Research Article

The Gender Impact of Trade on Employment in Least Developed Countries

Nursel AYDINER AVŞAR[1], Bengi YANIK İLHAN[2]

[1] Prof. Dr., Akdeniz University, Serik FBA, nurselavsar@akdeniz.edu.tr, ORCID: 0000-0002-4228-9020
[2] Assoc. Prof. Dr., Altınbaş University, FEAS, bengi.ilhan@altinbas.edu.tr, ORCID: 0000-0003-1578-8390

Abstract: Trade liberalization leads to changes in relative prices and the sectoral structure of an economy. These changes imply gendered employment effects mainly due to the unequal distribution of skills by gender in the labor market. It might also be the case that women workers are preferred over men in certain sectoral settings to take advantage of women's relatively low wages as a source of competitiveness in international markets. Least developed countries (LDCs) consist of the most disadvantaged economies among developing countries. This paper investigates the gendered employment effects of trade openness in the case of LDCs. Specifically, the paper estimates the impact of trade openness measures (e.g., trade ratio, export ratio, import ratio) on the female share of employment in broad economic sectors (i.e., agriculture, industry, services) using panel data analysis covering the period of 2000-2022 for 28 LDCs for which balanced panel data is available. The findings of the empirical analysis show that export share has a statistically significant and negative association with women's share of employment in agriculture and services. The adverse impact on the female intensity of employment in agriculture may be due to gender segregation by crop observed in most LDCs. There is a positive association between import share and female intensity of employment in services. Overall, income level and demographic factors such as fertility, population growth and urbanization play a more significant role than trade openness measures in explaining the female intensity of employment in broad economic sectors in LDCs.

Keywords: Trade, Gender, Labour Market, Least Developed Countries
Jel Codes: F16, F63, J16

En Az Gelişmiş Ülkelerde Dış Ticaretin İstihdam Üzerindeki Toplumsal Cinsiyet Etkisi

Öz: Ticaretin serbestleşmesi, bir ekonominin göreli fiyatlarında ve sektörel yapısında değişikliklere yol açar. Bu değişiklikler, işgücü piyasasında cinsiyete göre becerilerin eşitsiz dağılımından kaynaklanan toplumsal cinsiyete dayalı istihdam etkilerini beraberinde getirir. Ayrıca, uluslararası pazarlarda rekabet gücü kaynağı olarak kadınların nispeten düşük ücretlerinden yararlanmak amacıyla, belirli sektörlerde kadın işçilerin erkeklere tercih edilmesi de söz konusu olabilir. En az gelişmiş ülkeler (EAGÜ), gelişmekte olan ülkeler arasında en dezavantajlı ekonomilerden oluşmaktadır. Bu makale, EAGÜ'lerde ticarete açıklığın cinsiyete bağlı istihdam üzerindeki etkilerini incelemektedir. Özellikle, bu makale, dengeli panel verilerin mevcut olduğu 28 EAGÜ için 2000-2022 dönemini kapsayan panel veri analizi kullanarak, ticaret açıklığı ölçülerinin (örneğin, ticaret oranı, ihracat oranı, ithalat oranı) geniş ekonomik sektörlerdeki (yani tarım, sanayi, hizmetler) kadın istihdam payı üzerindeki etkisini tahmin etmektedir. Ampirik analizin bulguları, ihracat oranının tarım ve hizmet sektörlerinde kadınların istihdamdaki payı ile istatistiksel olarak anlamlı ve negatif bir ilişkiye sahip olduğunu göstermektedir. Tarımdaki kadın istihdam yoğunluğu üzerindeki olumsuz etki, çoğu EAGÜ'de gözlemlenen mahsul bazında cinsiyet ayrımcılığından kaynaklanıyor olabilir. İthalat oranı ile hizmet sektöründeki kadın istihdam yoğunluğu arasında pozitif bir ilişki bulunmaktadır. Genel olarak, gelir düzeyi ve doğurganlık, nüfus artışı ve kentleşme gibi demografik faktörler, EAGÜ'lerde geniş ekonomik sektörlerde kadın istihdam yoğunluğunu açıklamakta ticaret açıklığı ölçülerinden daha önemli bir rol oynamaktadır.

Anahtar Kelimeler: Ticaret, Toplumsal Cinsiyet, İşgücü Piyasası, En Az Gelişmiş Ülkeler
Jel Kodları: F16, F63, J16

Cite: Aydıner Avşar, N., & Yanık İlhan, B. (2025). The gender impact of trade on employment in least developed countries. *Fiscaoeconomia, 9*(3), 1635-1649. https://doi.org/10.25295/fsecon.1440991

Submitted: 21.02.2024
Accepted: 17.05.2025

1. Introduction

Trade liberalization leads to a change in relative prices, resulting in changes in the sectoral composition of production and employment. This in turn has gendered implications for employment to the extent that women and men are not distributed equally across different sectors (i.e., there is gender segregation in the labour market). These effects differ across developed and developing countries based on the predictions of trade theory. Trade liberalization may also reduce gender inequalities in the labour market by rendering gender discrimination costly via international competition. Finally, trade liberalization may result in technological upgrading in the domestic economy and reduce the need for physically demanding skills, which would help women find employment more easily in traditionally male-dominated sectors and occupations. The complex nature of the trade and gender nexus implies that the gender impact of trade liberalization is highly context specific. Among developing countries, the least developed countries (LDCs) constitute the most vulnerable economies with a high presence of informal economy and high levels of poverty and inequality. Economic activity has also shifted away from agriculture towards industry and services in African LDCs, Haiti, and Asian LDCs, and towards only services in Island LDCs (Wamboye, Adekola, & Bruno, 2015). There is a need to look at LDCs more closely in the context of trade and gender nexus. This paper aims to examine the impact of trade openness on gendered employment patterns in LDCs.

The category of LDCs was established by the UN General Assembly in 1971 to attract special international support for the most vulnerable and disadvantaged members of the UN. LDCs are defined as low-income countries suffering from structural impediments to sustainable development by the Committee for Development Policy (CDP) of the United Nations Department of Economic and Social Affairs (UNDESA). CDP reviews the list of LDCs triennially and identifies LDCs based on three criteria (UNDESA, 2024): Per capita gross national income (GNI), a human assets index (HAI), and an economic and environmental vulnerability index (EVI). HAI is composed of a health index (including the indicators of under-five mortality rate, prevalence of stunting, and maternal mortality ratio) and an education index (including the indicators of lower secondary education completion rate, adult literacy rate, and gender parity index for lower secondary education completion). EVI is composed of the economic vulnerability index (including the indicators of the respective shares of agriculture, forestry, and fishing in GDP, remoteness and landlockedness, merchandise export concentration, and instability of exports of goods and services) and the environmental vulnerability index (including the indicators of the share of population living in low elevated coastal zones, the share of population living in drylands, instability of agricultural production, victims of disasters).

According to the 2024 triennial review, a country is classified as an LDC if GNI per capita is below $1088, HAI is 60 or below and EVI is 36 or below; there are 45 countries included in the list of LDCs (UNDESA, 2024): They are Haiti from the Latin America and Caribbean region, Kiribati, Solomon Islands, and Tuvalu from Oceania, Afghanistan, Bangladesh, Cambodia, Lao People's Democratic Republic, Myanmar, Nepal, Timor-Leste and Yemen from Asia, Angola, Benin, Burkina Faso, Burundi, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Rwanda, São Tomé and Príncipe, Senegal, Sierra Leone, Somalia, South Sudan, Sudan and Zambia from Africa.

Especially LDCs in Africa heavily rely on commodities in their exports which makes them vulnerable to commodity price fluctuations while most LDCs in Asia specialize in manufacturing exports. Despite these differences, LDCs share common challenges such as limited infrastructure and productive capacity, low education and skill level of the workforce, a vicious cycle of poverty, the lack of economic diversification, and limited integration with the global economy. A country is defined as commodity-dependent if commodities constitute more than 60 percent of its merchandise exports. According to this

definition, among the LDCs, 14 countries (Afghanistan, Benin, Central African Republic, Eritrea, Ethiopia, Gambia, Guinea-Bissau, Kiribati, Madagascar, Malawi, Senegal, Solomon Islands, Somalia and Sudan) exhibit dependence on agricultural product exports, six countries (Angola, Chad, Lao People's Democratic Republic, Mozambique, South Sudan and Yemen) have a dependence on mineral fuels, lubricants, and related materials exports, and 11 countries (Burkina Faso, Burundi, Democratic Republic of the Congo, Guinea, Liberia, Mali, Mauritania, Niger, Rwanda, Sierra Leone and Zambia) show dependence on minerals, ores and metals exports (UNCTAD, 2023a).

In terms of trade liberalization policies, the most important initiative that grants most LDCs duty-free and quota-free access to international markets is EU's Everything But Arms initiative. Australia and New Zealand grant Kiribati, Solomon Islands, Tuvalu and Vanuatu preferential treatment through the Pacer Plus Agreement. At the multilateral level, LDCs are subject to less stringent preferential rules of origin thanks to the decisions taken at the Bali and Nairobi WTO Ministerial Conferences in 2013 and 2015. There are also regional agreements such as the South Asian Free Trade Area (SAFTA) and Asia-Pacific Trade Agreement (APTA) that grant greater preference to LDC members of the agreement. LDCs have more flexibility than other developing countries in meeting tariff liberalization requirements in the African Continental Free Trade Agreement (AfCFTA) as well (UNCTAD, 2021).

LDCs exhibit important differences in terms of gender equality in law and legislation that applies to economic and social life. It should be noted that the legal situation in gender equality sets the standard that applies and the actual situation in practice may be different. However, it is still useful to assess LDCs in a comparable way. According to the World Bank's Women, Business and the Law (WBL) index, LDCs overall get a score of 71 out of 100 with African LDCs having greater gender equality than LDCs in Asia and the Pacific (figure 1). LDCs overall perform relatively better with respect to the rights on mobility, entrepreneurship, workplace and pension compared to areas such as rights on pay, marriage and assets. Parenthood, with a score of 45, is an area that quests for significant improvements. In terms of regions, African LDCs score better than the rest in all areas except for the rights on assets. Parenthood and pay are two major areas that require bold action especially in Asian LDCs.

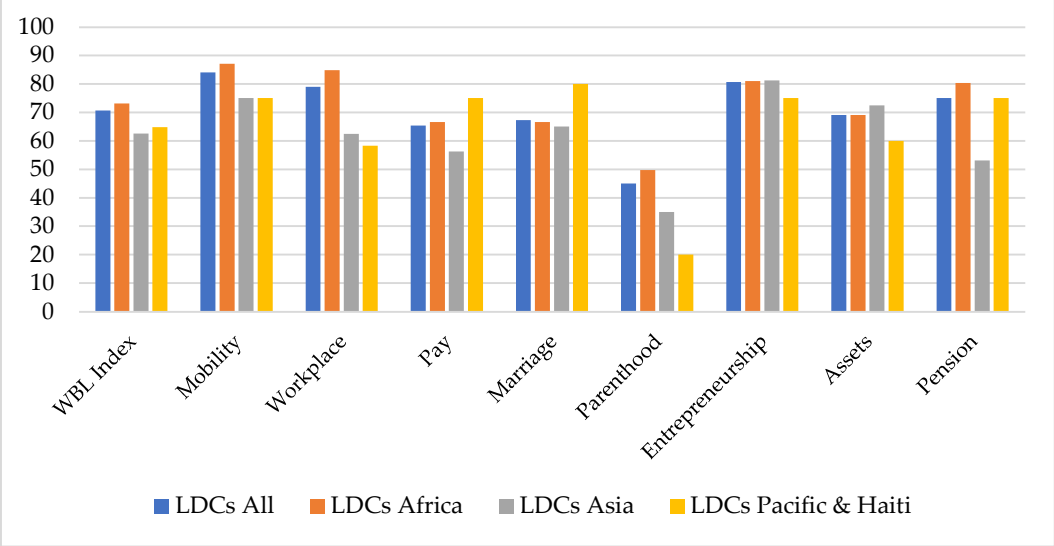

Figure 1. The Women, Business and the Law Index of LDCs, 2024 (**Source**: Calculated by the authors based on the World Bank Women, Business and the Law 1.0 Data for 1971-2024)

The trade and gender nexus has not been investigated empirically in the case of LDCs as a group except for a few studies that indirectly approach the issue, as discussed later in this paper. This paper, therefore, aims to fill this gap in the literature and analyses how trade openness affects gendered employment patterns in the broad sectors of the economy

using data for 28 LDCs for which balanced panel data is available. Specifically, we estimate the impact of trade openness on the female share of employment in agriculture, industry, and services sectors, respectively, using panel data analysis and covering the period of 2000-2022 in three alternative specifications. In the first specification, we measure trade openness as the share of total trade (the sum of exports and imports) in GDP. In the second specification, we measure trade openness as the share of exports and the share of imports of goods and services, in GDP, respectively. Finally, we introduce the shares of merchandise exports and merchandise imports distinguished by income level and geographical position of trading partners in total exports and total imports, respectively, to investigate if there are any differences in the impact of trade by trading partners.

The paper is structured as follows. Section 2 introduces an overview of theoretical explanations on the relationship between trade and gendered employment patterns, and presents the key findings from relevant empirical studies on LDCs. Section 3 presents the empirical analysis and section 4 concludes the paper.

2. Trade and Gendered Employment Patterns: A Conceptual Overview

According to standard trade theory, based on the Heckscher-Ohlin-Samuelson (HOS) theory (Heckscher & Ohlin, 1991; Stolper & Samuelson, 1941), developing countries specialize in low-skilled, labour-intensive sectors based on their comparative advantage. This increases the relative demand for and the returns to low-skilled labour in developing countries. The labour market implications of trade are gendered to the extent that there is gender segregation in the labour market and there are differences in the skill distribution of male and female labour. Assuming that women are disproportionately concentrated among low-skilled labour in developing countries, trade liberalization is expected to increase women's employment and income levels relative to men based on the standard trade theory. This in turn reduces gender inequalities in the labour market in developing countries. There is early evidence supporting this phenomenon of "the feminization of labour," which refers to both an increase in women's share of employment and an extension of unfavourable working conditions (e.g., low wages, job insecurity), traditionally typical of women's jobs, to the whole labour market (Standing, 1989; Standing, 1999). However, a process of defeminization has occurred in some middle-income developing countries in Latin America and Southeast Asia as they go through industrial upgrading (Tejani & Milberg, 2016). This is because men are preferred to women in this more technologically advanced production setting (Kucera & Tejani, 2014; Tejani & Kucera, 2021).

According to heterodox trade theory, absolute advantage, and not comparative advantage, determines a country's trade pattern, and hence trade liberalization may not always result in a win-win situation. Female workers are preferred over male workers in export firms to take advantage of the gender wage gap and women's relatively low bargaining power to lower costs under increased international competition. As a result, female employment expands along with an increase in gender wage gap and discrimination in export sectors in developing countries (Elson, Grown, & Çağatay, 2007).

In addition to the predictions of trade theories, Black and Brainerd (2004) reinterpreted Becker's (1971) theory of labour market discrimination in the context of trade liberalization. According to them, trade liberalization reduces the scope for hiring discrimination against women under increased international competition; this, in turn, increases women's employment relative to men in sectors that are open to trade.

Trade liberalization may also induce technological change as a competitive strategy. This has gendered labour market implications by reducing the need for physical strength. Since men are generally assumed to be better endowed with physical strength compared to women, trade-induced technological change is generally expected to increase the relative demand for and the returns to female labour in export sectors, with positive implications for gender equality in employment and wages (Juhn, Ujhelyi, & Villegas-

Sanchez, 2014; Pieters, 2018). However, trade liberalization may also induce automation with opposite gender implications for employment. Given that automation is mostly applied to routine or repetitive tasks that tend to be dominated by women workers, automation induced by trade liberalization may lead to losses in work hours and even in employment of women (Tejani & Fukuda-Parr, 2021).

There is only one empirical study on the determinants of gender employment patterns in LDCs as a group to the best of our knowledge. Individual country case studies are not covered for the sake of brevity.[1] Wamboye et al. (2015) empirically analyses how changes in sectoral performance affect female absolute and relative employment in LDCs while controlling for the influence of infrastructure development, industrialization, education, trade openness, and age dependency ratio (as a proxy for unpaid work). They find that there is a positive association between the expansion of the agricultural sector and female employment in both absolute and relative terms. There is instead a negative association between the expansion of services, manufacturing, and non-manufacturing sectors and female employment in LDCs. This mainly reflects the employer's preference for male workers relative to men following the expansion of production in the manufacturing and services sectors. However, after a threshold level of industrialization is achieved, positive employment effects are realized also for women in industry and services, especially in African LDCs. These findings imply that structural change away from agriculture might hurt women in LDCs in the initial stages of industrialization. Besides sectoral effects, women's employment is positively associated with improved access to education and reduced unpaid domestic and care work responsibilities (Wamboye, Adekola, & Bruno, 2015).

3. Empirical Analysis

3.1. Data and Descriptive Statistics

We use data from the World Bank's World Development Indicators (WDI) database and the International Labour Organization's (ILO) LabourStat database covering the period of 2000-2022 and for only the LDCs with balanced panel data. The LDCs included in the analysis are Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic Republic of Congo, The Gambia, Guinea, Guinea-Bissau, Haiti, Madagascar, Mali, Mozambique, Nepal, Niger, Rwanda, Senegal, Sierra Leone, Solomon Islands, Sudan, Timor-Leste, Togo, Uganda, Tanzania, and Zambia. Specifically, the female share of employment in each broad sector is taken from the ILO's estimates while trade openness measures (i.e., trade ratio, export ratio, import ratio, both in total and distinguished by trading partner group) and country control variables (i.e., GDP per capita, fertility rate, urbanization, population and population growth rate) are taken from the WDI database. The definitions of variables that are included in the empirical analysis are presented in Table 1 below.

[1] Interested readers could refer to UNCTAD (2023b) and UNCTAD (2021) for a detailed review of the literature on gender and trade linkages both in general and in the context of LDCs, respectively. There are a few country case studies on trade and gendered labour market effects in some of the LDCs covered in our analysis (See, for example, Khondker & Pettinotti, 2024; Lopez Mourelo & Samaan, 2018; Tanaka & Greaney, 2024).

Table 1. Variable Definitions

Variable Name	Variable Definition
Dependent Variables	
Female share of employment in agriculture (%)	The ratio of the number of women workers to the total number of workers in the agricultural sector, multiplied by 100
Female share of employment in industry (%)	The ratio of the number of women workers to the total number of workers in the industrial sector, multiplied by 100
Female share of employment in services (%)	The ratio of the number of women workers to the total number of workers in the services sector, multiplied by 100
Independent Variables	
Trade ratio	The ratio of the sum of total exports and total imports of goods and services to GDP, multiplied by 100
Export ratio	The ratio of total exports of goods and services to GDP, multiplied by 100
Import ratio	The ratio of total imports of goods and services to GDP, multiplied by 100
Per capita GDP	GDP per capita, PPP (constant 2021 international $)
Fertility rate	Fertility rate, total (births per woman)
Urbanization rate	The share of urban population in total population, multiplied by 100
Population	Population, total

Table 2 presents the descriptive statistics for all variables included in the empirical analysis for the years of 2000, 2010 and 2020.

Table 2. Descriptive Statistics

	DEPENDENT VARIABLES					
	Year	N	Mean	Standard deviation	Minimum	Maximum
Female share of employment in agriculture	2000	28	46.1	8.3	27.7	60.1
	2010	28	45.8	7.4	31.8	59.6
	2020	28	45.5	9.2	22.8	62.2
Female share of employment in industry	2000	28	26.2	15.3	3.0	67.1
	2010	28	28.2	15.6	4.4	67.2
	2020	28	30.7	14.8	6.8	59.8
Female share of employment in services	2000	28	39.5	13.5	11.2	67.8
	2010	28	41.2	12.7	12.7	67.2
	2020	28	42.8	11.1	17.7	68.0
	INDEPENDENT VARIABLES					
	Year	N	Mean	Standard deviation	Minimum	Maximum
Trade ratio	2000	28	49.2	30.4	22.6	175.6
	2010	28	59.0	25.0	32.7	134.4
	2020	28	55.7	26.3	10.0	124.0
Export ratio	2000	28	16.8	8.9	5.4	49.8
	2010	28	21.2	11.4	8.6	54.1
	2020	28	22.0	14.2	4.5	62.4
Import ratio	2000	28	32.5	27.9	13.2	165.0
	2010	28	37.7	20.2	15.3	125.8
	2020	28	33.7	14.3	4.8	68.4
Merchandise exports to high-income countries as a share of total merchandise exports	2000	27	61.7	26.1	16.4	98.2
	2010	28	56.7	27.8	2.3	93.1
	2020	28	46.9	27.5	3.5	92.2
Merchandise exports to SSA as a share of total merchandise exports	2000	27	21.2	23.6	0.0	78.0
	2010	28	20.0	20.5	0.0	67.2
	2020	28	23.0	25.9	0.0	89.0
Merchandise exports to EAP as a share of total merchandise exports	2000	26	4.5	11.3	0.0	54.8
	2010	28	9.2	13.6	1.3	70.3
	2020	27	13.0	17.1	0.0	71.5
Merchandise exports to SA as a share of total merchandise exports	2000	21	6.9	11.8	0.0	42.8
	2010	28	8.0	20.5	0.0	86.5
	2020	28	11.6	18.5	0.0	71.4
Merchandise imports from high income countries as a share of total merchandise imports	2000	27	55.9	18.5	6.9	87.4
	2010	28	45.5	14.5	11.0	73.7
	2020	28	39.4	11.1	12.3	56.8
Merchandise imports from SSA as a share of total merchandise imports	2000	27	21.7	21.6	0.0	92.8
	2010	28	17.3	15.9	0.0	63.0
	2020	28	15.6	13.2	0.0	44.1
Merchandise imports from EAP as a share of total merchandise imports	2000	27	8.8	8.0	0.0	40.0
	2010	28	18.3	11.6	3.3	55.4
	2020	28	25.2	14.5	6.9	73.9
Merchandise imports from SA as a share of total merchandise imports	2000	27	4.8	7.4	0.1	37.3
	2010	28	9.4	14.7	0.2	63.6
	2020	28	9.8	11.9	0.4	64.8
Per capita GDP	2000	28	1999.1	838.2	726.4	3734.3
	2010	28	2456.8	946.4	973.6	4385.5
	2020	28	2937.3	1486.5	861.0	6968.1
Population	2000	28	16136890	24773183	429978	129193327
	2010	28	20402426	29061161	540394	148391139
	2020	28	25963924	34321848	691191	167420951
Population growth rate	2000	28	2.5	0.6	1.2	3.4
	2010	28	2.6	0.8	0.5	4.7
	2020	28	2.5	0.7	1.1	3.7
Fertility rate	2000	28	5.7	1.0	3.2	7.7
	2010	28	5.2	1.2	2.3	7.5
	2020	28	4.4	1.2	2.0	6.9
Urbanization rate	2000	28	27.2	9.8	8.2	47.9
	2010	28	31.2	10.9	10.6	55.7
	2020	28	35.7	12.2	13.7	62.6

Note: SSA: Sub-Saharan Africa, EAP: East Asia and the Pacific, SA: South Asia. (Source: Authors' calculations using data from the World Development Indicators and ILOStat databases.)

Figure 2 presents the average share of women in total employment in each broad sector for the 28 LDCs and during 2000-2022. The female intensity of employment is the highest in the agricultural sector followed by industry and services. There is over time an

increase in women's share in total employment from 26 percent in 2000 to 30 percent in 2022 in industry and from 39 percent in 2000 to 43 percent in 2022 in services, on average. There is a slight fall in the share of women in agricultural employment from 46 percent in 2000 to 45 percent in 2022, on average.

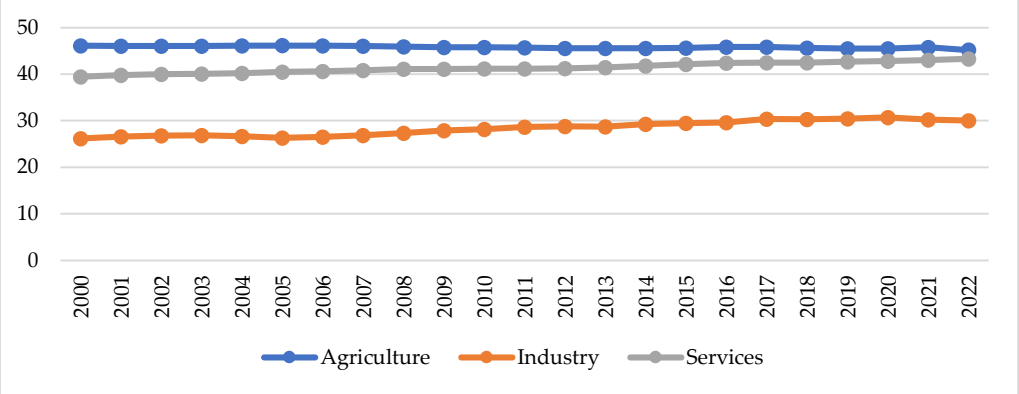

Figure 2. Female intensity of employment by sector (%)
(**Source:** Authors' calculations using data from the ILOStat database.)

Figure 3 presents the average trade ratio, export ratio and import ratio for the 28 LDCs from 2000 through 2022. There is an increase in the trade openness ratio from 49 percent in 2000 to 63 percent in 2022, on average, for the LDCs covered in our analysis, as expected. The import ratio is higher than the export ratio during the whole period, pointing at the trade deficit experienced in these countries as a group. The export ratio as a share of GDP increased from 17 percent in 2000 to 26 percent in 2022 while the import ratio changed from 32 percent in 2000 to 38 percent in 2022, on average.

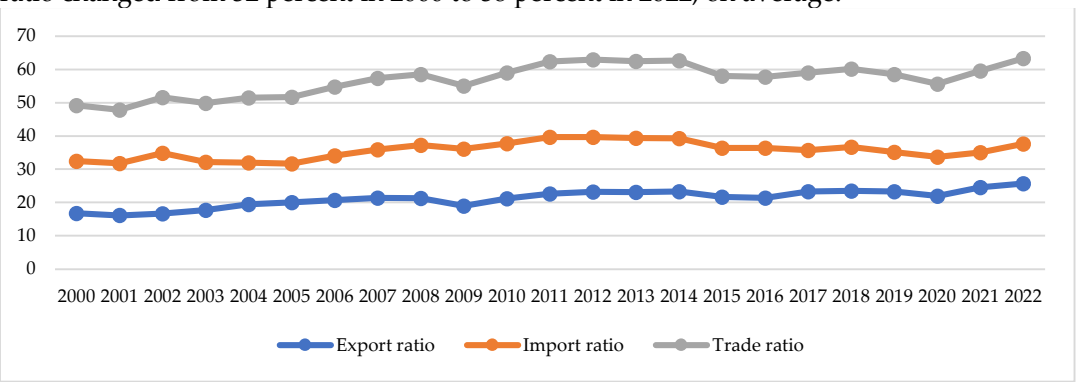

Figure 3. Trade openness measures (%)
(**Source:** Authors' calculations using data from the World Development Indicators database)

Figure 4 presents the demographic country control variables as an average for the 28 LDCs during 2000-2022. The population growth rate was relatively stable with an average of 2.6 percent during the period examined. On the other hand, the fertility rate fell from 5.7 to 4.3 per woman while the urbanization rate increased from 27 percent to 37 percent between 2000 and 2022 on average.

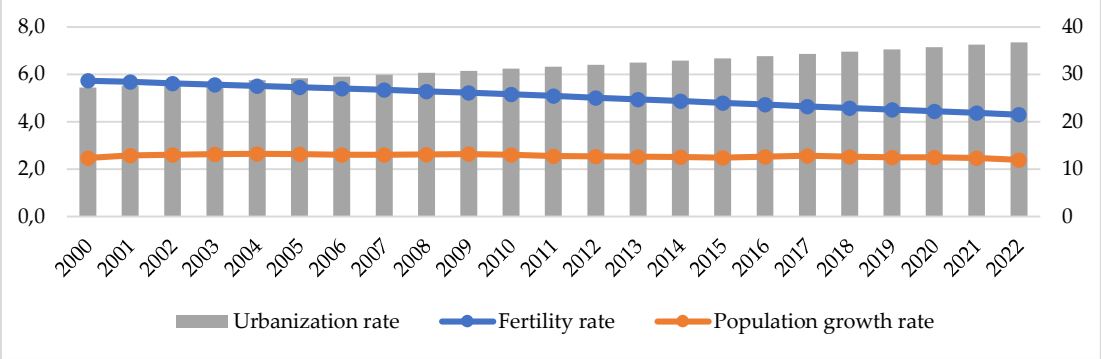

Figure 4. Demographic Factors
(**Source:** Authors' calculations using data from the World Development Indicators database)

3.2. Methodology

We estimate the following equation for each broad sector of the economy (i.e., agriculture, industry and services) using balanced panel data from 28 LDCs for which data is available for the period 2000–2022:

$$FES_{it} = \beta_1 TO_{it} + \sum_{j=1}^{4} \delta_j X_{jit} + \varphi_t + u_{it} \quad (1)$$

where FES_{it}, the dependent variable, shows the female employment share in each broad sector for country i and time t; TO_{it}, the main variable of interest, refers to trade openness and is defined as the share of total trade (exports and imports) in GDP. X_{jit} represents each of the control variables. φ_t represents time-specific fixed effects to control for any shocks common to all countries that are unrelated to trade openness, its subcomponents, and other control variables. u_{it} represents the unobservable factors in the regressions.

In the second specification, trade openness is replaced with the export-to-GDP ratio (EO_{it}) and the import-to-GDP (IO_{it}) ratio to account for the direction of trade flows:

$$FES_{it} = \beta_1 EO_{it} + \beta_2 IO_{it} + \sum_{j=1}^{4} \delta_j X_{jit} + \varphi_t + u_{it} \quad (2)$$

In the third specification, EO_{it} is replaced with merchandise export-to-GDP ratios distinguished by trading partners (EO_{it}^k), and IO_{it} is replaced with merchandise import-to-GDP ratios distinguished by trading partners (IO_{it}^k); k refers to high-income countries, Sub-Saharan Africa, South Asia, and East Asia and the Pacific as the main trading partners of LDCs. The equation takes the following form accounting for both the direction of trade flows and their destination/origin:

$$FES_{it} = \sum_{k=1}^{4} \beta_1^k EO_{it}^k + \sum_{k=1}^{4} \beta_2^k IO_{it}^k + \sum_{j=1}^{4} \delta_j X_{jit} + \alpha_t + u_{it} \quad (3)$$

Control variables are introduced as follows: GDP per capita, PPP (constant 2021 international $) controls for the impact of economic development on gendered employment structure. Fertility rate accounts for the influence of domestic care work on women's employment. Population size is introduced to reflect the size of the labour force as well as to check for differences between small and large countries in terms of opening their economies to trade. Urban share of population controls for the structural features of

the economy in terms of the rural-urban divide. Per capita income and population variables are introduced to the model in logarithms to normalize them.

The model is estimated using a fixed-effect panel data model that allows for controlling for country-specific characteristics such as religion, culture and other socioeconomic factors. In addition to that, Hausman tests were conducted for all model specifications, and the results consistently supported the use of the fixed-effects estimator over the random-effects alternative. The choice of the fixed effects model instead of the random effects model is based on the idea that these country-specific characteristics are not random and may impact the outcome variable and therefore need to be controlled for.

The tests for heteroskedasticity, autocorrelation, and cross-section dependence are run in the estimation stage, and it is verified that these are indeed issues in our panel regression model.[2] Therefore, to obtain standard error estimates robust to disturbances that are heteroskedastic, autocorrelated, and cross-sectionally dependent, the Driscoll-Kraay methodology is adopted using the user-written command xtscc by Hoechle (2007) in Stata.

3.3. Findings

Table 3 presents the empirical findings for the empirical analysis. According to these findings, trade openness has a negative and statistically significant association with the share of female employment in agriculture while its impact on the female intensity of employment is insignificant in industry and services. More specifically, a one percentage point increase in trade ratio leads to a 0.03 percentage point decrease in the female employment share in agriculture. Overall, the magnitudes of the estimated coefficients are relatively small, suggesting that trade openness measures have limited economic significance in terms of their impact on women's share of employment in each broad sector.[3]

Next to be examined is the impact of export and import shares in GDP on the female share of employment in each broad sector. The export share has a statistically significant and negative association with women's share of employment in agriculture and services. Specifically, a one percentage point increase in export intensity is associated with a 0.09 percentage point decrease in women's employment share in both agriculture and services. No statistically significant association is observed in the industrial sector. The adverse impact on the female intensity of employment in agriculture may be due to gender segregation by crop observed in most LDCs. Since export expansion leads to a shift of agricultural production from subsistence to cash crops, this might be adversely affecting women, who are disproportionately represented in the subsistence sector (UNCTAD, 2021). No statistically significant relationship is found for import shares in agriculture and industry while a positive association is found between the import share and the female intensity of employment in services. Hence, imports seem to play a complementary role with female labour in services.

The next investigation focuses on whether trading partners influence the impact of merchandise export and import shares on the female intensity of employment in broad sectors of the economy. According to Table 2 in section 3.1, in 2020, high income country markets constituted 47 percent of merchandise exports in LDCs, followed by 23 percent for SSA, 13 percent for EAP, and 12 percent for SA, on average. In terms of merchandise imports in 2020, the distribution of trading partners was as follows: 39 percent from high-income countries, 16 percent from SSA, 25 percent from EAP, and 10 percent from SA, on average. Overall, high-income countries followed by SSA dominate the export markets

[2] These tests are not presented in the paper as we have multiple model specifications; the tests include the Wald test for groupwise heteroskedasticity, the Hausman test, and the serial autocorrelation test. The test results are available upon request.

[3] The discussion is carried out without making a direct comparison with the empirical literature as there are not similar studies examining the gender impact of trade in LDCs as a whole as discussed in section 2 of this paper. A comparison with individual LDC case studies is beyond the scope of this paper. Instead, references are made to the broader gender and trade literature while discussing the results.

whereas high-income countries followed by EAP form the source of imports for the LDCs covered in our analysis.

Exports to high-income countries and exports to East Asia and the Pacific (EAP) as a share of total exports have no statistically significant association with the share of women in respective broad sector's employment. Exports to Sub-Saharan Africa (SSA) has a statistically significant and positive association with the female intensity of employment in both agriculture and services while the effect is insignificant in industry. Specifically, a one percentage point increase in the export share to SSA is associated with a 0.03 percentage point increase in the female intensity of employment in both agriculture and services. These findings imply that exports to nearby markets in SSA, where the majority of LDCs are located, help boost women's employment relative to men's in agriculture and services through the expansion of female-intensive activities. This might be because LDCs tend to sell low value-added products, in which female employment concentrates more, to countries of similar level of development in SSA. On the contrary, exports to high income countries, the major export market of LDCs, and to developing countries in EAP do not favour or disfavour female employment in LDCs.

Exports to South Asia (SA) have a statistically significant and negative association with the female share of employment in agriculture while it has a positive and statistically significant association with the female share of employment in industry. Specifically, a one percentage point increase in the export share to SA is associated with a 0.06 percentage point decrease in the female intensity of employment in agriculture and a 0.09 percentage point increase in women's employment share in industry. There is no statistically significant association in the case of services. It seems to be the case that exports to SA lead to a feminization of labour in the industrial sector of LDCs while a defeminization effect is realized in agriculture. This might be because industrial firms prefer female labour over male labour to take advantage of the low wages of women workers and their low bargaining power to compete with domestic producers in SA markets. The adverse effect of agricultural exports to SA markets might be because of the high cash crop content of such exports that disfavour women farmers.

Finally, imports from all four groups of trading partners exhibit a positive and statistically significant association with the female share of employment in the industrial sector. The impact is particularly high for imports from SSA and SA. This seems to reflect the complementary role that imports of intermediate goods and inputs play with labour in the production process in LDCs, which rely on imports for re-exporting in industrial export sectors including garments and textiles (UNCTAD, 2021). There is also a positive and statistically significant association between imports from SSA and the female intensity of employment in agriculture while imports from EAP have a negative and statistically significant association with women's share of employment in services.

Next to be discussed are the coefficient estimates for the control variables. It is found that GDP per capita has a statistically significant and positive association with the female intensity of employment in almost all sectors and model specifications. This implies that women's relative employment increases, reducing gender inequality in the labour market, as a country increases its level of development measured by per capita income. Population growth rate is negatively associated with the female intensity of employment in most sectors in LDCs. Hence as the population growth rate increases, this has negative repercussions for women's employment relative to men.

Similarly, there is a statistically significant and negative association between the fertility rate and women's share of employment in most sectors of the LDCs. A one-point increase in fertility rate is associated with an up to 2.5 percentage point fall in women's employment share in LDCs. Given that the fertility rate has been declining over time, as illustrated in Figure 4, this trend appears to have had a stimulating effect on women's employment relative to men, increasing the female intensity of employment in most sectors. The findings on the negative association between the population growth rate and the fertility rate, on the one hand, and the female employment intensity, on the other, are

consistent with the negative implications of increased unpaid work burden, resulting from care responsibilities, for women's relative employment.

Urbanization appears to have a positive association with the female intensity of employment in LDCs. A one percentage point increase in urbanization rate is associated with an up to 3.7 percentage point increase in the female intensity of employment. This also reflects the greater tendency of women to participate in paid employment in urban areas compared to rural areas. Given that there has been an increase in the urbanization rate over time, on average, in LDCs (figure 4), this trend of urbanization seems to have boosted women's employment relative to men's, thereby reducing the gender gap in employment.

Finally, when the magnitudes of trade variables and country control variables are compared, income level and demographic factors such as fertility, population growth and urbanization play a more significant role than trade openness measures in explaining the gender composition of employment by broad economic sectors in LDCs. Overall, country control variables have higher economic significance than trade variables.

Table 3. Estimation Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	**Agriculture**	**Industry**	**Services**	**Agriculture**	**Industry**	**Services**	**Agriculture**	**Industry**	**Services**
Trade ratio	-0.0259***	0.0106	0.00606						
	(0.00655)	(0.0161)	(0.00624)						
Export ratio				-0.0851***	0.0163	-0.0847***			
				(0.0234)	(0.0283)	(0.0236)			
Import ratio				-0.00587	0.00862	0.0367***			
				(0.00939)	(0.0232)	(0.00853)			
Exports to high-income countries							-0.00600	0.0330	-0.00478
							(0.0143)	(0.0203)	(0.0105)
Exports to East Asia and the Pacific							0.00132	-0.0168	-0.00717
							(0.0204)	(0.0213)	(0.0192)
Exports to Sub-Saharan Africa							0.0294*	-0.00741	0.0274***
							(0.0165)	(0.0203)	(0.00773)
Exports to South Asia							-0.0620*	0.0866**	-0.0260
							(0.0303)	(0.0338)	(0.0204)
Imports from high-income countries							-0.00193	0.0570**	-0.0110
							(0.0147)	(0.0225)	(0.0136)
Imports from East Asia and the Pacific							0.0166	0.0860**	-0.0468*
							(0.0202)	(0.0303)	(0.0249)
Imports from Sub-Saharan Africa							0.0627**	0.145**	0.0251
							(0.0297)	(0.0545)	(0.0148)
Imports from South Asia							-0.0259	0.184**	0.0321
							(0.0303)	(0.0670)	(0.0264)
Ln (per capita income)	5.582***	0.401	1.101	6.237***	0.338	2.104***	5.381***	-0.00629	2.393***
	(0.693)	(1.582)	(0.681)	(0.823)	(1.392)	(0.668)	(0.978)	(1.172)	(0.731)
Ln(population)	-13.77***	10.15***	-0.618	-13.87***	10.16***	-0.768	-15.07***	12.32***	-1.874*
	(0.649)	(0.856)	(0.862)	(0.957)	(0.858)	(1.004)	(0.824)	(1.383)	(1.018)
Fertility rate	-1.007***	2.507***	-2.071***	-1.302***	2.535***	-2.522***	-1.967***	2.037***	-2.356***
	(0.243)	(0.325)	(0.383)	(0.360)	(0.421)	(0.268)	(0.332)	(0.680)	(0.391)
Urbanization rate	0.368***	0.253***	0.0110	0.344***	0.256***	-0.0269	0.324***	0.155	0.0164
	(0.0349)	(0.0822)	(0.0183)	(0.0382)	(0.0710)	(0.0339)	(0.0323)	(0.117)	(0.0281)
Constant	220.1***	-160.1***	52.65***	219.4***	-160.0***	51.63***	247.3***	-197.3***	65.41***
	(10.50)	(19.49)	(15.40)	(17.10)	(18.61)	(14.82)	(13.60)	(32.28)	(13.74)
Observations	644	644	644	644	644	644	550	550	550
Number of groups	28	28	28	28	28	28	28	28	28

4. Conclusion

Trade liberalization leads to shifts in relative prices and, consequently, transformations in the structure of production and employment. Because women and men are unequally distributed across sectors, these structural changes have clear gendered employment implications. Trade liberalization may also reduce gender inequalities in the labour market by rendering gender discrimination costly via international competition. Finally, trade liberalization may result in technological upgrading in the domestic economy and reduce the need for physically demanding skills, which would help women find employment more easily in traditionally male-dominated sectors and occupations. Automation, on the contrary, may replace unskilled jobs which tend to be held by women disproportionately in most developing countries.

The benefits of trade liberalization are not evenly distributed, as pre-existing gender inequalities and social norms may limit women's ability to access new opportunities. For example, lower education levels among women, unpaid care burdens, cultural constraints, and unequal property rights may prevent women from fully benefiting from economic reforms. The extent of these effects also depends on policy responses, such as support for skill development and retraining programs targeted toward women to mitigate the adverse impacts of automation. There is hence a complex interaction between trade and gender.

Least-developed countries (LDCs) constitute the most vulnerable economies among developing countries. LDCs are defined as low-income countries suffering from structural impediments to sustainable development. LDCs share common challenges such as limited infrastructure and productive capacity, low education and skill level of the workforce, a vicious cycle of poverty, lack of economic diversification, and limited integration with the global economy. Furthermore, gender inequality tends to be more pronounced in LDCs, with women often overrepresented in informal and unpaid work, exacerbating their vulnerability to economic shocks and structural changes. To the best of our knowledge, there is no study examining the gendered employment effects of trade across LDCs. This paper aims to fill this gap by carrying out an empirical analysis of trade and gendered employment effects using data for 28 LDCs for which balanced panel data is available during 2000-2022.

Export share has a statistically significant and negative association with women's share of employment in agriculture and services. The adverse impact of exports on the female intensity of employment in agriculture may be due to gendered crop patterns and commercialization displacing female labour. There is a positive association between the import share and the female intensity of employment in services. Examining differences by trading partners, exports to Sub-Saharan Africa (SSA) has a statistically significant and positive association with the female intensity of employment in both agriculture and services while the effect is insignificant in industry. Exports to South Asia (SA) has a statistically significant and negative association with the female share of employment in agriculture while it has a positive and statistically significant association with the female share of employment in industry. Finally, imports from all four groups of trading partners have a positive and statistically significant association with the female share of employment in industry. This seems to reflect the complementary role of intermediate goods in labour-intensive manufacturing processes, which may absorb more female labour.

There is a statistically significant and positive association between a country's level of development measured by per capita income and the female intensity of employment in almost all sectors and model specifications. Both population growth rate and fertility rate are negatively associated with the female intensity of employment in most sectors in LDCs. This effect points at the role of unpaid care work in women's participation in the labour market. Given that fertility has been on decline across LDCs on average, this trend seems to have had a stimulating effect on women's employment relative to men increasing the female intensity of employment in most sectors. Urbanization seems to be in general

positively associated with the female intensity of employment in LDCs. This also reflects the tendency of women to participate in paid employment in urban areas more than in rural areas.

Moreover, access to education and health services, which tends to improve with urbanization and economic development, appear to play a critical role in enhancing women's employability and access to better-paying jobs in LDCs. Policies aimed at improving infrastructure, ensuring equitable access to education, and addressing cultural barriers could significantly amplify the positive effects of urbanization and development on female employment.

Overall, income level and demographic factors such as fertility, population growth and urbanization play a more significant role than trade openness measures in explaining the female intensity of employment in broad economic sectors in LDCs. However, these demographic and income effects often interact with trade policies and globalization trends, suggesting that comprehensive strategies integrating trade, development, and gender equality objectives are crucial for fostering inclusive growth in LDCs.

Trade policy measures should be complemented by employment and social policies that address gender-specific constraints. To promote women's employment in the context of trade liberalization, investment in human capital, especially in education and health care is crucial, as is support for childcare and social protection systems. In addition, infrastructure development and legal reforms that ensure women's access to land, finance and formal employment will enable them to benefit fully from economic change. Integrating trade objectives with inclusive employment strategies will help ensure that the benefits of trade lead to fairer labour market outcomes, especially for women in the most vulnerable economies.

References

Becker, G. (1971). *The economics of discrimination* (Second Edition). Chicago. The University of Chicago Press.

Black, S. & Brainerd, E. (2004). Importing equality? The impact of globalization on gender discrimination. *Industrial and Labor Relations Review, 57*(4), 540–559.

Elson, D., Grown, C., & Çağatay, N. (2007). Mainstream, heterodox, and feminist trade theory. E. van Steveren, D. Elson, C. Grown, & N. Çağatay (Ed.), *The feminist economics of trade.* Routledge.

Heckscher, E., & Ohlin, B. (1991). *Heckscher-Ohlin trade theory.* MIT Press.

Hoechle, D. (2007). Robust standard errors for panel regressions with cross-sectional dependence. *The Stata Journal*, *7*(3), 281-312.

Juhn, C., Ujhelyi, G., & Villegas-Sanchez, C. (2014). Men, women, and machines: How trade impacts gender inequality. *Journal of Development Economics, 106*, 179–193.

Khondker, B., & Pettinotti, L. (2024). COVID-19, trade and gender in Bangladesh. *Journal of the Asia Pacific Economy*, 29(4), s. 1766-1784.

Kucera, D., & Tejani, S. (2014). Feminization, defeminization, and structural change in manufacturing. *World Development, 64*, 569–582.

Lopez Mourelo, E., & Samaan, D. (2018). Can labor provisions in trade agreements promote gender equality? Empirical evidence from Cambodia. *Review of Development Economics*, 22, s. 404–433.

Pieters, J. (2018). Trade liberalization and gender inequality. *IZA World of Labor, 114*(2), 1-11.

Standing, G. (1989). Global feminization through flexible labor. *World Development, 17*(7), 1077–1095.

Standing, G. (1999). Global feminization through flexible labor: A theme revisited. *World Development, 27*(3), 583–602.

Stolper, W., & Samuelson, P. (1941). Protection and Real Wages. *The Review of Economic Studies, 9*(1), 58–73.

Tanaka, K., & Greaney, T. (2024). Trade and employment in the formal and informal sectors: A natural experiment from Cambodia. *Journal of Asian Economics* (101676).

Tejani, S., & Fukuda-Parr, S. (2021). Gender and COVID-19: Workers in global value chains. *International Labour Review, 160*(4), 649-667.

Tejani, S., & Kucera, D. (2021). Defeminization, structural transformation and technological upgrading in manufacturing. *Development and Change, 52*(3), 533–573.

Tejani, S., & Milberg, W. (2016). Global defeminization? Industrial upgrading and manufacturing employment in developing countries. *Feminist Economics, 22*(2), 24-54.

UNCTAD. (2021). *Trade and gender linkages: An analysis of least developed countries.* Geneva: United Nations Conference on Trade and Development.

UNCTAD. (2023a). *State of Commodity Dependence 2023 Report.* Geneva: United Nations Conference on Trade and Development.

UNCTAD (2023b). *Linking Trade and Gender towards Sustainable Development*. Geneva: United Nations Conference on Trade and Development.

UNDESA. (2024). *The Least Developed Country Category: 2024 Country Snapshots.* New York: UNDESA.

Wamboye, E., Adekola, A., & Bruno, S. (2015). Sectoral Shifts and Women's Employment: A Study of Thirty-Nine Least Developed Countries. *Journal of Economic Issues, 49*(4), 1045-1076.

Conflict of Interest: None.

Funding: None.

Ethical Approval: None.

Author Contributions: Nursel AYDINER AVŞAR (50%), Bengi YANIK İLHAN (50%)

Çıkar Çatışması: Yoktur.

Finansal Destek: Yoktur.

Etik Onay: Yoktur.

Yazar Katkısı: Nursel AYDINER AVŞAR (%50), Bengi YANIK İLHAN (%50)