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# Redirecting Energy Subsidies to Boost Women's Labor Force Participation in the EU-Med region <sup>[1]</sup>

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# 1. Executive Summary

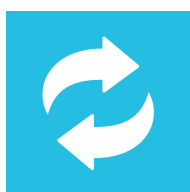
As global efforts are directed at reducing fossil fuel dependence, it is essential to evaluate the impacts that energy policies have on gender disparities in labor markets. The links between fossil fuel subsidies and female labor force participation rates remain an important underexplored topic in both labor market and energy policy research.

A recent study presented at the 2024 FEMISE Annual Conference investigates the links between fossil fuel subsidies and female labor force participation in the Euro Mediterranean region. Empirical results show that fossil fuel subsidies negatively link to female labor force participation. The effect is more pronounced at the lower quantiles, i.e. in the countries that record lower female inclusion in the labor market, suggesting further development implications of energy subsidies linked to opportunities for women to engage in paid economic activities. Governments need to gradually phase out fossil fuel subsidies and redirect funds towards gender-responsive initiatives, such as skill development.

## 2. Introduction

### 1. Energy subsidies and female labor force participation

Female labor force participation serves as a critical driver of economic growth, poverty reduction, and social well-being. However, globally, women's involvement in the workforce remains significantly lower than that of men. This is influenced by a multifaceted combination of economic, cultural and policy issues. The relationship between energy policies and female labor force participation has become an area of increasing scholarly interest, particularly in the context of sustainable development.



Research on fossil fuel subsidies, as energy policies, focuses on how these and their reforms impact women's welfare and empowerment, particularly in low-income households. Despite ongoing discussions on energy transition policies and gender equality in labor markets, there is a notable gap of empirical research on how fossil fuel subsidies relate to female labor force participation. Addressing this gap is essential for creating targeted energy policies that not only promote energy transition but also ensure that women are not left behind in the transforming energy and labor market landscapes. A large body of literature concentrates on the adverse effects of fossil fuel subsidies on the environment and economy. Fossil fuel subsidies promote overconsumption of fossil fuels, which means higher greenhouse gas emissions and energy wastage. The impacts of subsidy reforms remain a subject of debate. While some studies have shown short-term adverse impacts on economic growth (Breisinger et al., 2019), others provide evidence of positive effects on GDP per capita growth, employment, and emissions mitigation (Lin and Jiang, 2011; Mundaca, 2017).

The relationship between fossil fuel subsidies and employment is complex. Several empirical studies identify a correlation between the removal of fossil fuel subsidies and a decline in employment (Jiang and Lin, 2014; Lin and Ouyang, 2014; Ouyang and Lin, 2014). Research on female labor force participation has explored a variety of social, economic, and cultural factors. Studies have demonstrated that economic development often follows a U-shaped curve in female labor force participation, with initial declines occurring as economies shift from agricultural to industrial models (Tsani et al., 2013; Choudhry and Elhorst, 2018; Altuzarra et al., 2019). The relationship between energy policies and female labor force participation has emerged as an increasingly significant research area. Scholars investigate how access to renewable energy, along with policies and infrastructure investments, affects women's involvement in the workforce (Li et al., 2024).

While the European Union is transitioning from fossil fuel subsidies to renewable energy incentives due to climate policies, Middle East and North Africa (MENA) countries have relied on fossil fuel subsidies to keep low energy prices for social welfare and political stability. Gradually, phasing out fossil fuel subsidies in the MENA region could increase economic growth and labour force participation, particularly among the youth (Mundaca, 2017). Despite the extensive research carried out on the labor market dynamics and energy policies, the link between fossil fuel subsidies and female labor force participation in the Euro Mediterranean area has been underexplored. In addition, empirical research employs mean-based estimation techniques, that fail to capture the heterogeneous effects of fossil fuel subsidies across different levels of female labor force participation.

# 3. Mediterranean Context

## 1. Energy subsidies and female labor force participation: Evidence from the Euro Mediterranean region

Aligned with modern research objectives a recent study presented at the 2024 FEMISE annual conference assessed the links between fossil fuel subsidies and female labor force participation rate in the Euro Mediterranean region. The dataset for this research covers the years 2010 to 2022, including data on 27 European Union countries and 7 South Mediterranean countries (Algeria, Egypt, Jordan, Israel, Lebanon, Morocco, and Tunisia). The Euro Mediterranean countries were chosen due to their contrasting energy policies, labor market structures, and female labor force participation rates. Data and sources used are summarized in Table 1. The process of variable selection aligns with previous research that investigates female labor force participation, providing methodological robustness and facilitating comparative analysis with extant studies in the field.

Table 1. Data, time, measurement, and sources used for the analysis

Variable	Time Period	Unit of Measurement	Source
Dependent variable			
Female labor force participation rate	2010-2022	% of female population ages 15-64	International Labour Organisation database (2024)
Independent variable			
Fossil fuel subsidies	2010-2022	% of GDP	SDG Indicators database (2024)
Control variables			
Fertility rate	2010-2022	births per woman	World Development Indicators (2024)
GDP per capita	2010-2022	current international \$	World Development Indicators (2024)
Female unemployment rate	2010-2022	% of female labor force	World Development Indicators (2024)
Women political participation	2010-2022	from low to high (0-1)	V-Dem (2024)
Urban population	2010-2022	% of total population	World Development Indicators (2024)



## 4. Approach and Results

The study employed Method of Moments Quantile Regression techniques, as proposed by Machado and Santos Silva (2019), to capture the distributional effects of fossil fuel subsidies across different labor force participation rates levels. Unlike traditional regression methods, which assume a uniform relationship between variables, quantile regression allows for a more nuanced analysis, identifying whether the effect of fossil fuel subsidies varies at different points of the female labor force participation rates distribution. This is particularly important in labor market studies, where the impacts of labor force participation may differ at lower and upper levels.

Estimation results are summarized in Table 2. Fossil fuel subsidies have a negative coefficient in all quantiles (10th, 50th and 90th percentiles). However, the negative impact of these subsidies on female labor force participation is more pronounced in countries with low female labor force participation (Q\_10) compared to those with high participation rates (Q\_90). This indicates that fossil fuel subsidies exert a greater negative influence on female labor participation in countries, where women are already less integrated into the workforce.

Additionally, this finding could suggest that fossil fuel subsidies, which are generally beneficial for male-dominated sectors (such as energy), hinder opportunities for female employment. In countries where the female labor force participation is low, these subsidies may further entrench existing gendered structures in the labor market, thus limit women's economic opportunities. However, as we move in countries where female labor force participation is high, women may already be involved in sectors that are less dependent on fossil fuel subsidies, however, the impact is still negative. The inclusion of South Med as a regional dummy underscores structural disadvantages compared to Europe, as its coefficient remains significantly negative across all quantiles. This suggests that South Mediterranean systematically underperforms relative to Europe, regardless of female labor participation level, pointing to deeper institutional and policy barriers.

Table 2. Estimates of Method of Moments Quantile Regression

	Variables	Location	Scale	Q_10	Q_50	Q_90
	<b>fossil_fuel_subsidies</b>	<b>-1.015***</b>	<b>0.095</b>	<b>-1.181***</b>	<b>-1.011***</b>	<b>-0.869***</b>
		(0.294)	(0.056)	(0.284)	(0.294)	(0.324)
	<b>fertility_rate</b>	<b>2.995***</b>	<b>3.228***</b>	<b>-8.695***</b>	<b>3.148***</b>	<b>7.903***</b>
		(0.983)	(0.393)	(1.971)	(1.006)	(1.501)
	<b>log_GDP_per_capita</b>	<b>10.241***</b>	<b>1.545***</b>	<b>7.562***</b>	<b>10.313***</b>	<b>12.589***</b>
		(1.123)	(0.455)	(1.766)	(1.098)	(0.870)
	<b>unemployment_rate</b>	<b>-0.446***</b>	<b>-0.116***</b>	<b>-0.647***</b>	<b>-0.441***</b>	<b>-0.269*</b>
		(0.107)	(0.030)	(0.073)	(0.107)	(0.151)
	<b>urban_population</b>	<b>0.013</b>	<b>0.039**</b>	<b>-0.053</b>	<b>0.015</b>	<b>0.073**</b>
		(0.040)	(0.016)	(0.066)	(0.040)	(0.023)
	<b>women_political_participation</b>	<b>16.012***</b>	<b>2.506**</b>	<b>11.667***</b>	<b>16.131***</b>	<b>19.822***</b>
		(1.959)	(0.975)	(2.186)	(1.972)	(2.769)
	<b>_cons</b>	<b>-57.004***</b> <b>(10.363)</b>	<b>-22.392***</b> <b>(4.370)</b>	<b>-18.183</b> <b>(16.510)</b>	<b>-58.062***</b> <b>(10.047)</b>	<b>-91.048***</b> <b>(8.537)</b>
<b>Region Dummy</b>						
	<b>south_med</b>	<b>-20.105***</b> <b>(0.830)</b>	<b>-0.353</b> <b>(1.020)</b>	<b>-19.493***</b> <b>(1.982)</b>	<b>-20.122***</b> <b>(0.831)</b>	<b>-20.642***</b> <b>(1.738)</b>
	Obs.	382	382	382	382	382

Note: \* \* \*, \* \* and \* significance at 1 %, 5 % and 10 %, respectively. Heteroscedastic-robust standard errors are used in the estimation. Clustered-standard errors (by year), which allow for common shocks. Region dummy is included in the estimation to account for regional differences.

The empirical results show that log GDP per capita is positively associated with female labor force participation, with a larger effect at higher quantiles. As economies grow women are more likely to integrate in labor markets, especially in countries where female labor force participation is already high. Therefore, policymakers should consider fossil fuel subsidy reforms to reallocate public spending toward development priorities. The fiscal space provided by such reforms can be utilized towards gender-responsive policies which in turn lead to economic development and higher female labor force participation. However, unemployment rates negatively affect female labor force participation, particularly at lower quantiles, suggesting that downturns disproportionately impact women. Women's political participation is a strong and significant positive factor of female labor force participation across all quantiles, supporting the idea that higher gender representation in policymaking translates into more inclusive labor policies. Lastly, the South Med dummy variable is consistently negative, and its impact becomes more pronounced at the 90th percentile, indicating that the female labor force participation gap between South Med and Europe widens at higher levels of female labor force participation. While female labor force participation is already lower in South Med, the barriers to female labor force participation become even more restrictive at the upper end of the distribution. South Med countries may continue to experience economic and cultural constraints that limit women's integration.



## 6. Concluding remarks & Policy recommendations

Female labor force participation in South Mediterranean countries remains constrained by structural and cultural factors. At just 17.9%, the region has the lowest rate of female participation in the labor market globally, well below the world average of 49.1%<sup>[2]</sup>. Restrictive legal frameworks, financial exclusion, and gender norms, among others, continue to undermine the possibility for women to participate in the economy. In many cases, women still require male permission to work or start a business, restricting their economic autonomy<sup>[3]</sup>. Access to finance is another issue, with women-owned businesses in the region far less likely to secure bank loans compared to the global average. Additionally, women shoulder a disproportionate share of unpaid care work, spending up 10 times more time on it than men and performing 4.7 times more unpaid care.<sup>[4]</sup>

Fossil fuel subsidies are primarily directed towards wealthier, traditionally male-dominated industries and divert public funds from services that would encourage female employment, such as childcare. Identifying the mismatch can help governments redirect fossil fuel subsidies spending to remove obstacles for women. Fossil fuel subsidies reform creates fiscal space that can be used to shift resources towards gender-responsive services.

Policy recommendations for the Euro Mediterranean countries to increase female labor force participation can be made taking into consideration the challenges posed by the countries' structures.

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[2] <https://genderdata.worldbank.org/en/regions/middle-east-north-africa>

[3] [https://www.oecd.org/content/dam/oecd/en/publications/reports/2020/11/changing-laws-and-breaking-barriers-for-women-s-economic-empowerment-in-egypt-jordan-morocco-and-tunisia\\_6f14ec15/ac780735-en.pdf](https://www.oecd.org/content/dam/oecd/en/publications/reports/2020/11/changing-laws-and-breaking-barriers-for-women-s-economic-empowerment-in-egypt-jordan-morocco-and-tunisia_6f14ec15/ac780735-en.pdf)

[4] [https://www.oecd.org/content/dam/oecd/en/publications/reports/2020/11/changing-laws-and-breaking-barriers-for-women-s-economic-empowerment-in-egypt-jordan-morocco-and-tunisia\\_6f14ec15/ac780735-en.pdf](https://www.oecd.org/content/dam/oecd/en/publications/reports/2020/11/changing-laws-and-breaking-barriers-for-women-s-economic-empowerment-in-egypt-jordan-morocco-and-tunisia_6f14ec15/ac780735-en.pdf)

## **Gradually reduce fossil fuel subsidies and reallocate resources**

Given the negative links between fossil fuel subsidies and female labor force participation, governments should gradually reduce these subsidies and reallocate funds toward policies that enhance female labor market participation. For instance, subsidizing and expanding access to childcare services. In 2024, Jordan introduced a National Childcare Policy with the aim to improve the access of women to high-quality and affordable childcare services and improve female labor participation. The policy is designed to support women's entry and retention in the workforce.<sup>[5]</sup> Additionally, governments could invest in supporting female entrepreneurship, particularly within the context of the energy transition. Canada has launched a \$7 billion initiative to support women access the financing, networks and expertise they need to start up, scale up and expand into international markets.<sup>[6]</sup>

## **Develop gender-targeted skill-building programs**

Governments and institutions should design and implement training programs specifically targeted at women. For instance, the "Women in Wind" program (Global Wind Energy Council) builds technical and leadership capacity for women in the sector. Also, in early 2025, the UNDP Accelerator Lab partnered with the British University in Egypt to offer the Future Fit Accelerator, a pilot program designed to equip women with skills in sustainability, AI, automation, and climate-resilient careers. Participants had hands-on training and global networking, which significantly increased their interest in green-sector employment.

[5] <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099603312182322486/idu0056e275100e7a04ea1088b00c4b24ebf37c8>

[6] <https://ised-isde.canada.ca/site/women-entrepreneurship-strategy/en>

## **Promote women's political participation**

The strong positive correlation between women's political participation and female labor force participation suggests that gender-balanced policymaking leads to inclusive labor policies.

Overall, it may be argued that fossil fuel subsidies are not gender neutral. While reducing fossil fuel subsidies may cause short-term economic adjustments, repurposing subsidies and use of the available funding for female-support and targeted social programs can lead to long-term improvements in female labor force participation.

## References

- Altuzarra, A., Gálvez-Gálvez, C., & González-Flores, A. (2019). Economic development and female labour force participation: The case of European Union countries. *Sustainability*, 11(7), 1962. <https://doi.org/10.3390/su11071962>.
- Breisinger, C., Mukashov, A., Raouf, M., & Wiebelt, M. (2019). Energy subsidy reform for growth and equity in Egypt: The approach matters. *Energy Policy*, 129, 661-671. <https://doi.org/10.1016/j.enpol.2019.02.059>.
- Choudhry, M. T., & Elhorst, P. (2018). Female labour force participation and economic development. *International Journal of Manpower*, 39(7), 896-912. <https://doi.org/10.1108/IJM-03-2017-0045>.
- Jiang, Z. & Lin, B. (2014). The perverse fossil fuel subsidies in China—The scale and effects. *Energy*, 70, 411-419. <https://doi.org/10.1016/j.energy.2014.04.010>.
- Lin, B., & Jiang, Z. (2011). Estimates of energy subsidies in China and impact of energy subsidy reform. *Energy Economics*, 33(2), 273-283. <https://doi.org/10.1016/j.eneco.2010.07.005>.
- Li, X., An, L., Zhang, D., Lee, C. C., & Yu, C. H. (2024). Energy access and female labor force participation in developing countries. *Renewable and Sustainable Energy Reviews*, 199, 114468. <https://doi.org/10.1016/j.rser.2024.114468>.
- Lin, B. & Ouyang, X. (2014). A revisit of fossil-fuel subsidies in China: Challenges and opportunities for energy price reform. *Energy Conversion and Management*, 82, 124-134. <https://doi.org/10.1016/j.enconman.2014.03.030>.
- Machado, J. A., & Silva, J. S. (2019). Quantiles via moments. *Journal of econometrics*, 213(1), 145-173. <https://doi.org/10.1016/j.jeconom.2019.04.009>.
- Mundaca, G. (2017). Energy subsidies, public investment and endogenous growth. *Energy Policy*, 110, 693-709. <https://doi.org/10.1016/j.enpol.2017.08.049>.
- Ouyang, X. & Lin, B. (2014). Impacts of increasing renewable energy subsidies and phasing out fossil fuel subsidies in China. *Renewable and Sustainable Energy Reviews*, 37, 933-942. <https://doi.org/10.1016/j.rser.2014.05.013>.
- Tsani, S., Paroussos, L., Fragiadakis, C., Charalambidis, I., & Capros, P. (2013). Female labour force participation and economic growth in the South Mediterranean countries. *Economics Letters*, 120(2), 323-328. <https://doi.org/10.1016/j.econlet.2013.04.043>.

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## About FEMISE

FEMISE, the Forum Euroméditerranéen des Instituts de Sciences Économiques, is a Euro-Mediterranean network of over 100 economic and social research institutes from both shores of the Mediterranean. Established in Marseille, France, in 2005 as an NGO, FEMISE promotes dialogue on economic and social policies to foster cooperation and mutual benefit between Europe and its Mediterranean partners. Coordinated by the Economic Research Forum (ERF) in Egypt, FEMISE focuses on strengthening research capacity, fostering public-private dialogue, disseminating research findings, and building partnerships to support regional collaboration and sustainable development.

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