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The demographical and economic factors affecting female labor force participation in Saudi Arabia

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Abstract: The female labor force participation holds significant implications for various aspects of society, the economy, and individual lives. Understanding its significance involves recognizing the multifaceted impact of women's participation in the workforce. In this context, the current study investigates the factors influencing the female labor force participation rate in Saudi Arabia while using a set of independent variables such as GDP growth, employment-to-population ratio, inflation, urban population growth, tertiary school enrollment, labor force with advanced education, fertility rate, and age dependency ratio, covering a period from 2000 to 2022. The results reveal that the employment-to-population ratio, inflation rate, urbanization, and age dependency ratio have positive and statistically significant impacts on the female labor force participation rate. This research offers valuable insights for formulating policies to foster female empowerment and overcome the obstacles that hinder their economic participation.

Keywords: female; labor force; demographic; economic; Saudi Arabia

1. Introduction

The active participation of women in the labor force is essential for fostering economic growth, innovation, and social progress. In this context, a comprehensive comprehension of the determinants shaping female labor force participation assumes paramount significance for policymakers and stakeholders endeavoring to cultivate a society characterized by inclusivity and prosperity (Klasen, 2019).

The factors contributing to the low level of female labor force participation in Saudi Arabia are attributed to various elements, including challenges related to childcare, women's lower educational attainment, prevailing conditions in the labor market, limited availability of part-time employment opportunities, deficiencies in legislation concerning women's employment, and the gradual transformation of traditional norms associated with women's participation in the workforce. Over the past few years, there has been a notable surge in women's involvement in the private sector in Saudi Arabia. This change is driven by a blend of factors, including proactive government initiatives promoting women's economic empowerment, an upward trend in educational achievements among Saudi women, and a growing need for female labor in the private sector. Consequently, between late 2018 and the end of 2022, the participation rate of Saudi women in the labor force has experienced an upward trajectory, increasing from 20 percent to 35 percent (World Bank, 2023).

This paper seeks to examine the demographic, economic, educational, and social determinants influencing female labor force participation in Saudi Arabia. The investigation incorporates economic development indicators such as GDP growth, employment-to-population ratio, inflation, and urban population growth. Furthermore,

the study considers educational factors, encompassing the literacy rate, school enrollment, tertiary education, and the engagement of females in the labor force with advanced educational qualifications. Besides, this investigation encompasses social factors, specifically examining variables such as the fertility rate and age dependency ratio in its analysis of the factors influencing female labor force participation in Saudi Arabia. By conducting a comprehensive analysis of demographical, economic, educational, and social factors, this research endeavors to offer a holistic understanding of the influences on female labor force participation in Saudi Arabia. The study's outcomes are anticipated to contribute to evidence-based policymaking, providing insights that can guide strategies aimed at enhancing women's economic empowerment and advancing gender equality within the labor market.

Despite ongoing initiatives to increase female workforce participation, Saudi Arabia continues to encounter challenges in achieving elevated levels of women's engagement in the labor force. Therefore, this research aims to shed light on the barriers and opportunities confronting women in their access to and sustained presence in the labor market. Ultimately, the findings will inform evidence-based policies and interventions geared towards promoting women's economic empowerment and fostering gender equality within the labor force.

The remainder of the paper is structured as follows: Section 2 delves into the related literature, providing a review of relevant studies and scholarly work. Following this, Section 3 outlines the data sources and the model utilized for the research. Section 4 conducts an in-depth analysis of the estimated results. Finally, Section 5 encapsulates the paper by summarizing the key findings and presenting conclusive remarks derived from the research.

2. Literature review

In accordance with labor-leisure theory, the labor participation rate is examined in conjunction with both the anticipated market wage and the value that women attribute to the time dedicated to household tasks. In contrast, neoclassical theory posits that labor supply represents the decision-making process between engaging in work and leisure, constituting an increasing function of the real wage. Furthermore, labor demand is contingent upon the real wage, and neoclassical theory operates under the assumption of a competitive free market. Conversely, labor-seeking theory contends that neither employees nor firms possess complete information about the labor market. This theory acknowledges the opportunity cost associated with sacrificing leisure time to acquire information and accepts the existence of both unemployed individuals and vacant job positions corresponding to these individuals (Altuzarra et al., 2019; Korkmaz and Korkut, 2012).

A multitude of scholarly investigations have assessed the theoretical dimensions pertaining to the effects of demographical, economic, educational, and social factors on the global landscape of female labor force participation. In their examination of economic factors, Niemi and Lloyd (1981) examined the impact of inflation on the patterns of women's labor supply. In the preliminary phase, the researchers presented empirical results that depicted changes in the labor force participation rates across different age groups of women and the study revealed positive and statistically

significant coefficients associated with the Consumer Price Index (CPI) for both young and prime-age women, representing the most salient findings. Whereas Boserup (1970), Goldin (1995), Horton (1996) and Mammen and Paxson (2000) have identified the existence of U-shaped relationships between female labor force participation rates and per capita income on a global scale. Thevenon (2013) investigated the determinants of female labor supply across 18 OECD countries during the period from 1980 to 2007. The study assessed the impact of labor market and policy characteristics on female labor force participation. Labor market characteristics, including the share of employment in services and the public sector, the proportion of part-time jobs, employment protection legislation stringency measured by the OECD indicator, and unemployment rates were considered. Policy characteristics, such as paid leave, childcare services for children under the age of three, and financial incentives to work, were also analyzed. The findings revealed that the growth of employment in the services sector and the increasing prevalence of part-time work positively influenced female employment. When full-time employment served as the dependent variable, the expansion of the service sector was correlated with increased full-time employment. However, in models with part-time employment as the dependent variable, the correlation was less evident. The impact of the public sector on female labor force participation was unclear, as employment protection varied across countries. Educational attainment, measured by the average number of years spent in education, was identified as a crucial factor, with each additional year decreasing the likelihood of full-time employment due to the availability of high-wage jobs. Considering policy characteristics, the study found that an increase in spending on leave was associated with decreased female labor force participation. Furthermore, a positive correlation was observed between the provision of childcare services and both full-time and part-time female labor force participation (Attanasio et al., 2008; Jaumotte, 2004).

Taking a local viewpoint, Naseem and Dhruva (2017) highlighted the substantial role of female labor force participation (FLFP) in the Saudi labor market and economic development during the last fifty years. Their study posits that the unemployment rate, fertility rate, and urban population are the primary factors influencing the female labor force participation rate in the Kingdom of Saudi Arabia. Their study also posits that cultural norms and legal restrictions, particularly those related to female mobility and employment, may serve as potential factors imposing significant costs for employing women. Consequently, this makes Saudi men and expatriate workers appear as more cost-effective alternatives. This phenomenon represents a failure on the demand side of the labor market, where the effective cost of hiring women surpasses their wage rate, creating a “cost wedge”. This cost disparity lowers employment opportunities for women, leading to a reduction in the overall number of women being employed. Furthermore, women encounter additional challenges in the workforce. The prevailing culture surrounding the guardianship of women poses a significant obstacle. Transportation to and from work tends to be more expensive for female employees. Traditional workplaces were not originally structured to accommodate women, particularly in the private sector, discouraging female candidates from applying. Additionally, adapting workplaces to accommodate women often requires companies to make substantial investments in separate facilities, a financial burden not all

companies can afford (Naseem and Dhruva, 2017).

Moreover, Agboola (2021) conducted a study aiming to explore the correlation between the female labor force participation rate, female tertiary school enrollment, female life expectancy, and per capita income in Saudi Arabia. The research spanned the years from 1991 to 2017, employing traditional unit root tests such as Augmented Dickey-Fuller (ADF), Phillips-Peron (PP), and Kwiatkowski-Phillips-Schmidt-Shin (KPSS), alongside the Zivot and Andrews (ZA) test. The findings indicated that all independent variables exhibited a positive and significant impact on the female labor force participation rate in Saudi Arabia. Consequently, the study suggests that investing in female education, the healthcare sector, and fostering economic growth are essential strategies to enhance female labor force participation in the country. However, Thaddeus et al. (2021) conducted a study to investigate the long-term impact of FLF (female labor force) on economic growth in sub-Saharan Africa. The results suggest that there is a causal relationship between economic growth and female labor force, and the direction of causality is unidirectional, running from economic growth to female labor force. The study found that female labor force participation rate has a negative and significant impact on economic growth (GDP) in sub-Saharan Africa in the long run, making it a liability. However, in the short run, the contribution was insignificantly negative. Similarly, Bloom and Canning (2009) conducted a study on social norms to determine the effect of fertility on female labor force participation across various countries. They used abortion legislation as an instrument for fertility. The study found that removing legal restrictions on abortion significantly reduces fertility. On average, a birth reduces a woman's labor supply by almost two years during her reproductive life. These findings suggest that increased female labor supply, as a result of behavioral change, plays a significant role in economic growth during the demographic transition when fertility rates decline. In addition, Marois and Zhelenkova (2022) provide the first labor force projections for India and its regions up to the year 2060. They have used a discrete-time microsimulation model to achieve these projections. This model takes into account changes in population size and composition resulting from demographic characteristics, educational attainment, and secular tendencies. Labor force participation rates are estimated at the individual level using personal characteristics as predictors. The estimates reveal that even with constant labor force participation rates, the labor force dependency ratio (non-workers to workers) is very unlikely to reach favorable levels. This could compromise the potential demographic dividend that the country could gain from its favorable age structure. Maurer and Potlogea (2020) examined the impact of male-biased labor demand shocks on women's labor market outcomes. To explore this issue, they studied large oil field discoveries in the southern United States from 1900 to 1940. The study found that oil wealth has an overall positive impact on female labor force participation, which single women primarily drive. Although oil discoveries increase demand for male labor and raise male wages, they do not force women out of the tradable goods sector or the labor force. The findings suggest that the absence of any crowding out effects of oil wealth can be explained by compensating forces such as demand effects within the tradable sector or income effects that lead to growth in the non-tradable sector. In addition, while using a panel of six developing countries in the Southeast Asia and East Asia region for the period 2011 to 2021, Rahmawan and Aisyah (2024)

propose that the engagement of women in parliamentary activities positively and significantly influences the rate of female labor participation. Conversely, they find that the female unemployment rate negatively and significantly affects the female labor participation rate. Similarly, Pignatti's (2020) research demonstrates that support for female entrepreneurs can benefit the female labor participation rate. Such support emerges as a pivotal factor in assisting women in surmounting obstacles in entrepreneurship, such as gender stereotypes, discrimination, and the burden of household responsibilities.

The current research distinguishes itself by utilizing a more extensive set of data compared to Naseem and Dhruva (2017). While their study covers the period from 2005 to 2015, our research extends over a broader timeframe, encompassing data from 2000 to 2022. This extended time horizon allows for a more comprehensive analysis of trends and patterns. Furthermore, our research incorporates a wider array of economic and demographic variables, providing a more nuanced understanding of the factors influencing the phenomenon under investigation. This expansion in both temporal scope and variable inclusiveness enhances the robustness and depth of our study, contributing to a more thorough exploration of the dynamics impacting the subject matter.

3. Data and model specification

To evaluate the impact of the demographical, economic, educational, and social factors on the female labor force participation rate in Saudi Arabia, this research specifies the model as follows.

$$FLFP_t = \beta_0 + \beta_1 GDP_t + \beta_2 EPR_t + \beta_3 INF_t + \beta_4 URB_t + \beta_5 SE_t + \beta_6 LFH_t + \beta_7 FR_t + \beta_8 ADR_t + \varepsilon_t \quad (1)$$

where $FLFP_t$ is female labor force participation rate at time t : this rate represents the percentage of working-age women who are either employed or actively seeking employment. It is calculated by dividing the number of women in the labor force by the total working-age female population and multiplying the result by 100, GDP_t is the growth rate of gross domestic product and it is measured as an annual %, EPR_t is the female employment to population ratio measured as % of total female population, This ratio specifically measures the percentage of the working-age female population that is employed. It is calculated by dividing the number of employed women by the total working-age female population and multiplying the result by 100. Whereas INF_t is the inflation rate (annual %), URB_t urban population growth (Annual %)—urban population growth refers to the increase in the number of people residing in urban areas over a specific period of time. This growth is a significant aspect of global demographic trends, and it has several implications for societies, economies, and the environment. Moreover, SE_t is the female school enrollment, LFH_t is the female labor force with advanced education (% of total working-age population with advanced education), “Advanced education” typically refers to education beyond high school or secondary education, such as tertiary or post-secondary education, including college and university degrees, master’s degrees, and doctorates. In addition, FR_t is the female fertility rate measured as total births per woman and finally, ADR_t is the age dependency ratio, measured as the % of working-age population. This ratio compares the number of dependent individuals (typically children and elderly) to the number of

working-age individuals in a population. It is usually expressed as a percentage.

The data for these variables is extracted from the World Bank’s databases and it covers the period from 2000 to 2022.

4. Results and analysis

This research begins its empirical analysis by providing an overview of the selected variables through descriptive statistics, such as means, standard deviations, and pairwise correlations (**Table 1**). The results reveal an average female labor force participation rate of 21% during the sample period, which is quite low in the country. Average GDP growth rate remained 4% whereas average female employment to population ratio was 17%. In addition, average female labor force with higher education is 46% which indicates relatively larger proportion of female labor force with advanced degrees. **Table 1** also reveals a larger dispersion in the data for the females’ school enrollment, with a standard deviation of 16.75. Furthermore, **Table 1** presents the pairwise correlations between the selected variables and indicates a strong and positive correlation between the female labor force participation rate (FLFP) and female employment-to-population ratio (EPR) as well as with the female school enrollments (SE).

Table 1. Descriptive statistics and pairwise correlations.

	EPR	ADR	FR	FLFP	GDP	LFH	INF	SE	URB
Mean	17.25	46.47	2.82	21.28	4.04	46.66	2.72	52.34	2.65
Median	16.38	44.11	2.76	20.62	3.97	46.66	2.47	49.17	2.56
Maximum	23.33	60.06	3.50	29.55	11.24	55.92	9.87	78.27	4.24
Minimum	14.71	39.43	2.39	16.90	-4.34	37.42	-2.09	32.47	0.13
Std. Dev.	2.52	6.82	0.33	3.64	3.94	5.77	2.62	16.75	1.08
Jarque-Bera	6.47	2.68	1.58	3.16	0.02	1.20	2.91	2.35	0.65
Probability	0.04	0.26	0.45	0.21	0.99	0.55	0.23	0.31	0.72
Observations	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00
EPR	1.00	-0.65	-0.74	0.98	-0.27	0.83	-0.09	0.79	-0.78
ADR	-0.65	1.00	0.98	-0.76	0.43	-0.94	0.01	-0.86	0.54
FR	-0.74	0.98	1.00	-0.84	0.39	-0.98	0.09	-0.92	0.64
FLFP	0.98	-0.76	-0.84	1.00	-0.31	0.90	-0.13	0.87	-0.82
GDP	-0.27	0.43	0.39	-0.31	1.00	-0.39	0.09	-0.35	0.04
LFH	0.83	-0.94	-0.98	0.90	-0.39	1.00	-0.17	0.96	-0.70
INF	-0.09	0.01	0.09	-0.13	0.09	-0.17	1.00	-0.37	0.31
SE	0.79	-0.86	-0.92	0.87	-0.35	0.96	-0.37	1.00	-0.74
URB	-0.78	0.54	0.64	-0.82	0.04	-0.70	0.31	-0.74	1.00

In the subsequent phase, we assess the stationarity of the dataset. The Augmented Dickey-Fuller (ADF) test is a statistical test used in econometrics and time series analysis to determine whether a unit root is present in a univariate time series dataset. The presence of a unit root indicates that a time series is non-stationary, meaning its statistical properties, such as mean and variance, are not constant over time. It appears

that the estimates presented in **Table 2** show that all selected variables are stationary at the first difference. This finding suggests that a simple multivariate regression may not be an appropriate methodology to estimate the model. The presence of first-order differencing indicates that the variables may exhibit a unit root, and the data may be non-stationary in their original form, and it may lead to issues such as spurious regression or biased parameter estimates. Since the sample size is small and we are unable to specify a vector autoregression model with lagged variables to mitigate the consequences of the non-stationarity of the selected data variables. Therefore, we employ a multivariate regression model with differenced variables as differencing can help transform non-stationary time series data into stationary ones, making them more amenable to standard regression techniques.

Table 2. Augmented Dickey-Fuller Unit Root tests.

	P-Val	P-Val
	level	1st Difference
ADR	0.258113	0.047201
EPR	0.629532	0.008481
FLFP	0.420355	0.055679
GDP	0.072784	0.006209
FR	0.306543	0.010361
INF	0.215806	0.000189
LFH	0.033176	0.000288
SE	0.382674	0.058112
URB	0.006863	0.058482

Table 3 presents the estimates from the model specified in Equation (1). The estimates reveal a positive and statistically significant relationship between the female employment-to-population ratio (EPR) and female labor force participation rate (FLFP), indicating that as the proportion of employed women among the working-age female population increases (higher EPR), there is a corresponding increase in the percentage of women actively participating in the labor force (higher FLFP). In addition, estimates reveal a positive and statistically significant relationship between the inflation rate (INF) and the female labor force participation rate (FLFP), suggesting that as the inflation rate increases, there is a corresponding increase in the percentage of women actively participating in the labor force. Moreover, estimates suggest a positive and statistically significant relationship between urbanization and the female labor force participation rate (FLFP) which implies that urban areas, with higher levels of infrastructure, educational opportunities, and diverse economic activities, may create an environment that encourages more women to join the labor force. Furthermore, factors associated with urbanization, such as improved access to education, a broader range of job opportunities, and changes in societal norms, could contribute to higher female labor force participation rates in urban settings. The estimated results also indicate a positive and statistically significant relationship between the age dependency ratio (ADR) and female labor force participation rate (FLFP) which suggests that as the proportion of dependent individuals (children and

elderly) relative to the working-age population increases, there tends to be an increase in the percentage of women participating in the labor force. This might be influenced by factors such as the need for additional income in households with more dependents, changes in family dynamics, or policies that support work-life balance.

Table 3. Model estimation.

DFLFP	Coefficient	Std. err.	t	P > t	[95% conf. interval]	
DGDP	0.001459	0.011053	0.13	0.897	-0.02242	0.0253377
DEPR	1.247907	0.05845	21.35	0	1.121634	1.37418
DINF	0.05983	0.02105	2.84	0.014	-0.1053	-0.0143491
DURB	0.32796	0.089023	3.68	0.003	-0.52028	-0.1356377
DSE	0.004229	0.021531	0.2	0.847	-0.04228	0.0507431
DLFH	0.04834	0.115216	0.42	0.682	-0.29725	0.2005701
DFR	0.093708	0.535885	0.17	0.864	-1.064	1.251417
DADR	0.19018	0.062578	3.04	0.009	-0.32537	-0.0549867
_CONS	-0.09953	0.098261	-1.01	0.33	-0.31181	0.1127463

Prob > F = 0;
R-squared = 0.9911;
Adjusted R-squared = 0.9857;
Root MSE = 0.18427.

The overall model is significant according to the *F* test at the 1% significance level and explains about 99% of the variation in the dependent variable—the female labor force participation rate (FLFP). To further check the reliability of our estimates, we performed the diagnostic tests. To assess the normality of the dataset, current research employs the Jarque-Bera, which is based on the skewness and kurtosis of the data distribution and assumes that the data is normally distributed. The estimates of the JB test in **Table 4** reveal a probability of 0.64, indicating that the data (differenced) is normally distributed.

Table 4. Diagnostics tests.

Normality		Heteroscedasticity	Autocorrelation	Multicollinearity
JB	0.91	Breusch-Pagan/Cook-Weisberg test H0: Constant variance	0.24	Mean VIF 2.23
PROB	0.64	PROB	0.627	
			Durbin-Watson d-statistic (9, 22)	

To test for autocorrelation in the residuals of our regression model, this research employs the Durbin-Watson (DW) statistic, which is closer to 2, suggesting that there is no autocorrelation in the residuals of the regression model. To assess the presence of heteroskedasticity in the residuals, the current study uses the Breusch-Pagan/Cook-Weisberg test, which assumes constant variance and estimates reveal a probability of 0.62, confirming that residuals are homoscedastic. This indicates the standard errors estimated from the least squares regression are reliable.

Moreover, to assess the degree of multicollinearity in our regression analysis, this research uses the Variance Inflation Factor (VIF). Multicollinearity occurs when two or more independent variables in a regression model are highly correlated, making it difficult to distinguish the individual effects of each variable on the dependent variable.

The VIF quantifies how much the variance of an estimated regression coefficient is increased due to multicollinearity. A VIF of 1 indicates no multicollinearity (perfect independence between the variable and other predictors). As the VIF increases, it suggests an increasing degree of multicollinearity. A commonly used rule of thumb is that a VIF greater than 10 (some use 5) may indicate a problematic level of multicollinearity. Subsequently, **Table 4** indicates an average VIF value of 2.23, indicating no multicollinearity in our regression analysis.

5. Conclusion

This study examines the determinants of the labor force participation rate among females aged 15 and above in Saudi Arabia using a least squares regression model. The analysis considers a range of factors, including economic indicators, demographic variables, and educational factors. These variables include female labor force participation rate, GDP growth, employment-to-population ratio, inflation, urban population growth, tertiary school enrollment, labor force with advanced education, fertility rate, and age dependency ratio spanning a period from 2000 to 2022. The results indicate that the employment-to-population ratio, inflation rate, urban population growth, and age dependency ratio significantly influence the labor force participation rate. Specifically, a higher employment-to-population ratio is associated with increased female labor force participation. Similarly, higher inflation rates, urban population growth rates, and larger age dependency ratios are linked to larger female participation in economic activity. These findings are consistent with the findings of Naseem and Dhruva (2017). Current research suggests the need for policies that improve employment opportunities and address urbanization-related challenges to enhance female labor force participation. However, it is important to note that some independent variables, such as GDP growth, tertiary school enrollment, labor force with advanced education and fertility rate, do not exhibit statistically significant relationships with the female labor force participation rate. This implies that while these variables may impact the economy and society, they may not directly influence female labor force participation.

In addition, based on our results, several policy implications can be considered; for instance, policymakers should focus on initiatives that encourage higher employment-to-population ratios. This might involve implementing job creation programs, vocational training, and education policies to enhance skill sets and employability. Particular attention should be given to strategies to increase female employment, given the positive association between a higher employment-to-population ratio and increased female labor force participation. Policies that address urbanization challenges and promote sustainable urban development can be crucial. Urban areas should be designed to accommodate population growth, ensuring adequate infrastructure and amenities. Given the observed correlation between higher urban population growth rates and increased economic activity among women, this may positively influence female labor force participation. Policymakers may need to consider policies that address the challenges associated with larger age dependency ratios. This could involve developing social and economic support systems for elderly dependents, potentially lessening the burden on the working-age population.

Additionally, policies supporting work-life balance, such as affordable childcare options and flexible working arrangements, may be beneficial in overcoming the impact of age dependency ratios on labor force participation.

Recognizing the influence of various factors on female labor force participation, policymakers should design gender-specific economic policies. These policies might include reducing gender-based discrimination, providing family-friendly work environments, and offering targeted support for women entering or re-entering the workforce. Furthermore, Policies that ensure equal access to education and training opportunities for all segments of the population can positively impact labor force participation rates.

Nevertheless, future research should consider additional variables and explore other potential factors that may affect female labor force participation, such as cultural and societal norms, access to childcare, and gender equality in the workplace. Such investigations will contribute to a more comprehensive understanding of female labor force participation dynamics and guide the development of effective policies to promote inclusive economic growth and gender equality.

Authors contributions: Conceptualization, SA and RS; methodology, SA; software, RS; validation, SA and RS; formal analysis, SA; investigation, RS; resources, SA; data curation, RS; writing—original draft preparation, SA; writing—review and editing, RS; visualization, SA; supervision, RS; project administration, SA; funding acquisition, SA. All authors have read and agreed to the published version of the manuscript.

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