

The Cyclical Effects on Labor Force Participation: A Study of the Saudi Labor Market using ARDL Techniques

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ABSTRACT

This article assesses the cyclical effects on Labor Force Participation (LFP) in the Saudi labor market. The Discouraged Worker Effect (DWF) and Added Worker Effect (AWF) for men and women LFP rates were examined by applying the Autoregressive Distributed Lag (ARDL) method. The results showed the existence of AWF in the long run in the case of women. They also confirmed that the women's LFP rate is countercyclical to economic activity and procyclical to unemployment and inflation rates. However, there is no evidence of the impact of the unemployment rate and economic cycles on women's decision to participate in the labor force in the short run. Moreover, the results support the invariance unemployment hypothesis for men's decision to participate in the labor force. This means that these factors do not affect men's decision to join the workforce, but other factors make them look for work to increase income. This study also suggests that women can be motivated to enter the labor market if their chances of finding work are improved through an active economic policy that creates jobs for both men and women.

Keywords-Labor Force Participation (LFP); Added Worker Effect (AWF); Discouraged Worker Effect (DWF); Saudi labor market

I. INTRODUCTION

Macroeconomic models have linked the unemployment rate with the Labor Force Participation (LFP) rate, and analyzing this relationship is important for formulating economic policies [1]. It is also important to distinguish the dynamics of unemployment during business cycles. LFP is related to the unemployment rate through economic activity. In periods of recession, the unemployment rate increases and the duration of the search for work increases, leading to the frustration of some job seekers and causing them to stop searching for work, leave the labor force, and, therefore, the number of unemployed seems less than the real number. This explains why the calculated unemployment rate is lower than the actual one during periods of economic recession [2]. As a result, the size of the labor force appears less than the actual, as well as the LFP rate. This effect is called the Discouraged Worker Effect (DWE), which refers to the withdrawal of workers from the labor market due to the failure of searches [3] so that the participation rate is procyclical to economic activity and countercyclical to the unemployment rate [4]. This is represented in the inverse relationship between unemployment and LFP rates. On the other hand, the increase in the unemployment rate makes some secondary workers, such as housewives and children who do not wish to work, search for work to support the income of their families, which increases the number of unemployed and the participation rate in the

labor force. This effect is called the Added Worker Effect (AWF), meaning that participation is countercyclical to economic activity or procyclical to the unemployment rate [4]. This is reflected in a direct relationship between unemployment and LFP rates, indicating that the calculated unemployment rate is always higher than the actual unemployment during economic recessions [2].

The Saudi labor market is characterized by its heavy reliance on foreign labor, especially in the private sector, as well as on the employment of citizens in the government sector, in addition to the low rate of women's participation in the labor market. This leads to a problem for policies related to labor market reforms. In recent decades, the government has adopted policies for the supply and demand sides. On the supply side, the government expanded spending on education, training, and foreign scholarships, while on the demand side, it adopted many policies, including subsidies, quotas, and market incentives to employ Saudi citizens and prohibit the recruitment of expatriate workers in some professions. The government also launched Saudization programs such as Nitaqat, which requires the private sector to employ Saudis, in addition to increasing the minimum wage in the private sector. Saudi Vision 2030 included among its most important goals an increase in women's participation in the labor force from 22% to 30% and a reduction in the unemployment rate from 12% in 2016 to 9% by 2030. Vision 2030 also aims to create most of

the new job opportunities in the private sector. One of the most significant developments in the Saudi labor market is the increase in women's participation in the labor force. It should be noted that this goal was achieved early at the end of 2020 when the rate of women participating in the labor market reached 30%. Women's LFP in Saudi Arabia increased from 14% in 1990 to 34% in 2022, while men's LFP rates were maintained at around 80% despite the decline to less than 75% in some years. Women's LFP nearly doubled in 1990-2022, while men's participation moderately declined to 74%. Reflecting shifts in labor supply behavior for both men and women, the gender gap in LFP rates decreased by 73%, from 55% to 15%. In addition, the increase in the participation of Saudi women in the labor force is due to the large increase in the number of women job seekers for the first time. The pace of women's employment in the private sector increased after the social and cultural reforms in the labor market accompanying this vision. A survey by the Saudi Statistics Authority showed that the percentage of unemployed women without previous work experience increased from 72% in the first quarter of 2021 to 81% in the fourth quarter of 2021 out of the total number of women seeking employment. The recovery in the labor market was linked to the positive growth rates witnessed by the Saudi economy, which contributed to increasing the size of the labor market, the demand for labor, and the productivity rates.

It is worth noting that as the Saudi economy is heavily dependent on oil, this vision came to diversify the economy. The growth of the oil sector is more vulnerable to shocks, which affects economic growth for a long period [5]. However, the growth in the non-oil sector is stable and mitigates negative shocks to economic growth. The Saudi economy is also distinguished by the fact that both the public and private sectors contribute to economic stability [5]. Moreover, as the largest producer and exporter of oil, Saudi Arabia is also one of the largest gas producers in the world, which enhances efforts to diversify the economy and benefit from comparative advantages [6], allowing it to achieve the goals related to reforming the labor market structure.

This study examines how economic variables of business cycles that describe the economy, such as economic activities, unemployment, and inflation rate, affect LFP rates in Saudi Arabia, specifically to ensure the existence of DWF and AWF effects on the LFP rate for men and women in the domestic labor market. The importance of this study comes from being one of the few studies that dealt with the Saudi labor market, especially after the reforms and structural changes in the labor market in line with Vision 2030. Understanding the nature of cyclical relationships between participation rates and economic variables of business cycles is important for identifying the response of the labor market to changes in the states of the economy. This study adopts the ARDL approach, which is an empirical analysis that allows exploring multiple channels of cause-and-effect relationships in complex relationships. ARDL allows direct links between participation rate, unemployment, and economic activities in Saudi Arabia. The study relies on annual time series data issued by the Saudi Authority for Statistics, the Saudi Central Bank, and the World Development Indicator (WDI), covering 1990-2022.

II. LITERATURE REVIEW

The cyclical effects on the relationship between LFP and unemployment are empirically examined under the following hypotheses: The DWF, the AWF, and the invariance of unemployment. Several studies have attempted to empirically examine both hypotheses from both micro- and macroeconomic perspectives, finding mixed results. At the macroeconomic level, DWF and AWF have been realized through some cyclical characteristics of LFP rates, specifically the relationship between LFP and unemployment rates.

The results of applied studies in different countries provide evidence to refute the hypothesis of unemployment invariance and support the presence of DWF in the aggregate, gender, or different worker groups. For example, in [7] the DWF relationship was found in Sweden, and in [8], it was shown that about a third of people who are out of the workforce are discouraged. Likewise, in [9], this finding was supported for married men and women aged 50-65 years, and in [10], the same relationship was found across the United States. This hypothesis was confirmed in African regions [11] and in wives' responses to labor supply in Turkey [12]. A DWF relationship was found only for women in a group of European countries [13], whereas evidence was found for only Polish men in [14]. In [15], it was found that the LFP rate behaved non-linearly in Poland, correlating the change with the stable value of the cyclical unemployment rate: If the unemployment rate exceeds 13%, it shows the DWF. In [16], it was suggested that there was a DWF for men in Spain, while women's AWF occurs only when the unemployment rate is below a certain threshold.

Cointegration analysis indicated a long-term relationship between unemployment and LFP, revealing the AWF in Italy [17, 18]. In [19], it was suggested that the AWF may have been responsible for the slowdown in the women's labor force in Latin America. In [20], the DWF and AWF of the women's labor force in Romania were shown. In [21], it was highlighted that there are two effects in the labor market, both of which affect the LFP rate simultaneously. However, the effect of AWF is stronger but transient, while DWF's is weaker but long-lasting. In [22], AWF was revealed for women, while DWF was confirmed for men in six Latin American countries. On the other hand, other studies obtained opposite results for Canada, finding AWF for men and DWF for women [23, 24]. Furthermore, in [25], AWF was found in young men and DWF in groups of middle-aged and older men in Japan.

In [4], it was shown that AWF prevails in most of the business cycle fluctuations in the Polish labor market for both men and women, whereas DWF prevails in the low business cycle fluctuations. In [26], it was found that the participation rate is procyclical in Australia. This study found evidence that AWF prevails in both-way shifts between unemployment and nonparticipation that contribute to higher unemployment during an economic downturn. DWF was also found to be dominant in transitions from nonparticipation to employment. In [27], the presence of both DWF and AWF in Germany was confirmed, but different age groups responded differently to temporary and permanent changes in the unemployment rate.

In [28], a significant AWF was found in terms of increased full-time employment and working hours in Australia, and a significant DWF was found for married women and the regional unemployment rate. In [29], AWF was observed for wives whose husbands had lost their jobs, increasing their LFP. Worsening unemployment has a dampening effect on wives' response to a job offer, as they tend to reduce their LFP when unemployment increases. In [1], it was observed that DWF is dominant in developed countries, while AWF is dominant in developing ones.

However, some empirical studies support the unemployment invariance hypothesis, which indicates that long-term unemployment is independent of LFP. For example, but not limited to [30, 31], it was suggested that a temporary shock may have lasting effects on the unemployment rate but not on LFP in Turkey. Furthermore, in [32], no evidence was found that high unemployment is the primary driver of low LFP among urban women in Turkey. In [33], the relationship between the unemployment rate and the LFP rate was examined in Spain, showing that there is no long-term relationship between unemployment and LFP for the total and men cases, but confirming the long-term relationship for women.

This study builds on previous studies to investigate the response of LFP to the unemployment rate using VAR models and cointegration analysis to verify the presence of long-term relationships and to analyze AWF and DWF from the total and group perspectives. The aim is to analyze the two factors separately or simultaneously. Different findings confirm that both effects exist simultaneously in the labor market, both influence LFP, and the effect refers to the decision made by workers who have not been successful in their job search to leave the labor market or reduce their LFP. Specifically, this study shows that AWF is stronger but temporary, while DWF is weaker but long-lasting. The labor participation rate is also sensitive to the labor market situation in the groups, but the effect of AWF is clearly present for women.

III. METHODOLOGY AND MODEL SPECIFICATION

The hypotheses and the econometric model of the study were established based on economic theory and previous empirical studies to clarify the structural link between the state of economic activity and the business cycle, the unemployment rate, and the LFP rate. The relation between the changes in economic activity and the unemployment rate can be expressed based on Okun's law, where changes in unemployment are determined by changes in the output. According to Okun's law, a 2% increase in GDP coincides with a 1% decrease in the unemployment rate [34]. Therefore, economic growth is an important prerequisite to addressing unemployment. In [35], the relationship between inflation and unemployment was discovered. Therefore, the government can tolerate either a low unemployment rate and a high inflation rate or a low inflation rate but a high unemployment rate [36].

Studies on the LFP rate have mostly relied on individual data using independent variables, such as family income, number of children, and educational level, in addition to wages and income from other sources. Other studies were interested in

determining the effect of the discouraged and added factors by linking the LFP rate by gender and the unemployment rate as dependent variables. Changes in the LFP rate are cyclical and there are co-adjustments between the LFP and the unemployment rates. Therefore, most short-term adjustments in the unemployment rate reflect economic situations, where it tends to decrease during economic booms and increase during economic downturns. For this reason, adjustments in the LFP rate that reflect cyclical factors tend to be correlated with the unemployment rate. In contrast, a higher LFP rate reflects structural factors that are likely to be associated with a higher unemployment rate if new entrants in the labor force take longer to find work [26]. The corresponding model is specified as follows:

$$LFP_t = a_t + \alpha U_t + \beta GDP_t + \theta INF_t + \varepsilon_t \quad (1)$$

where LFP denotes the labor force participation rate by gender, U is the unemployment rate by gender, GDP is the growth rate of real GDP, as a proxy of economic activities, INF is the inflation rate, and ε_t is an error term. This study applies the Autoregressive Distributed Lag (ARDL) testing approach, which is an empirical analysis that allows multiple channels of cause-and-effect relationships to explore complex relationships. ARDL models differ from other modeling techniques because they test effects on previously hypothesized causal relationships in addition to investigating multiple relationships of dependence and independence between variables. The ARDL model is expressed as follows:

$$\Delta LinLFP_t = \gamma_0 + \gamma_1 LinU_{t-1} + \gamma_2 LinGDP_{t-1} +$$

$$\gamma_3 LinINF_{t-1} + \sum_{i=0}^p \delta_{11} \Delta LinU_{t-i} + \sum \delta_2 \Delta LinGDP_{t-i} + \sum_{i=0}^p \delta_3 \Delta LinINF_{t-i} + \varepsilon_t \quad (2)$$

Based on the theory, the effect of unemployment is expected to be negative if the effect of the discouraged factor is stronger than the added factor. This study employs annual time series data from 1990 to 2022 for Saudi Arabia. The data are from the Saudi Central Bank, the Saudi Statistics Authority, and the World Development Indicator (WDI).

IV. DATA ANALYSIS AND INTERPRETATION

The descriptive statistics analysis of the data, as shown in Table I, indicates that the participation rate of men in the Saudi labor market averaged about 75% during the period 1991-2022. While the rate of women's LFP reached an average of 18% for the same period, its minimum rate reached approximately 14% in 1991 and increased to reach its maximum value of 34% in 2022, while the maximum was in the same year. This clearly reflects the increasing rates of LFP in the Saudi labor market for men and more for women, consistent with the goals of Vision 2030. In addition, unemployment rates averaged 4% and 13% for men and women, respectively, during the study period. These rates are low compared to other countries in the world. The unemployment rate among women reached a maximum of 22% in 2019 and decreased to 13% in 2022. Promoting female participation in the workforce is an important part of Saudi Arabia's economic and social transformation. Several reforms in the past decade have made it easier for women to enter the Saudi labor market. The results of the standard deviation of LFP rates for men and women also

indicate that they are low, indicating stability in the Saudi labor market indicators during the period 1999-2022, with a noticeable improvement as the labor market policies bear fruit in achieving the desired goals.

TABLE I. DESCRIPTIVE STATISTICS

	FLF	MLF	GGDP	UF	UM	INF
Mean	18.359	76.158	6.772	13.894	4.216	2.124
Median	17.338	76.516	6.405	14.074	3.949	1.890
Maximum	31.957	80.600	27.078	22.587	7.476	15.529
Minimum	14.501	72.035	-17.448	4.950	2.165	-19.615
Std. Dev.	3.824	2.654	11.773	6.218	1.442	8.116
Skewness	1.822	0.076	-0.131	-0.018	0.850	-0.622
Kurtosis	6.801	1.664	2.475	1.515	2.956	3.760
Jarque-Bera	34.668	2.257	0.429	2.755	3.617	2.661
Probability	0.000	0.323	0.806	0.252	0.163	0.264
Sum	550.786	2284.766	203.155	416.839	126.480	63.747
Sum Sq. Dev.	424.219	204.352	4019.714	1121.587	60.372	1910.

The variables are tested for stationarity before starting regression analysis, using Dickey-Fuller unit root tests. The results in Table II show that all the variables are nonstationary in levels with intercept. However, all variables were confirmed to be stationary after the first difference. Since ARDL does not require prior testing of variables, the stationarity test guides whether ARDL is appropriate or not, as ARDL is only applicable for the variables that are stationary of order 0 or 1. In this case, since the variables are integrated into order 1, ARDL can be applied.

The ARDL bounds-test technique was used to examine the long-term relationship between the variables in the specified model. The results of the ARDL bounds test for cointegration in Table III indicate that the calculated F-statistic is 6.66, which is higher than the upper limit. Hence, the null hypothesis of no cointegration is rejected at all levels of significance. The bounds test shows that the variables in the specified model are cointegrated, showing that there is a long-run relationship between the LFP rate and the key variables in the model.

TABLE II. AUGMENTED DICKEY-FULLER UNIT ROOT TEST

Variable	Level		1 st difference		Order of integration
	Intercept	Trend and Intercept	Intercept	Trend and Intercept	
GDP	-4.340	-4.263*	-6.213*	-6.142*	I(0) (1)
FLF	2.267	2.811	-4.730*	-5.502*	I (1)
MLF	-0.826	-1.688	-3.888*	-4.878*	I (1)
UM	-2.960	-4.041*	-4.740*	-4.990*	I(0) I (1)
UF	-2.596	3.009	-3.679	-4.394*	I(1)
INF	-4.607	-4.505*	-5.484*	-5.751*	I(0) I (1)

TABLE III. RESULTS OF F-BOUNDS TEST

Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	6.663	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

The ECM coefficient is -0.656, as shown in Table IV, which is negative, and its statistical significance indicates that the imbalance from the previous year's shock will be adjusted

in the current period, i.e. in less than a year. This means that women's LFP rate in the Saudi Labor Market adjusts to its equilibrium due to fluctuations in cyclical factors, and there is a coadjustment between the participation rate and the unemployment rate. Therefore, most of the short-term adjustments in the unemployment rate reflect fluctuations in business cycles, which means that there is a long-term relationship between all variables under study. However, the short-term test results show that the relationship between women's LFP and unemployment rates was statistically insignificant.

TABLE IV. ARDL (2, 2, 2, 2)

Variable	Coefficient	Std. error	t-Statistic	Prob.
D(FLF(-1))	1.177015	0.192739	6.106779	0.0000
D(UF)	-0.295166	0.212110	-1.391570	0.1831
D(UF(-1))	-0.215056	0.256413	-0.838708	0.4140
D(NGDP)	-0.099175	0.051414	-1.928943	0.0717
D(NGDP(-1))	0.129390	0.050252	2.574841	0.0204
D(INF)	0.135693	0.073665	1.842019	0.0841
D(INF(-1))	-0.193392	0.069489	-2.783063	0.0133
CoIntEq(-1)*	-0.655814	0.196965	-3.329603	0.0042
R ²	0.637863	Mean dependent var	0.623429	
Adjusted R ²	0.511115	S.D. dependent var	1.400385	

The results in Table V indicate that there is a direct and statistically significant long-term relationship between the unemployment rate and the LFP of females in the labor force. This is shown by the high value of the estimated coefficient, which is 0.425. This confirms the presence of the effect of the added factor. The results are consistent with studies that have shown a long-term relationship between unemployment and LFP and have revealed the added factor effects, such as [21, 22] in Latin America. On the other hand, the studies in [23, 24] obtained the opposite results for Canada.

The effect of the economic growth rate (real GDP growth) as an indicator of economic activity was negative and statistically significant, indicating that the rate of women's LFP in the labor force is the opposite of the economic cycle regarding the GDP. The inflation rate also has a stimulating effect on the increasing number of women entering the labor market, meaning that the increase in the general level of prices makes them join the labor force and search for work. However, in the short term, the effect of these factors was unclear, as the statistical results were insignificant. These results are consistent with [37], which showed the importance of economic, not social, factors in influencing the decision of women to join the Saudi labor market.

TABLE V. ARDL LONG RUN TEST

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UF	0.425415	0.025191	16.88785	0.0000
NGDP	-0.374970	0.069857	-5.367703	0.0007
INF	0.556936	0.115571	4.819010	0.0013
C	14.50860	0.349761	41.48146	0.0000

Regarding the men's participation rate in the labor force, these factors, namely unemployment, economic growth, and inflation rates, did not have any effect on their decision to participate in the labor force. There is no statistical evidence of

a relationship between the LFP rate of men and their unemployment rate, suggesting that changes in the unemployment rate do not change their decisions about LFP. Thus, there appears to be no evidence of AWF or DWF for men. This can be explained by the fact that men do not leave the labor force when they become unemployed or because they feel frustrated when they fail to find a job, as they are the primary workers in the family [23]. This means that men's decision to participate and search for work is affected by other factors, which may be due to their responsibility for spending on their family, unlike women who are not responsible for spending.

V. CONCLUSIONS AND POLICY RECOMMENDATIONS

The clear features of the Saudi labor market are the prevailing decline in unemployment rates and the increase in women's LFP in recent years. This study explored the cyclical effects on the LFP rate for men and women in the Saudi labor market based on time series data for the period 1991-2022. The short- and long-term relationship between unemployment rates and LFP was investigated by applying ARDL. The findings showed that there is no long-term relationship between unemployment and LFP rates for men. Thus, the analysis suggests that men's LFP rates are not associated with the unemployment rate, which leads to the conclusion that there is an unemployment invariance hypothesis for them. However, the results showed the presence of a cointegration relationship between the unemployment rate and the women's LFP rate. This indicates that there is evidence that women's participation is related to the unemployment rate. The ARDL results showed that the unemployment rate has a statistically significant direct effect on women's LFP rate. Based on these results, the study believes that there is an AWF for women in the Saudi labor market. The women's LFP rate was procyclical with the unemployment rate and countercyclical with GDP.

The presence of AWF on women in the Saudi labor market leads to some recommendations. New entry into the labor market during economic recessions can lead to increased unemployment among women if the job seeker does not find the right job. Also, the decline in women's participation in the labor market occurs during economic booms, when it is easy to find a job, indicating that it cannot be attributed to discouragement but to other social factors. Therefore, policy measures should focus on motivating women to stay and continue in the labor market permanently.

To increase employment and reduce unemployment, which affects LFP, it is necessary to adopt demand- and supply-side policies simultaneously, as the dynamics of LFP are linked to economic and social structural factors, as well as to cyclical effects related to employment. Demand-side policies can reduce recession-induced unemployment, while supply-side policies can reduce structural unemployment. These policies should focus on the causes of unemployment and gender LFP. Since there is a close relationship between economic growth and unemployment, reducing unemployment rates requires achieving economic growth rates, especially in non-oil sectors. Previous studies in Saudi Arabia showed the importance of bank credit [38, 39], the insurance sector [40, 41], the financial

system in general [42], and the construction sector [43], in addition to the retail and wholesale trade sector [44]. On the other hand, in [45], the need for new effective skills was emphasized in overcoming the challenges of rapid technological changes and bridging the gap between supply and demand for skills arising from changes in the Saudi labor market. Further research into a deeper disaggregation of age and gender could shed light on the characteristics of economic and social influences.

However, this study suffers from some limitations that should be mentioned compared to previous relevant empirical literature. As the empirical analysis was carried out using macroeconomic data, due to the unavailability of microdata, future studies should utilize relevant microdata and economic and social characteristics, including gender, age group, education, wage, and income from sources other than labor, to obtain further conclusions about the dynamics of the Saudi labor market.

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