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Foreign direct investment, trade openness, and the gender unemployment gap in Saudi Arabia: An empirical ARDL approach

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ABSTRACT

This study is one of the few that examines how foreign direct investment (FDI) and trade openness affect female and male unemployment rates in Saudi Arabia. The analysis uses the gender unemployment gap index (GGI) and applies an autoregressive distributed lag (ARDL) model along with the Bounds test to explore these relationships. The results show three main findings: First, FDI has a positive and significant effect on the unemployment gap between women and men, suggesting that women have not benefited from FDI inflows during this period. Second, both short-run and long-run estimates show that trade openness has a negative and significant impact on female unemployment, meaning that increasing international trade reduces unemployment among women, while it may lead to higher unemployment among men. Third, the results indicate that women have not benefited from public investment or oil revenues, as their unemployment rate tends to increase with these economic factors.

1. Introduction

Over the past few decades, FDI and trade openness have largely been considered as major factors of economic growth and economic development for developing countries. Indeed, FDI is considered as a driver of sustainable development through technological transfer and promoting competition in the domestic input market (Hobbs et al., 2021). These positive effects have been reinforced by an increasingly globalized economy, characterized by greater openness to international markets since the 1990s. Further, the literature argues that FDI and trade openness are likely to influence labor markets in developing countries either by creating or destroying jobs.

In fact, it is not clear whether FDI and trade openness create more jobs than they destroy. Foreign companies may generate fewer jobs than local ones since they tend to be more productive and more demanding in terms of skills. Moreover, little is known about the effect of FDI and trade openness on gender employment inequality, i.e., whether men and women in developing economies have benefited equally from foreign investments and the openness of their economies to international markets. In the literature, empirical results are mixed and not conclusive. While FDI seems to have a positive impact on women's employment in semi-industrialized countries (more specifically in low-skilled and labor-intensive sectors), which offer better working conditions, including higher wages and more extensive benefits, other findings point out that women may lose jobs in high-skilled industries.

In this study, we examine the impact of FDI and trade openness on female unemployment versus male unemployment for one of the developing countries and the biggest net oil-exporting country in the Middle East: Saudi Arabia. We focus on the case of Saudi Arabia for the following reasons:

1. Saudi Arabia's Vision 2030 sets out ambitious economic goals by opening and diversifying its economy to transform it into a global investment powerhouse. In particular, the Vision aims to increase FDI to 5.7% of GDP.
2. In Saudi Arabia, improving the inclusion of women in the economic life is a political priority for the policymakers of the country, as highlighted in Saudi Arabia's Vision 2030. The policy objectives aim for better gender equality and an inclusive economy where all citizens, including women, can benefit from economic growth. Women's empowerment is at the forefront of all social

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reforms, making Saudi society more inclusive through greater and better access to education and the labor market.

3. The impact of FDI and trade openness on Saudi Arabia's female labor market has not received significant focus in empirical studies.

2. Theoretical and empirical literature review

2.1. The impact of FDI on gender unemployment

The impact of FDI on the unemployment rate in host countries has been the focus of an important number of theoretical and empirical studies. Indeed, FDI is considered a macroeconomic factor that may generate employment in host economies by stimulating economic growth, transferring technology, developing human capital, motivating domestic investment, and developing national industries (Irpan et al., 2016).

Further, FDI benefits both home and host countries and it is widely considered as an integral part of an open and efficient international economic system and one of the main catalysts for development which may create new jobs, pay higher wages, and then reduce poverty at least in developing countries; See for example de Mello (1997), Borensztein et al. (1998), Ram and Zhang (2002), Zulfiu-Alili (2014), Beata (2015), and Albassam (2015) for a literature review of the effects of FDI on job creations and wages in developing countries.

Indeed, the fundamental contribution of FDI to job creation lies in its positive impact on stimulating economic growth in the host country, which in turn accelerates job creation. A set of theoretical and empirical studies addressing this issue confirms this finding by arguing that FDI is a factor influencing economic growth through its positive benefits on several economic variables (Ram and Zhang, 2002; Hansen and Ran, 2006; Madariaga and Poncet, 2007). However, it is worth noting that previous empirical results issued from research conducted in developed and developing countries were surprisingly mixed. The negative relationship between FDI inflows and female unemployment has not always been empirically proven (Hisarciklilar et al., 2014; Mohamed, 2018).

For example, Sharma (2020) found that FDI has had a significant impact on gender outcomes in India. The employment of female workers is positively influenced by an increase in industry-level FDI inflows. Using an industry-weighted gender inequality index, her findings show that the employment of unskilled women has most benefited from the increase in FDI. These results are like those of a previous study on Vietnam.

Fernandes and Kee (2020) showed that FDI firms in Bangladesh hire more female workers, particularly administrative and production workers. In addition, domestic firms that share local suppliers with foreign firms also employ more female administrative workers. Using a panel dataset of 94 developing countries from 1990 to 2015, Ouedraogo and Marlet (2018) found that FDI inflows improve women's welfare and decrease gender inequality. However, the impact is lower in countries where women have low access to resources and face a heavier burden to open a business.

Further, empirical results show that in developed countries, FDI is positively associated with increased female labor participation through the complementarity between the technology diffused and the female workforce. In addition, FDI may improve working conditions, safety, and health in the workplace, which positively affects female labor outcomes. For instance, Naomi et al. (2018) showed that foreign affiliates in Japan are more gender equal. They find that FDI recruits higher proportions of female workers, managers, board members, and directors than domestic firms of the same size in the same industry.

A recent OECD (2023) report indicates that in the case of Austria, gender asymmetries in the labor market are persisting, which indicates that men benefit more than women from job opportunities created by FDI. Similar results were found by Luomaranta et al. (2020) in the case of the business sector of Finland, where disparities are strongest in the best-paying professions.

2.2. The impact of trade openness on gender unemployment

The impact of trade openness on the labor market was investigated through an important number of theoretical as well as empirical studies. At a theoretical level, according to the traditional Heckscher-Ohlin model, trade openness in emerging economies should decrease unemployment, which is due to the raised demand for abundant unskilled labor in developing countries (Bussmann, 2009; Dutt et al., 2009; Hasan et al., 2012).

Conversely, demand for skilled labor is decreasing in abundant capital economies. However, economists have faced challenges in finding strong empirical evidence to support it. Empirical research findings were mixed and not conclusive due to the complexity of links between trade openness and employment, as jobs are created and destroyed according to countries' levels of development, technological changes, and workforce skills (Ranjan, 2012).

Furthermore, researchers have focused on whether trade openness is gender-neutral, i.e., whether men or women benefit disproportionately from trade liberalization. Some authors have investigated the impact of trade liberalization on female labor force participation without focusing on its effect on gender unemployment (Bussmann, 2009; Heath and Mobarak, 2015; Kis-Katos et al., 2018). Their results suggest that female labor participation is positively linked to trade liberalization in developing countries. A World Bank report emphasized that countries that have higher levels of gender equality are more open to trade.

This result shows that trade offers promising advantages for women. In developing countries, women are more represented in the workforce in firms that engage in trade, compared with non-exporting firms.

Other researchers have focused their investigations on the effect of trade openness on the employment gender gap. Besedeš et al. (2021) showed that in the case of the United States, although trade liberalization with China reduces gender gaps in local United States labor markets, it increases female workers' unemployment rate and reliance on part-time jobs. On the other hand, Wang et al. (2020) suggested that trade liberalization in China has reduced a growing gender employment gap in the long run. Their results imply that the share of females in the workforce has increased due to the increasing import competition. In the same way, Connolly (2022) showed that regions in Brazil that are more exposed to Chinese imports experience an increase in the female employment-to-population ratio and a decrease in male and female unemployment rates.

These employment gains are greatest for women, indicating a reduction in barriers to employment for Brazilian women. However, a recent study by Afolabi and Raifu (2024) showed that in the case of 29 Sub-Saharan African countries, FDI is considered a viable and promising factor for fostering employment and closing gender gaps in employment. The key factor in reducing employment gender gaps in these countries lies in their institutional quality. A few other studies have focused on the case of Saudi Arabia, such as Alfalih (2024). Their empirical findings based on ARDL estimations confirm that liberalization of trade reduces unemployment in the long run in Saudi Arabia. However, these authors didn't distinguish between male and female cases.

3. Empirical methodology and data

To test the impact of FDI inflows and trade openness (OP) on the gender gap between female and male unemployment rates in Saudi Arabia during the period 1991-2021, we develop a simple unemployment gender gap index (GGI) which is calculated by dividing the female unemployment rate by the male unemployment rate. A GGI of less than 1 suggests that women are more advantaged than men in job opportunities (inequality in favor of females), and a GGI of greater than 1 suggests the other way around. Then we apply an ARDL model and bounds testing for the cointegration approach developed by Pesaran et al. (2001) by adding some other variables as controls, which are commonly used in the literature: inflation rate (INF_t), public investment (GFCG) and oil rents (OIR).

$$GGI = f(FDI_t, GFCF_t, INF_t, OIR_t, OP_t) \quad (1)$$

$$\Delta GGI_t = c + \sum_{i=1}^{p} \alpha_{1i} \Delta GGI_{t-1} + \sum_{i=1}^{q_1} \alpha_{2i} \Delta FDI_{t-1} + \sum_{i=1}^{q_2} \alpha_{3i} \Delta GFCF_{t-1} + \sum_{i=1}^{q_3} \alpha_{4i} \Delta INF_{t-1} + \sum_{i=1}^{q_4} \alpha_{5i} \Delta OIR_{t-1} + \sum_{i=1}^{q_5} \alpha_{6i} \Delta OP_{t-1} + \beta_1 GGI_{t-1} + \beta_2 FDI_{t-1} + \beta_3 GFCF_{t-1} + \beta_4 INF_{t-1} + \beta_5 OIR_{t-1} + \beta_6 OP_{t-1} + \varepsilon_t \quad (2)$$

where, Δ is the first difference operator; GGI stands for gender gap index in terms of unemployment rate as described formerly; FDI is the net inflow of foreign direct investment; GFCF is the gross fixed capital formation, which represents a proxy for public investment; INF is the rate of inflation; OIR is oil rent.

A positive and significant coefficient of one of these explanatory variables indicates that the more this variable increases, the more the gap in terms of unemployment between men and women deepens, and vice versa. Our annual data covering the period 1991-2021 for Saudi Arabia are used from the World Development Indicators of the World Bank (see Appendix A for the description and measurement of data). The summary statistics of our data are described in Table 1, and Fig. 1 shows their annual evolution during the period 1991-2021.

4. Empirical results

4.1. Unit root tests

Before examining the potential long-run relationship among the variables, it is necessary to test their stationarity. To do this, we apply three tests: the Augmented Dickey-Fuller (ADF) test, the Phillips-Perron (PP) test, and the Dickey–Fuller Generalized Least Squares (DF-GLS) detrending test. For all three tests, the null hypothesis (H_0) states that the variable contains a unit root. The null hypothesis is rejected if the t-statistic is less than the critical value at the 5% significance level. The ADF test tests whether a time series is stationary around a trend or a constant mean. It extends the classical Dickey-Fuller test by adding lagged terms to correct for autocorrelation in the residuals. However, it is sensitive to the choice of the lag number and has low power for series close to stationarity. The PP test is an alternative to the ADF test. It uses a non-parametric method to correct for autocorrelation and residual heteroscedasticity, without explicitly adding lagged terms to the model, but it can be sensitive to sample size and strongly autocorrelated series.

Table 1: Summary statistics of the variables

Variables	GGI	FDI	INF	OP	GFCF	OIR
Mean	3.997	0.615	1.963	71.271	21.475	34.058
Median	3.118	0.367	1.222	68.166	20.720	31.342
Maximum	8.917	3.296	9.870	96.102	29.356	54.085
Minimum	0.659	-1.307	-2.093	49.713	17.308	15.978
Standard deviation	2.595	1.080	2.630	12.036	2.988	10.176
Observations	31	31	31	31	31	31

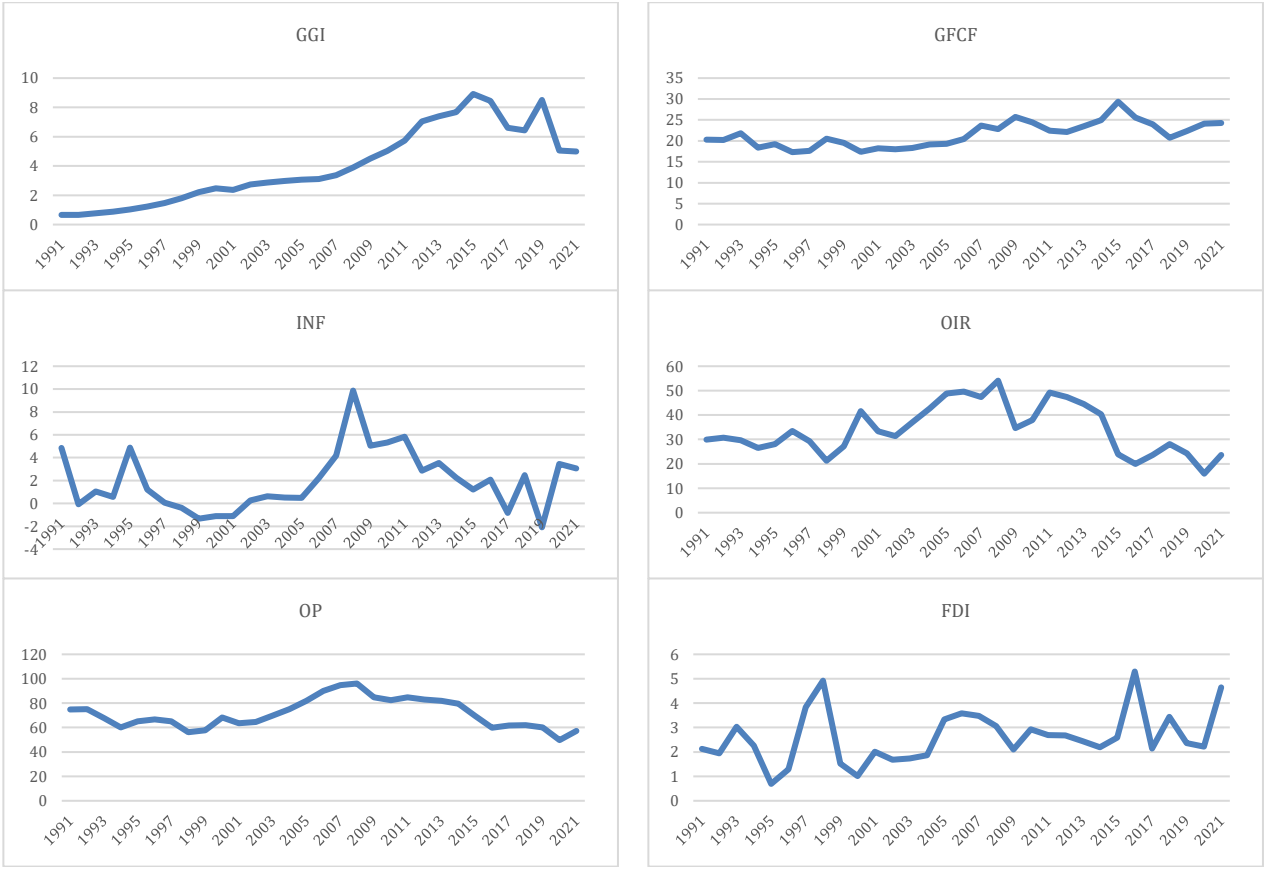

Fig. 1: Evolution of all variables (1991-2021)

That's why we have chosen a third test, which is the DFGLS test. Indeed, this test is an improved version of the ADF test. It applies a Generalized Least Squares (GLS) regression transformation to eliminate deterministic trends before testing the unit root. It has better statistical power than the ADF and PP tests, especially for series with a trend, and it is less sensitive to sample size. Elliott et al. (1996) and later studies have shown that this test has significantly greater power than the previous versions of the augmented Dickey–Fuller test. The results of the unit root tests in Table 2 indicate that the null hypothesis of non-stationarity cannot be rejected for the variables (GGI, GFCF, OP, INF, OIR) at the level, except for the FDI variable which seems to be integrated of order zero according to the three-unit root tests.

As a result, we must test the presence of a unit root in the first difference for these variables. The results are reported in Table 3.

Table 2: ADF, PP, and DF-GLS unit root tests on levels of variables

Variables	ADF test		PP test		DF-GLS test	
	T-statistic	Critical value at 5%	T-statistic	Critical value at 5%	T-statistic	Critical value at 5%
GGI	-1.98[b]	-3.60	-0.48[c]	-1.95	-0.66[a]	-3.19
FDI	-4.59[a]	-3.56	-3.96[a]	-2.96	-4.76	-3.19
GFCF	-2.83[b]	-3.56	-2.60[b]	-3.56	-2.81	-3.19
OP	-0.70[c]	-1.95	-0.70[c]	-1.95	-1.14	-1.95
INF	-1.25[c]	-1.95	-2.55[c]	-1.95	-1.75[c]	-1.95
OIR	-0.66[c]	-1.95	-0.58[c]	-1.95	-1.95[a]	-1.95

a: No trend; b: Constant and trend; c: No constant or trend; For each stationarity test, start with a trend and constant, drop the trend if insignificant, then drop the constant if also insignificant

4.2. Cointegration test

To test for a long-term cointegrating relationship between the dependent variable and the explanatory variables, we apply the Bounds test under the following hypotheses:

H_0: $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6$ (absence of a long-run relationship)
H_1: $\alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq \alpha_6$ (existence of a long-run relationship)

According to Table 4, the calculated value of F = 9.108 exceeds the upper I(1) bounds of the critical values (at the 1%, 5%, and 10% thresholds). We therefore reject the hypothesis of no long-term relationship (H_0) and accept (H_1), which indicates the presence of a long-term relationship between the dependent variable and the explanatory variables.

The results in Table 5 show that the error correction coefficient (ECM_{t-1}=-0.366) is statistically significant (p-value = 0.000) with a negative sign indicating the existence of a long-term relationship (cointegration) between the dependent variable (GGI) and the explanatory variables (GFCF, FDI, OP, INF, and OIR). The value of this coefficient expresses the speed with which the model adjusts towards long-term equilibrium after a shock.

Table 3: ADF, PP, and DF-GLS unit root tests on first differences of variables

Variables	ADF test		PP test		DF-GLS test	
	T-statistic	Critical value at 5%	T-statistic	Critical value at 5%	T-statistic	Critical value at 5%
GGI	-1.54[a]	-2.96	-1.45[a]	-2.96	-1.18[a]	-1.95
FDI	-4.59[a]	-3.56	-3.96[a]	-2.96	-4.76[a]	-3.19
GFCF	-2.83[b]	-3.56	-2.60[b]	-3.56	-2.81[b]	-3.19
OP	-0.70[c]	-1.95	-0.70[c]	-1.95	-1.14[c]	-1.95
INF	-1.25[c]	-1.95	-2.55[c]	-1.95	-1.75[c]	-1.95
OIR	-0.66[c]	-1.95	-0.58[c]	-1.95	-1.95[a]	-1.95

Table 4: Bound test results

	Significance	Lower bound I(0)	Upper bound I(1)
F-statistic = 9.108	10%	2.08	3
	5%	2.39	3.38
	1%	3.06	4.15

Table 5: Estimates for short-run coefficients (effect) through ARDL (3,0,3,3,2,3) (the lags of the ARDL model are selected based on Akaike info criterion)

Variables	Coefficient	Standard error	T-statistic	P-value
D(GGI(-1))	-0.014	0.101	-0.144	0.888
D(GGI(-2))	-1.317***	0.152	-8.642	0.000
D(GFCF)	0.545***	0.069	7.837	0.000
D(GFCF(-1))	-0.657***	0.098	-6.679	0.000
D(GFCF(-2))	-0.354***	0.099	-3.545	0.007
D(OIR)	0.255***	0.038	6.625	0.000
D(OIR(-1))	-0.296***	0.039	-7.497	0.000
D(OIR(-2))	-0.173***	0.043	-3.999	0.004
D(INF)	-0.133***	0.034	-3.850	0.004
D(INF(-1))	-0.128**	0.041	-3.133	0.013
D(OP)	-0.210***	0.043	-4.858	0.001
D(OP(-1))	0.146***	0.033	4.321	0.002
D(OP(-2))	0.127**	0.039	3.242	0.011
ECM (t-1)	-0.366***	0.101	-3.623	0.000

*, **, and *** denote respectively significance levels at 10%, 5%, and 1%

4.3. Long-term effects

Table 6 shows the long-run coefficient estimates of our ARDL model. All the coefficients are statistically significant except for the inflation rate variable. This means that the long-run relationship between the dependent variable and the explanatory variables is well validated. In the long run, the estimated coefficients of FDI, OIR, and GFCF are positive and significant, while the trade openness is negative.

4.4. Diagnostic/stability tests

According to Table 7, the LM probability (0.971) is greater than the 0.05 significance level. The H_0 hypothesis (no serial correlation) is therefore rejected, indicating the absence of autocorrelation in the residuals.

Table 6: Estimates for long-run coefficients based on ARDL

Variable	Coefficient	Standard error	T-statistic	P-value
FDI	0.207***	0.072	2.861	0.009
OP	-0.557***	0.092	-6.006	0.000
OIR	0.693***	0.130	5.327	0.000
INF	0.146	0.124	1.174	0.274
GFCF	1.311***	0.063	3.606	0.000
C	-8.022***	2.395	-3.348	0.010

*, **, and *** denote respectively significance levels at 10%, 5%, and 1%

Table 7: Residual autocorrelation test

Diagnostic tests	F-statistic	P-value
Breusch-Godfrey (serial correlation LM test)	0.028	0.971
Jarque-Bera (normality test)	0.937	0.625
Breusch-Pagan- Godfrey (heteroskedasticity test)	0.473	0.913
Ramsey RESET test	3.411	0.102

4.5. Stability of the ARDL model

According to the results of the CUSUM and CUSUMQ stability tests applied to the residuals of our model equation (Fig. 2), we note that the curves lie in the critical zone between the two lines representing the limits of the interval (5% significance level). We therefore reject the hypothesis of structural change over time and that the model is stable in both the long and short term.

4.6. Endogeneity test

Testing for endogeneity in our ARDL model is an important step in ensuring the validity of the estimated parameters. Indeed, endogeneity can arise due to omitted variables, measurement errors, or simultaneity and the Ordinary Least Squares (OLS) estimates in the ARDL model will be biased and inconsistent, so we need to use techniques like Instrumental Variables (IV), Two-Stage Least Squares (TSLS) or Generalized Method of Moments (GMM). We then run the Durbin-Wu-Hausman (DWH) (The test statistic of the DWH test is distributed as a Chi-squared random variable with degrees of freedom equal to the number of regressors tested for endogeneity) test, which is a standard method for testing for endogeneity in a regression model. In our model, the variables FDI and OP could be endogenous because they can be explained by other factors.

We estimate a restricted ARDL model using TSLS and GMM (In comparison to TSLS, GMM can be more efficient in models with heteroskedasticity or autocorrelation) methods and perform the DWH test

with the null hypothesis that FDI and OP are exogenous. If the p-value of the test statistic is greater than 5%, we accept the null hypothesis of the exogeneity of the suspected variables (FDI and OP). The lagged values of the variables FDI and OP, as well as the other variables in our ARDL model that are assumed to be exogenous (INF, OIR, GFCF), are used as instruments. The results of the DWH T-statistic are 0.395 for TSLS and 0.329 for GMM.

The p-value of the DWH test according to the TSLS and GMM estimations is greater than 5%, so we can accept the null hypothesis that FDI and OP are exogenous variables.

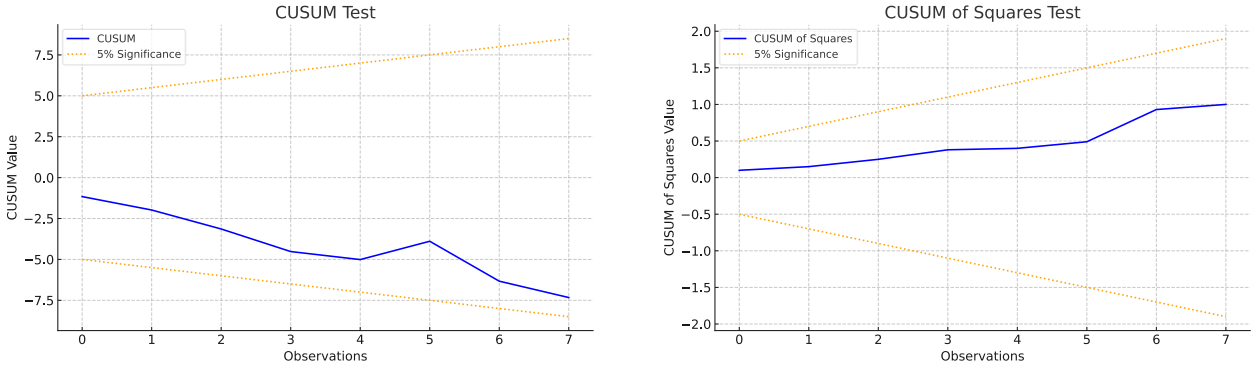

Fig. 2: CUSUM and CUSUMQ stability tests

5. Results and discussion

Our empirical results from the long-run estimates of the ARDL model show that FDI inflows has a positive and statistically significant coefficient on the GGI variable, which means that women in Saudi Arabia don't benefit from FDI inflows since their unemployment rates are not positively affected by the entrance of new investments into the Saudi's economy. This result may not be surprising since in 2022, for example, the FDI inflows are more concentrated in male-worker-intensive sectors such as transportation and storage and manufacturing activities where the share of male workers in these two sectors is 76% compared to the total number of workers, while the highest share of female workers compared to the total number of workers is in wholesale and retail trade activity and repair of motor vehicles and motorcycles (19.8%), and construction activity (14.4%).

Moreover, most of the foreign companies in Saudi Arabia's economic activities are skill-intensive industries that require highly skilled workers. However, the number of skilled female workers in the Saudi labor market remains low compared to males. Indeed, despite the progress of female graduates, the share of engineering, manufacturing, and construction among total female graduates is low compared to other disciplines (1.7% in 2021). These facts partly explain the negative effect of FDI on female unemployment compared to male workers, who are more represented in economic activities where foreign companies are more concentrated.

On the other hand, the coefficient of trade openness is statistically significant with a negative sign, which suggests that Saudi women are more advantaged in the labor market than Saudi men as the economy is opened to the international markets. This result goes in line with some earlier empirical findings for the case of developing countries, where trade openness increases female labor force participation. However, the coefficients related to the control variables are positive and statistically significant for oil rents (OIR) and public investment (GFCF), but non-significant for the inflation variable (INF). Female unemployment, and hence the gender unemployment gap, is negatively affected by an increase in oil rents and public investment. This result indicates that the female labor force share is still facing barriers and challenges to entering the labor market despite the efforts made by the Saudi government to overcome gender discrimination within economic organizations in the public as well as private sectors. In addition, it seems that Saudi monetary policy's aim to maintain inflation at low levels does not lead to the creation of more jobs and the reduction of unemployment rates, neither for male workers nor for females.

As a result, additional gender neutrality laws should be implemented by the regulatory authorities in Saudi Arabia to help women participate significantly and more effectively in national development by enhancing their participation in the labor market. Helping women to acquire high skills through the higher education system and strengthening the capacities of female entrepreneurs should be a priority for Saudi policymakers. More specifically, the number of female graduates in scientific and technical fields, as well as in vocational training, should be boosted to provide skilled workers for foreign (and local) companies. Consequently, the Saudi government should redouble efforts in education and training investment so that females will be equipped with the skills and knowledge required by foreign companies and to ensure that the outcomes of higher education are in line with the requirements of the labor market.

Thus, Saudi Vision 2030 offers policymakers an excellent opportunity to promote, enforce, and monitor labor market gender equality through:

- Overcoming some socio-cultural barriers and local traditions (such as gender segregation, discrimination in terms of working conditions and rights) supported at the organizational, societal, and national cultural levels that make it difficult for Saudi women to find jobs and reduce their independence (while preserving the identity of the society). In fact, the Kingdom has implemented many legislative, social, and economic reforms in recent years to ensure an end to all forms of discrimination and inequalities of opportunities and rights in the labor market against women, which has resulted in an inclusive and significant social change.
- Intensifying efforts to reduce the unemployment rate, which is already approaching the 2030 target (7%), and to increase female labor force participation from 22% in 2023 to 30% by 2030.
- Improving the education and training system by creating a modern curriculum that focuses on rigorous standards in literacy, numeracy, skills, and character development. Saudi women have the right to enroll in public/private schools and universities and have the right to apply for scholarships to study abroad.
- Diversifying the Kingdom's economy and expanding its income. In particular, the Kingdom aims to increase FDI inflows by introducing new initiatives and attracting more global investment.

6. Conclusion

From the point of view of the economic literature, studies that have tried to understand the effects of trade openness on unemployment, on the one hand, and those that have studied the effects of FDI inflows on unemployment in different countries using different approaches, on the other hand, have come to different conclusions.

Moreover, the evidence shows that men and women don't benefit equally from trade openness and foreign firms. The case of Saudi Arabia is no exception: while female workers benefit from trade openness, their unemployment rate increases due to new foreign investment inflows, unlike male workers. The country's policymakers should therefore implement gender-neutral strategies to empower women and increase their labor force participation so that they can better benefit from foreign investment.

Appendix A. Data description and measurement

Data description and measurement used in the ARDL model are given in Table A1.

Table A1: Data descriptions and measurement

variables	Description/measurement
Unemployment rate (male and female)	Unemployment refers to the share of the labor force that is without work but available for and seeking employment.
Trade openness (% of GDP)	Exported and imported goods/services are summed and quantified as a proportion of GDP.
Foreign direct investment, net inflows (% of GDP)	Foreign direct investment is the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital, as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors and is divided by GDP.
Oil rents (% of GDP)	Oil rents are the difference between the value of crude oil production at regional prices and total costs of production.
Inflation	As measured by the consumer price index, the Annual percent change in cost reflects the average consumer to obtain a set of products and services based on the consumer price index. This set of products/services might remain the same or be altered annually or at another frequency.
Gross fixed capital formation (% of GDP)	Gross fixed capital formation (formerly gross domestic fixed investment) includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, commercial and industrial buildings.

List of abbreviations

FDI	Foreign direct investment
GGI	Gender gap index
ARDL	Autoregressive distributed lag
GFCF	Gross fixed capital formation
OIR	Oil rents
INF	Inflation
OP	Trade openness
ADF	Augmented dickey-fuller
PP	Phillips-perron
DF-GLS	Dickey-Fuller generalized least squares
ECM	Error correction model
OLS	Ordinary least squares
IV	Instrumental variables
TSLS	Two-stage least squares
GMM	Generalized method of moments
DWH	Durbin-Wu-Hausman
CUSUM	Cumulative sum
CUSUMQ	Cumulative sum of squares

Compliance with ethical standards

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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