

# Unveiling the Interplay of Okun's Law and Gender Dynamics in the Middle East and North Africa Region

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**Abstract:** The unemployment rate in the Middle East and North African countries (MENA) is considered one of the highest among other regions, particularly among females. It is already known that the unemployment rate harms the GDP of many countries. However, it is unclear how the male/female unemployment rate affects GDP in MENA countries. Therefore, this study aimed to investigate the impact of the male/female unemployment rate on GDP in MENA countries based on Okun's law. The study used the World Bank's secondary data for total unemployment, female/male unemployment, gross domestic product, gross domestic product per capita, countries' total consumption, imports, and exports. Moreover, the study estimated Okun's law using the simple and multiple OLS regression statistical analysis on panel data for the time series period between 2011 and 2020. Results suggest that unemployment rates negatively affect the GDP of MENA countries, where female unemployment has a higher impact on GDP than male unemployment due to the high rate of female unemployment in the region. One percent increase in the female unemployment rate reduces the GDP and GDP per capita significantly more than the total and male unemployment rates. Such results support the findings by the OECD that MENA countries are expected to continue losing billions of dollars per year if they do not take gender equality into greater consideration. This could imply that females have a significant role in boosting economic productivity in MENA countries. The results of this study could provide insight into the use of Okun's law to estimate the relationship between the unemployment rate and GDP in MENA countries, particularly as it relates to policy recommendations.

**Keywords:** Female Unemployment, MENA, MENA Unemployment, Okun's law, Unemployment

## 1. Introduction

Gross domestic product (GDP) is a crucial indicator that measures the quality and performance of a country's economy. GDP represents the total value of all goods and services produced over a specific period and shows a country's production and growth. Economic variables such as unemployment, import and export of goods and services, and government spending influence GDP, with studies suggesting that the higher the unemployment rate, the lower a country's GDP and economic growth[1]. An increase in unemployment indicates an unproductive economy, and increased import activities at the expense of the exports of goods and services can distort a country's balance of trade, devalue its currency, lower its GDP, and vice versa[2]. Furthermore, government spending on infrastructure, education, health, social welfare, labor productivity, and the macro-micro economy has encouraged GDP growth, a dynamic

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economy, and lower unemployment rates[3][4].

The relationship between unemployment and GDP has also been encapsulated by Okun's law [5]. Based on U.S. data, Okun found that a one percent increase in the unemployment rate results in GDP falling by three percent[5]. Okun's law has been helpful for policymakers in reducing unemployment and improving GDP[6]. The one percent unemployment rate increase to three percent GDP decrease rule has evolved over time to fit the current economic status and employment trends. The objective of Okun's Law is to observe the relationship between the unemployment rate and losses in a country's productivity. Suggests that there is an inverse relationship between unemployment and GDP growth.

For the MENA countries, unemployment has been a recurring problem[7]. Unemployment rates in the region are considered among the highest in the world and influence respective national GDPs. This may be attributed to insufficient structural reforms, low export activities, low government spending, increased birth rates, and low, unclear human resource development strategies. Unemployment has major social and economic negative consequences, such as increased depression and crime rates, lower economic productivity and consumption, and a loss of skills[8]. Moreover, it generates excessive inflation, resulting in rising living costs and hardship for people[9].

To date, there is a lack of studies examining unemployment and GDP in the MENA countries using data after 2015. Previous studies have shown that the relationship between male/female unemployment and GDP fluctuates and varies based on the period of analysis[10]. Moreover, the MENA countries have experienced enormous economic, social, and political change and a rapid increase in population over the last few years, thus adding to regional uncertainty. Given the relative lack of studies utilizing more recent data and consideration of factors such as gender imbalance on unemployment rates and GDP, there is a need for a more in-depth investigation of the MENA countries. Consequently, this study could provide further insight into the use of Okun's law to estimate the relationship between unemployment and GDP to help determine whether or not the unemployment rate affects GDP and, uniquely, whether gender matters in MENA countries. In line with this, the study aimed to investigate the impact of the male/female unemployment rate on GDP in MENA countries based on Okun's law concept.

## 2. Literature Review

Based on Okun's law, an increase in the unemployment rate by 1 % will result in a 3 % decrease in the GDP[5]. Okun's law has been used in studies for various countries, including G7 countries[11], OECD countries[12], India[13], and South Africa[14]. The common feature among these studies is that the relationship between growth and unemployment has a permanent and stable character and confirms that Okun's law is generally valid despite regional differences.

### 2.1 MENA Countries' GDP and Unemployment Rate

In the MENA countries, the GDP of many countries has been dependent on extractive industries. While this has changed gradually towards manufacturing industries[15], further work is needed to promote manufacturing industrial sectors. More importantly, both the extractive and manufacturing industries have not been able to solve the increase in unemployment rates in MENA countries[15]. Unemployment rates and GDP vary from one MENA country to another. The World Bank statistics on unemployment in the MENA region showed that the average unemployment rate was 10.9% in 2021, with the highest at 28.4% (Djibouti) and the lowest at 0.3% (Qatar). Moreover, there was wide variation in GDP across the region, with Saudi Arabia exhibiting the highest GDP at US\$ 700.12 billion and Djibouti recording the lowest at just US\$ 3.38 billion. Such variations among MENA countries encourage selective analysis and collective findings on the relationship between the unemployment rate and GDP[15][16].

The MENA region is characterized by higher female unemployment than male unemployment. Female unemployment represented 19.2% in 2020, whereas male unemployment was 8.4%[17]. As a result, there is a noticeable gender gap regarding job market participation. The level of female employment is the lowest among other regions. Even with improvements in the education system, a reduction in the education gender gap, and a rapid increase in the number of educated females, employment rates are stagnant or declining. This is also called the “MENA paradox” phenomenon[18]. Specifically, it has been argued that concentrating on educational attainment without considering sociocultural barriers will not help achieve female economic empowerment[19].

## 2.2 Sociocultural and Political Aspects and Unemployment

Underlying the MENA paradox are social norms, cultural constraints, and political instability, which contribute to gender inequality in job markets and lower percentages of female labor force participation [18][19]. Although there have been rapid changes and developments in the MENA countries, many countries' values and norms are still based on gender roles, which define gender behavior expectations, gender relations, and what is a suitable role for females and males[20]. As such, this can hinder females' participation and capability to influence and contribute to a country's development and growth[21]. Furthermore, marital status may also affect decisions to enter the job market. Unmarried female employment is higher than married females in the MENA region[22][23], with married females less likely to join the workforce than unmarried females[22][24]. Studies showed that females often quit their jobs after getting married to focus on childrearing and taking care of the home[22]. Married women prefer to work in the public sector rather than the private sector[22], because of more flexible work time and parental leave[18][25]. This phenomenon can also be seen across the globe, as studies have cited that regardless of females' employment status, females spend more time raising children and taking care of household responsibilities than their male counterparts in many countries[25-27]

Moreover, political instability and civil war in some MENA countries also negatively affect female labor force rates. Conflicts, insecurity, and violence often lead to the permeation of conservative norms, which discourage females from employment and increase their household responsibilities as the outside environment becomes unsafe for them[28-33]. Furthermore, areas under violent militia groups sharply decrease the visibility of females outside of the household[28][34][35]. Such socio-cultural constraints and political instability could further increase the female unemployment rate and could have a negative impact on the GDP of some MENA countries.

In the MENA countries, several countries have adopted social development goals and new policies to address the gender gap in the job market. Saudi Arabia, for example, has made significant changes to encourage females to join the labor force. These policies include female empowerment in the aspects of labor market, gender equality, and education[36]. Currently, professional fields that were once limited to males are now accessible to females, such as the aviation industry, sales and retail positions, as well as stage acting[36]. Based on recent data, Saudi Arabia has achieved the highest growth rate of females joining the workforce among G20 countries over the past 20 years. Specifically, there was a 7 percentage point increase in female workforce participation rates to 23 % in 2018, with more recent data suggesting that this has increased further to 29 % in 2020[37]. In a recent report, the World Bank[38] stated that Saudi Arabia ranked as the highest reformer and improver by significantly improving gender equality. But despite these advancements, the broad data suggests challenges in addressing female unemployment. To test whether or not the unemployment rate affects GDP and, uniquely, whether gender matters, the next section outlines data and methods for the investigation.

### 3. Research Methodology

#### 3.1 Okun's Law and Econometric Estimation Methodology

To find the effect of unemployment and the gender gap on GDP, the quantitative methodology in this study focused on panel data to estimate Okun's law for the MENA countries. Qatar, Malta, and Djibouti were excluded due to data unavailability. By using an annual time series, the relationship between total, female, and male unemployment and the growth rate of GDP between the period from 2011 to 2020 has been analyzed. The World Bank's secondary data was collected for the analysis.

There are several versions of Okun's law, such as the gap, difference, and dynamic. This study used the difference version of Okun's law as it captures the change in unemployment with the change in output growth over time[39]. Several studies have applied difference version of Okun's law, with results found to be valid[40]. Specifically, they test the effect of unemployment on GDP and then compare it with imports, exports, total consumption, and population to identify its significance.

For this analysis, multiple regression and panel data between 2011 and 2020 were used to determine the relationship between unemployment and GDP in MENA countries. The World Bank's secondary data was used for various dependent and independent variables.

##### 3.1.1 Dependent and Independent Variables

The dependent variables were gross domestic product rate (GDP) and gross domestic product rate per capita (GDPPC), both being constant in the 2015 US dollar. The independent variables included the unemployment rate, male unemployment rate, female unemployment rate, import and export, and population.

##### 3.1.2 Regression Model

It was formulated as follows:

$$\Delta y_{it} = \alpha + \beta * X1_{it} + \beta * X2_{it} + \beta * X3_{it} + \beta * X4_{it} + \beta * X5_{it} + u_{it} \quad u \sim i. i. d. N(0, \sigma^2) \quad (1)$$

where  $\Delta y_{it}$  stands for the real growth of MENA countries.  $X1_{it}$  represents the rate of unemployment for the MENA countries,  $X2_{it}$  stands for the import rate,  $X3_{it}$  indicates the export rate,  $X4_{it}$  stands for the total consumption,  $X5_{it}$  indicates population. where  $i$  is the individual dimension ( $i=1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17$ ) and  $t$  is the time dimension ( $t=2011, 2012, 2019, 2020$ ).

In line with Okun's Law, two hypotheses were tested in this study: (1) the total unemployment rate negatively affects the GDP rate, and (2) female unemployment has higher negative effects on GDP than male unemployment.

As has been noted in MENA countries, the percentage of female unemployment is higher than male unemployment[17].

#### 3.2 Data Collection

This study utilized panel data from 17 countries in the MENA region over 10 years, between 2011 and 2020. The empirical analysis was based on data collected from the World Bank on MENA countries' total unemployment, female and male unemployment, GDP, GDP per capita, imports, exports, total consumption of government and households, and population. All variables were log-transformed to unify units, and all independent variables were lagged to avoid endogeneity issues, with White's robust standard errors to correct heteroskedasticity and have the best unbiased linear estimation (see [Table 1]).

### 3.3 Data Validation

Data validation involves guaranteeing data quality, while data migration is a pivotal process that directly impacts the quality of data management[41]. The data were collected from an authoritative resource, the World Bank. Moreover, to ensure the validity of the data analysis, countries with missing data have not been included in this study, such as Qatar, Malta, and Djibouti. All of Okun's law versions are valid[39][40]. In this study, the different version of Okun's law was used to detect the changes in unemployment with the changes in output growth over time[39].

[Table 1] Unemployment Rate Trends: MENA Region (2011–2020)

Variables	Obs	Mean	Std	Min	Max
GDP (constant 2015 US\$) (log)	177	1.73763E+11	1.68953E+11	12146400000	6.78581E+11
GDP per capita (constant 2015 US\$) (log)	177	12288.56377	11907.95926	891.0959626	40438.33852
Unemployment (log)(lag)	180	9.419152919	5.551248289	1.180999994	26.26000023
Unemployment, male (% of male labor force) (modeled ILO estimate) (log)(lag)	180	7.745382362	5.066017817	0.462000012	22.45400047
Unemployment, female (% of female labor force) (modeled ILO estimate) (log)(lag)	180	16.84220593	8.645123868	3.460999966	42.81100082
Imports of goods and services (constant 2015 US\$) (log)(lag)	171	65885260512	70144333388	5935478390	3.23273E+11
Exports of goods and services (constant 2015 US\$) (log)(lag)	171	65778701543	85610504921	1138982095	4.06018E+11
Total consumption (log)(lag)	173	1.22786E+11	1.17665E+11	23807586	4.63368E+11
Households and NPISHs Final consumption expenditure (constant 2015 US\$) (log)(lag)	173	89919552300	84415714534	23807586	3.23837E+11
General government final consumption expenditure (constant 2015 US\$) (log)(lag)	164	34670051406	40422171347	2371367640	1.99803E+11
Population, total (log)(lag)	180	24649920.66	25220832	1278153	102334403

## 4. Results and Discussion

The pooled simple OLS regression was conducted between unemployment and GDP rates. The results showed that total, male, and female unemployment rates have a negative impact on GDP rate and a significant relationship with GDP growth in MENA countries. It also found that a 1 % increase in total, male, and female unemployment rates reduced GDP by  $-0.267\%$ ,  $-0.191\%$ , and  $-0.276\%$ , respectively ([Table 2] and [Fig. 1]). Consequently, an increase in the female unemployment rate reduced GDP more than an increase in male unemployment rates. Such results might imply that the relationship between unemployment and GDP growth has a permanent and stable character, regardless of varieties in the level of unemployment and GDP growth in different countries[12][13]. This agrees with the reported negative relationship between unemployment and GDP growth in Malaysia, with Okun's coefficient of  $-1.75$ [42].

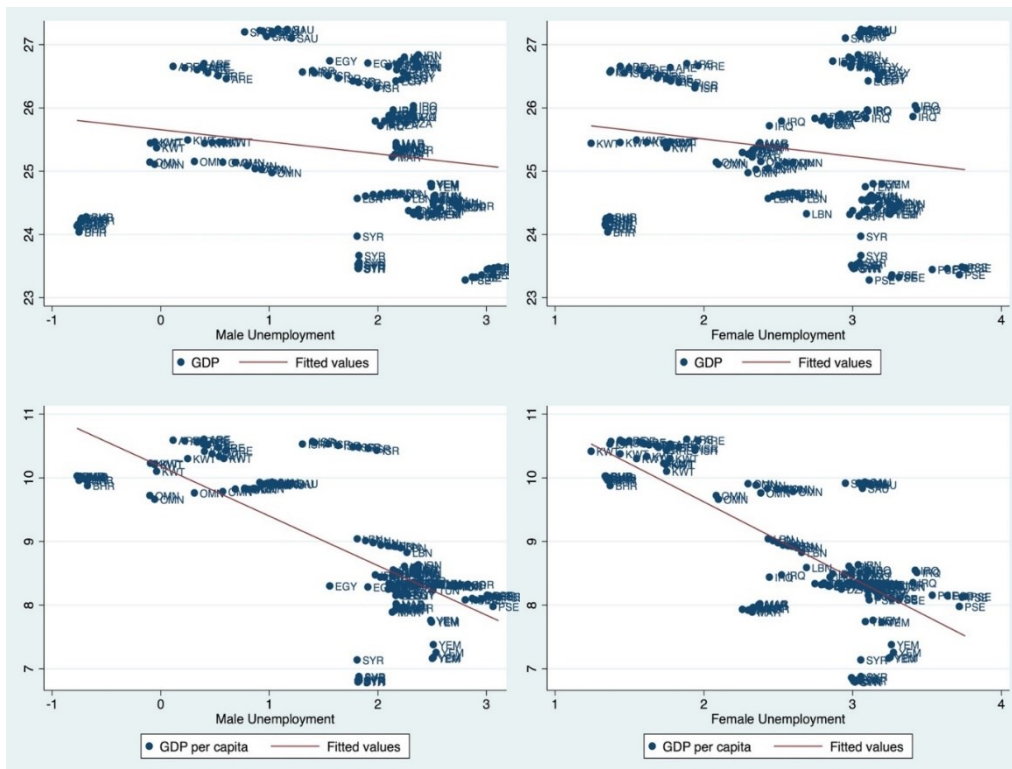
In addition, the pooled simple regression between unemployment rates and GDP per capita showed that total, male, and female unemployment rates significantly negatively impact GDP per capita growth. Specifically, 1 % increases in total, male, and female unemployment rates reduced GDP per capita by  $-1.016\%$ ,  $-0.779\%$ , and  $-1.200\%$ , respectively [Table 2]. Therefore, the first hypothesis is confirmed, as findings suggest that the unemployment rate has a negative effect on the GDP rate. However, the effect of the female unemployment rate on GDP is negative and higher than the male unemployment rate. This might be related to the fact that female unemployment rates are higher than male unemployment rates. According to the World Bank[17], the female unemployment rate in 2020 was 19.2%, and the male unemployment rate was 8.4%. As mentioned earlier, such a high rate of unemployment among females may be due to cumulative legal and social barriers that prevent females' access to the labor market in the MENA countries. Moreover, 56% of females are not internet users in MENA countries, which worsens gender-skewed unemployment rates[43]. One-half of the 84 million female population in the MENA countries are not connected online and do not have a smart device[44]. Such reports might explain the higher impact of female unemployment than male unemployment on the

GDP of the MENA countries. As such, gender labor market inequality is a critical challenge facing the region.

[Table 2] OLS Analysis Estimation

	GDP (log)						GDP per capita (log)					
	Total		Male		Female		Total		Male		Female	
	Basic	Full	Basic	Full	Basic	Full	Basic	Full	Basic	Full	Basic	Full
Unemployment (log)(lag)	-0.267**	-0.024	-0.191*	-0.009	-0.276*	-0.063	-1.016***	-0.023	-0.779***	-0.009	-1.200***	-0.060
	(0.123)	(0.038)	(0.101)	(0.031)	(0.145)	(0.054)	(0.054)	(0.038)	(0.046)	(0.031)	(0.066)	(0.055)
Import (log)(lag)		0.496***		0.499***		0.498***		0.498***		0.501***		0.501***
		(0.128)		(0.129)		(0.126)		(0.128)		(0.129)		(0.127)
Export (log)(lag)		0.309***		0.311***		0.298***		0.307***		0.310***		0.298***
		(0.077)		(0.078)		(0.077)		(0.077)		(0.078)		(0.077)
Total consumption (log)(lag)		0.005		0.004		0.005		0.005		0.004		0.005
		(0.016)		(0.017)		(0.016)		(0.016)		(0.017)		(0.016)
Population (log)(lag)		0.314***		0.308***		0.327***		-0.679***		-0.686***		-0.667***
		(0.035)		(0.035)		(0.034)		(0.035)		(0.035)		(0.035)
Constant	25.863***	0.457	25.656***	0.391	26.060***	0.548	10.880***	0.450	10.178***	0.388	12.022***	0.534
	(0.260)	(0.798)	(0.197)	(0.804)	(0.368)	(0.783)	(0.125)	(0.800)	(0.104)	(0.806)	(0.167)	(0.785)

Note: \*\*\*, \*\*, \* at 1%,5%,10% significance, respectively. Basic models are the result of the simple regression of the dependent variable (GDP, GDP per capita) on the total, male and female un-employment, and the full models are the result of the multilabel regression of the dependent variable (GDP, GDP per capita) on all the independent variables. White robust corrected standards errors in parenthesis, variables with (log) are log-transformed, and (lag) is lagged one year in empirical analysis to avoid endogeneity issues.



[Fig. 1] Influence of Male vs. Female Unemployment

The 1% increase in the female unemployment rate has a higher effect on GDP growth than the male unemployment rate, as it decreases the GDP rate by  $-0.276\%$ , whereas it reduces by  $-0.191\%$  due to the increase in male unemployment. As such, the second hypothesis is confirmed – that female

unemployment has a negative effect on the GDP. According to the OECD[45], 68% of the labor population in MENA countries work in the informal sector due to limited job opportunities in the public and private sectors. This can be problematic as the informal sector economy does not provide stable or sufficient income. In contrast, formal jobs for females are reported to have a positive and significant impact on economic growth and consequently provide a great contribution to the GDP[46]. Moreover, the negative impact of female unemployment on GDP growth in MENA countries may be because females live longer lives but are in worse health conditions than males[47]. In addition, marital status in MENA countries can also influence female participation in the labor market, where unmarried females are more likely to be employed than married females. However, once females get married, they often resign from their jobs due to pervasive gender roles. Moreover, educated and married females prefer working in the public stable sectors, such as administration and education, due to more flexible work times and parental leave[22]. Such issues would help further explain the abnormal relationship between the unemployment rate and GDP growth in the MENA countries.

Although females in the MENA region represent 48.2% of the population and 18% labor force, female employment is among the lowest worldwide[37]. Moreover, although access to education in the MENA countries among females aged between 15 to 24 increased significantly from 46% in 1974 to 92% in 2017[37], the percentage of females in the job market is still low. This could further impact GDP levels in the MENA countries. The empirical results suggest that female and male unemployment has different effects on the GDP of MENA countries. Specifically, female unemployment has a higher negative long-term effect on GDP than male unemployment. Such results support findings by the OECD[48] that MENA countries are expected to continue losing billions of dollars per year if they do not take gender equality into greater consideration. Based on these estimates, increasing female participation in the labor force to the same level as males can boost global GDP by 26% in 2025[48]. As such, it is imperative that MENA countries consider female contributions to the economy – at the very least, in light of women's critical role in boosting economic productivity.

On the other hand, the MENA region's economies mostly depend on extractive industries for many years more than the manufacturing industries[15]. As extractive industries alone might not be enough to create more female jobs, reduce unemployment, and further increase GDP, policymakers should consider promoting manufacturing and alternative industries to further promote GDP growth and decrease the unemployment rate. This should also include provisions to encourage female employment in the workforce.

## 5. Conclusions

This study aimed to investigate the impact of the male/female unemployment rate on GDP in MENA countries based on Okun's law concept. The study showed that Okun's law can be used to estimate the relationship and impact of unemployment on the GDP rate in the MENA region. The pooled OLS regression results support such an assumption, as total, male, and female unemployment rates have a negative impact on the GDP rate and have a significant negative relationship with GDP growth. Specifically, the results suggest a 1% increase in total, male, and female unemployment rates reduce GDP by  $-0.267\%$ ,  $-0.191\%$ , and  $-0.276\%$ , respectively. It is already reported that job creation is connected with economic growth in the short run and unemployment rates are associated with economic growth in the long run in some MENA countries[1].

Moreover, the 1% increase in the female unemployment rate negatively affects GDP growth more than the male unemployment rate. Consequently, the unemployment of males and females impacts economic growth differently. This might be related to the fact that the female unemployment rate (19.2%) is higher than the male unemployment rate (8.4%)[17]. Such a high unemployment rate among females is linked with cumulative legal, social barriers, and political instability[18][19]. Furthermore,

although females in the MENA region represent 48.2% of the population and 92% have access to education, female employment is among the lowest worldwide[37]. This could further impact GDP levels across the MENA region. As gender inequality in the labor market is a crucial challenge facing MENA countries, this study's findings may provide further impetus for policymakers to better understand the impact of the female unemployment rate on GDP and encourage greater female participation in the labor force going forward to the benefit of the region. Policymakers in the MENA countries may need to look for options, such as offering tax incentives, to encourage companies to employ more females in full-time, part-time, and temporary jobs; integrating education qualifications into the labor market; encouraging and offering contentious professional development to match the labor market flexibility and changeability; and offering guidance and counseling as an element for employment strategy.

### 5.1 Study Limitations and Future Work

In the future, additional research can help address some of the limitations of this study – specifically with respect to the impact of government spending, corruption rates, and population aging as potential variables. Moreover, as this analysis did not evaluate labor market policies and the impact of extractive and manufacturing industries on the GDP of the MENA countries, further studies can help uncover the potential role of these factors in influencing Okun's law estimation. In addition, while this study aimed to provide a broad overview of the MENA region, GDP variations among MENA countries and the relationship between the female unemployment rate and public, private, and informal sector employment distribution may also influence Okun's law estimation. A more detailed analysis of these issues may further this paper's findings and aid in effective policy formulation.

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