality jobs raises concerns. This complex trade and women's employment nexus aligns with feminist economist standpoints. Women seem to represent as "competitive advantage" in the export-oriented sectors, which enables firms to enhance their international competitiveness. In particular, informal and home-based employment helps exporting firms reduce costs when exposed to a higher level of trade openness. Women, in this regard, would appear to be attractive candidates for these jobs, given the perceived characteristics of flexible and cost-effective labour (Standing 2006: 323). Furthermore, looking from the quality of employment lens, the trend of feminization of labour tends to be a strategic response by GVC participants to external shocks and cost management imperatives (Elson 1999, Standing 1989, Hossain et al. 2013). In addition, women's bargaining power might be weakened due to the excessive supply of females in job markets, coupled with the perception of being low-skilled, thereby facilitating their concentration in informal employment.

These findings necessitate a more comprehensive approach to understanding international trade through a gender-responsive lens. A singular focus on job quantity proves insufficient when considering the impact of trade on women's employment outcomes. Looking deeper into a quality

perspective, women seem to be exploited rather than empowered by trade openness, contradicting neoclassical predictions. Furthermore, this dynamic potentially undermines broader gender equality objectives. To illustrate, low-skilled employment may limit career advancement opportunities (Prasad 2018, Otobe 2015), while substandard working conditions in informal settings may compromise the health outcomes and living standards of women.

Therefore, policymakers need to address both job creation and the quality of employment opportunities generated through trade. Given the positive correlation between regulation and women's employment, governments should strengthen national laws that aim at protecting employees in informal sectors, which encompass minimum wage standards, social security benefits, and workplace protections. Such measures can also attract more FDI, which has been demonstrated to improve women's employment outcomes in this study. Moreover, countries should enforce policies concerning women's education and literacy, as it is the major factor that helps to increase their employment in formal and sustainable job positions. From an international level, labor clauses in trade agreements should encourage equitable hiring practices and female entrepreneurship. Such agreements can aid in the development of more gender-sensitive economic policies, which are essential not only for promoting equity but also for fostering inclusive development.

Considering the limitation of data availability, the results might only serve as a valuable reference for policymakers in a broad sense. Since trade and gender posit multidimensional linkages, this paper calls for further research to explore the impact of trade on employment across various sectors. Moreover, other roles of women as entrepreneurs and consumers should also be taken into consideration in future studies, as these factors can influence trade patterns and gender equality, thereby ultimately contributing to the development of more gender-inclusive and sustainable international trade policies.

Appendices

Appendix I
List of countries in the data sample

List of countries in the dataset for measuring the impact of trade on women's employment

Country	ISC3 code
Albania	ALB
Argentina	ARG
Armenia	ARM
Australia	AUS
Austria	AUT
Azerbaijan	AZE
Belgium	BEL
Benin	BEN
Bangladesh	BGD
Bulgaria	BGR
Bahrain	BHR
Bahamas, The	BHS
Belarus	BLR
Belize	BLZ
Bolivia	BOL
Barbados	BRB
Brunei Darussalam	BRN
Botswana	BWA
Canada	CAN
Switzerland	CHE
Chile	CHL
Cameroon	CMR
Colombia	COL
Cyprus	CYP
Czechia	CZE
Germany	DEU

Country	ISC3 code
Denmark	DNK
Egypt, Arab Rep.	EGY
Spain	ESP
Finland	FIN
France	FRA
United Kingdom	GBR
Ghana	GHA
Greece	GRC
Hong Kong SAR, China	HKG
Honduras	HND
Hungary	HUN
Indonesia	IDN
India	IND
Ireland	IRL
Iran, Islamic Rep.	IRN
Iceland	ISL
Italy	ITA
Jamaica	JAM
Japan	JPN
Cambodia	KHM
Korea, Rep.	KOR
Sri Lanka	LKA
Morocco	MAR
Mexico	MEX
Malta	MLT
Mongolia	MNG

Country	ISC3 code
Mauritius	MUS
Namibia	NAM
Netherlands	NLD
Norway	NOR
Pakistan	PAK
Panama	PAN
Philippines	PHL
Poland	POL
Portugal	PRT
Paraguay	PRY
Romania	ROU
Singapore	SGP
El Salvador	SLV
Slovak Republic	SVK
Slovenia	SVN
Sweden	SWE
Thailand	THA
Tunisia	TUN
Turkiye	TUR
Ukraine	UKR
Uruguay	URY
United States	USA
Viet Nam	VNM
South Africa	ZAF
Zambia	ZMB

List of countries in the dataset for measuring the impact of trade on quality employment of female labour

Country	ISC3 code
Argentina	ARG
Armenia	ARM
Australia	AUS
Austria	AUT
Belgium	BEL
Bangladesh	BGD
Bulgaria	BGR
Bolivia	BOL
Brunei Darussalam	BRN
Switzerland	CHE
Chile	CHL
Colombia	COL
Cyprus	CYP
Czechia	CZE
Denmark	DNK
Egypt, Arab Rep.	EGY
Spain	ESP
Finland	FIN
France	FRA
United Kingdom	GBR
Greece	GRC
Honduras	HND
Hungary	HUN
India	IND
Ireland	IRL

Country	ISC3 code
Iceland	ISL
Italy	ITA
Sri Lanka	LKA
Mexico	MEX
Malta	MLT
Mongolia	MNG
Mauritius	MUS
Namibia	NAM
Netherlands	NLD
Norway	NOR
Pakistan	PAK
Panama	PAN
Poland	POL
Portugal	PRT
Paraguay	PRY
El Salvador	SLV
Slovak Republic	SVK
Slovenia	SVN
Sweden	SWE
Turkiye	TUR
Uruguay	URY
Viet Nam	VNM
South Africa	ZAF
Zambia	ZMB

Appendix II
The results of VIF test for Multicollinearity

Variables	VIF
Trade Openness and Quantity of employment	
ICT	2.45
GDP per capita	2.27
Educational level	2.25
Regulation	1.78
Population Growth	1.32
Female Labour Force Particpation Rate	1.27
FDI stock inflow	1.20
Trade Openness	1.13
Trade Openness and Quanlity of employment	
GDP per capita	2.08
Educational level	1.87
Female Labour Force Particpation Rate	1.26
FDI stock inflow	1.32
Trade Openness	1.26

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