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ENERGY POLICIES AND LABOUR MARKET GENDER GAPS: THE CASE OF EUROMED REGION

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ENERGY POLICIES AND LABOUR MARKET GENDER GAPS: THE CASE OF EUROMED REGION

CONTENTS

ABSTRACT

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 labour markets. The links between fossil fuel subsidies and female labour force participation rates remain an important underexplored topic in both labour market and energy policy research. This study investigates the relationship between fossil fuel subsidies and female labour force participation rates in the Euro-Mediterranean region. The Method of Moments Quantile Regression is used to analyse how the relationship between fossil fuel subsidies and female labour force participation rates differs at various levels of labour force participation, providing a distributional perspective. Our findings indicate that fossil fuel subsidies have a negative effect on female labour force participation at lower quantiles, however, at higher quantiles, the impact of these subsidies is diminished. These results have significant policy implications, calling for the incorporation of gender dimensions in policy reforms pertaining to energy transition. Governments need to gradually phase out fossil fuel subsidies and redirect funds towards gender-responsive initiatives, such as skill development, and work incentives in sectors such as renewable energy. Our study contributes to the growing discussion on energy policy and labour market inclusion, offering empirical evidence that can assist policymakers aiming to bridge the gap between energy reforms and gender-inclusive employment.

Keywords: Female labour force participation; Fossil fuel subsidies; Euromed region; MMQR

JEL classification: C21; H20; J16; Q48

RÉSUMÉ

Alors que les efforts mondiaux sont dirigés vers la réduction de la dépendance aux combustibles fossiles, il est essentiel d'évaluer les impacts des politiques énergétiques sur les disparités entre les sexes sur les marchés du travail. Les liens entre les subventions aux combustibles fossiles et les taux de participation des femmes à la population active demeurent un sujet important encore peu exploré dans les recherches sur le marché du travail et les politiques énergétiques.

Cette étude examine la relation entre les subventions aux combustibles fossiles et les taux de participation des femmes à la population active dans la région euro-méditerranéenne. La méthode de la régression quantile par les moments (Method of Moments Quantile Regression) est utilisée pour analyser la manière dont cette relation varie selon les différents niveaux de participation, offrant ainsi une perspective plus nuancée.

Nos résultats indiquent que les subventions aux combustibles fossiles ont un effet négatif sur la participation des femmes à la population active aux quantiles inférieurs. Toutefois, à des niveaux plus élevés de participation, cet impact s'atténue. Ces résultats ont d'importantes implications en matière de politiques publiques, soulignant la nécessité d'intégrer les dimensions de genre dans les réformes liées à la transition énergétique.

Les gouvernements doivent progressivement supprimer les subventions aux combustibles fossiles et réorienter les fonds vers des initiatives sensibles au genre, telles que le développement des compétences et les incitations à l'emploi dans des secteurs comme les énergies renouvelables. Notre étude contribue au débat croissant sur la politique énergétique et l'inclusion sur le marché du travail, en fournissant des preuves empiriques utiles aux décideurs souhaitant rapprocher les réformes énergétiques des objectifs d'emploi inclusif et équitable.

الملخص

مع توجّه الجهود العالمية نحو تقليل الاعتماد على الوقود الأحفوري، يصبح من الضروري تقييم تأثير السياسات الطاقوية على الفجوات بين الجنسين في سوق العمل. لا تزال العلاقة بين دعم الوقود الأحفوري ومعدلات مشاركة النساء في القوى العاملة موضوعًا مهمًا لم يُتناول بشكل كافٍ في أبحاث سوق العمل وسياسات الطاقة.

تبحث هذه الدراسة في العلاقة بين دعم الوقود الأحفوري ومعدلات مشاركة النساء في القوى العاملة في منطقة الأورو-متوسط. وقد تم استخدام طريقة الانحدار الكمي بطريقة العزوم لتحليل كيفية اختلاف هذه العلاقة عند مستويات مختلفة من مشاركة القوى العاملة، مما يوفر منظورًا توزيعيًا أكثر دقة.

تشير نتائجنا إلى أن دعم الوقود الأحفوري له تأثير سلبي على مشاركة النساء في القوى العاملة عند الشرائح الدنيا من التوزيع، بينما يقل هذا التأثير عند الشرائح العليا. لهذه النتائج آثار هامة على مستوى السياسات، إذ تدعو إلى إدماج الأبعاد الجندرية في إصلاحات السياسات المتعلقة بالتحول في قطاع الطاقة.

ينبغي على الحكومات العمل على التخلص التدريجي من دعم الوقود الأحفوري وإعادة توجيه التمويل نحو مبادرات تراعي النوع الاجتماعي، مثل تنمية المهارات وتقديم الحوافز الوظيفية في قطاعات مثل الطاقة المتجددة. وتُسهم دراستنا في النقاش المتزايد حول سياسات الطاقة والإدماج في سوق العمل، من خلال تقديم أدلة تجريبية يمكن أن تساعد صانعي السياسات على ربط إصلاحات الطاقة بأهداف التوظيف الشامل والمراعي للنوع الاجتماعي.

INTRODUCTION

In the last few decades, the global energy landscape has undergone significant changes, with a growing emphasis on green technologies and equitable economic development. One of the central aspects of this process is phasing out fossil fuel subsidies. Governments in different countries use fossil fuel subsidies to lower energy costs and stabilize energy-intensive industries. However, these subsidies create adverse implications, including environmental degradation and unfair distribution of resources. Subsidies have the potential to hinder the shift towards a low-carbon economy and encourage unsustainable energy use (Li and Sun, 2018). Although studies on the economic and environmental impacts of subsidies are prevalent, their social effects have been overlooked, particularly their gender implications. Fossil fuel subsidies often fail to benefit poor women and can even exacerbate gender inequality (Kitson et al., 2016). Despite global commitments to gender equality, fossil fuel subsidies often reinforce male-dominated sectors, such as oil and gas, where women are significantly underrepresented. The share of female sectoral employment is around 15% (IEA, 2022). Meanwhile, subsidy reforms can reshape labour markets, potentially creating new employment opportunities for women. The renewable energy sector, which is often considered the largest beneficiary of the fossil fuel subsidy removal, tends to offer more equitable job opportunities for women. The International Renewable Energy Agency (IRENA) reports that women presently make up 32% of the workforce worldwide in the renewable energy industry, a percentage that is higher than in the oil and gas industry[1]. As countries work to transition toward sustainable energy and inclusive economies, it is critical to understand the broader effects of fossil fuel subsidies on social frameworks.

Female labour 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. In 2024, women accounted for 42% of the workforce worldwide. Women make up only 31.7% of senior leaders indicating the obstacles to career advancement and leadership roles[2]. This is influenced by a multifaceted combination of economic, cultural and policy issues. Because of these complicated problems, it is crucial to tackle the obstacles to women's involvement. The relationship between energy policies and female labour force participation has become an area of increasing scholarly interest, particularly in the context of sustainable development. For instance, policies promoting renewable energy transition introduce new employment prospects. Nevertheless, women still face structural barriers such as energy poverty, caregiving responsibilities, and industry biases (Bellepea and Türüç, 2024; Asaleye and Ncanywa, 2025). Beyond direct employment opportunities in the energy sector, energy policies are instrumental in enabling female employment in other sectors. There is

[1] https://www.irena.org/-/media/Files/IRENA/Agency/Events/2021/Mar/Gender-Equality-for-an-Inclusive-Energy-Transition_Women-Leading-the-Way-in-Solar Energy_Agenda.pdf?la=en&hash=6924F947007848012B31A7987B670AC965E93B94

[2] https://www.weforum.org/publications/global-gender-gap-report-2024/digest/

evidence that improved access to electricity has a significant impact on increasing female employment by reducing time spent on domestic labour (Dinkelman, 2011). 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. Subsidies on kerosene and liquefied petroleum gas are often used to support low-income households. For instance, a study in Nigeria found that kerosene subsidies did not work well, and it is not a healthy or safe fuel, and liquified petroleum gas subsidy policies are also not recommended, given that they have tended to benefit urban and relatively wealthy citizens (IISD, 2020). Subsidy reforms can present opportunities for the reallocation of resources to social programmes that directly benefit women. In Indonesia, these reforms freed up financial resources that were redirected to infrastructure, healthcare, and education, areas that can increase women's job opportunities and welfare.[3]

Despite ongoing discussions on energy transition policies and gender equality in labour markets, there is a notable gap in empirical research on how fossil fuel subsidies relate to female labour 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 changing labour market framework. The objective of this research is to fill this gap by investigating the relationship between fossil fuel subsidies and female labour force participation. This is completed with the use of the Method of Moments Quantile Regression. This methodological choice allows us to capture the heterogeneous effects of fossil fuel subsidies, providing a distributional view. Focus rests with the Euromed region, consisting of the European Union (EU) and 7 South Mediterranean countries. The Euromed regions exhibit significant differences in female labour force participation. In the EU, female labour force participation has increased, but the gender gap remains (Périvier and Verdugo, 2018; Aydin et al., 2019). In contrast, South Mediterranean countries experience lower female labour force participation due to cultural norms, economic conditions, labour market barriers, mobility restrictions, and policy constraints (Tsani et al., 2013; Assaad and Krafft, 2016; Abdou et al., 2019; Bolukbasi and Kutlu, 2019). Our findings can effectively inform policy discussions regarding subsidy reform, gender equity and labour market policies in the region. Ultimately, this research aims to provide policymakers with evidence showing how subsidy policies may affect the labour force, to encourage more inclusive policy decisions.

The remainder of the paper is structured as follows: Section 2 reviews the existing literature. Section 3 provides an overview of the method and data employed. Section 4 presents the results of the analysis, followed by a discussion. Lastly, Section 5 concludes the study, summarizing the key findings and presenting policy considerations for an inclusive energy transition in the Euromed region.

[3] https://www.climatechangenews.com/2016/06/15/when-fossil-fuel-subsidy-cuts-undermine-women/

LITERATURE REVIEW

Fossil fuel subsidies are governmental measures designed to mitigate the economic barriers related to the fossil fuels production and consumption (Rentschler and Bazilian, 2017; Sampedro et al., 2017). These interventions can take the form of direct cash transfers, price controls, tax breaks, and investments in energy infrastructure. In 2022, global fossil fuel subsidies exceeded $1 trillion (IEA, 2023). 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. However, although these subsidies are supposed to reduce costs, they have resulted in fiscal pressures and inefficient energy use (Rentschler and Bazilian, 2017). This literature review synthesizes existing research on fossil fuel subsidies and female labour force participation rates, identifying key debates, empirical findings, and research gaps that this study seeks to address.

A large body of literature concentrates on the adverse effects of fossil fuel subsidies on the environment and economy. These incentives promote overconsumption of fossil fuels, which means higher greenhouse gas emissions and energy wastage. As explained by Coady et al. (2017), global fossil fuel subsidies in 2015 accounted for around 6.5% of global GDP. The removal of these subsidies could reduce emissions by 28% and fossil fuel air pollution deaths. Burniaux and Château (2014), argue that reduction of these might contribute to a worldwide shift towards a low-carbon economy, with a projected 10% decrease in greenhouse gas emissions by 2050.

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). Gradually, phasing out fossil fuel subsidies in the MENA region could increase economic growth and labour force participation, particularly among the youth, as demonstrated by Mundaca (2017). Subsidy removal often generates savings which are redirected to public investment in education and health. According to Monasterolo and Raberto (2019), government funds would be redirected to clean energy investments through the elimination of fossil fuel subsidies. This could be beneficial for female workers, given that these sectors are inclusive and gender- balanced.

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. Within the Chinese context, three papers have investigated the effects of fossil fuel subsidy removal on employment; however, all of which reveal a negative impact (Jiang and Lin, 2014; Lin and Ouyang, 2014; Ouyang and Lin, 2014). Despite the consistency of the results, this raises questions about the broader labour market implications of these reforms. Rentschler and Bazilian (2017) highlight the need to manage the social and political dimensions associated with fossil fuel subsidy reforms to prevent adverse

effects on vulnerable populations. Reallocation of subsidies needs to prioritize social spending, such as on health and education.

Research on female labour 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 labour 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). Higher levels of education and improved job opportunities are strong predictors of higher female labour force participation (Euwals et al., 2011). This has been especially evident in countries characterized by higher educational attainment rates. Furthermore, the relationship between energy policies and female labour 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) found that access to clean energy is linked to increased female labour force participation in developing countries, as energy access reduces time-consuming household labour. Empirical evidence from Indonesia's liquefied petroleum gas subsidy programme shows that access to cleaner, subsidized cooking fuel significantly increased female labour force participation, household consumption, and women's decision-making power in financial matters (Bharati et al., 2021).

Despite the extensive research carried out on the labour market dynamics and energy policies, the link between fossil fuel subsidies and female labour force participation in the Euro-Mediterranean area has been underexplored. The existing literature has focused on aggregate employment effects of fossil fuel subsidies (Mundaca, 2017; Sulaiman et al., 2022; de Bruin and Yakut, 2023) or on cultural barriers in female labour force participation (Jayachandran, 2020). However, no study integrates these perspectives to examine how energy subsidies differentially impact female labour force participation in various labour market contexts. 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 labour force participation. This study addresses these gaps by applying the Method of Moments Quantile Regression to analyse the effect of energy subsidies on female labour force participation across the entire distribution, not just at the mean. By looking at both the European Union and 7 South Mediterranean countries, this paper provides new evidence on regional disparities in subsidy effectiveness, with significant policy implications for gender-sensitive energy policy.

DATA AND METHODS

Aligned with the research objectives and addressing the findings present in existing literature, the current study seeks to evaluate the influence of fossil fuel subsidies, fertility rate, GDP per capita, unemployment rate, urban population, and women political participation on female labour force participation rate. The dataset for this research covers the years 2010 to 2022, focusing specifically on the context of the Euromed region[4]. The selection of countries is driven by data availability and their relevance to the research objectives, with a focus on the Mediterranean. The Euromed countries were chosen due to their contrasting energy policies, labour market structures, and female labour force participation rates. Data and sources used are summarized in Table 1. The process of variable selection aligns with previous research that investigates female labour 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 labour force participation rate	2010-2022	% of female population ages 15-64	ILO (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 labour 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)

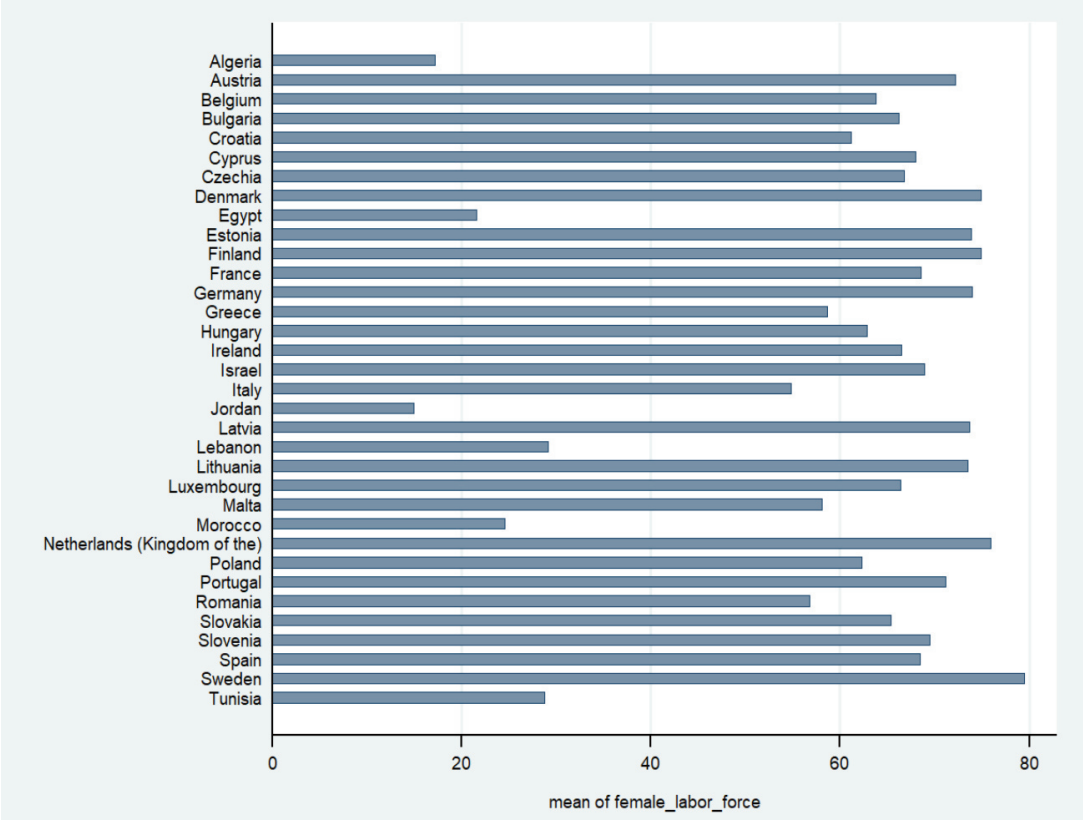
The descriptive statistics are presented in Table 2. On average, approximately 59.87% of women in the countries included in the dataset are either employed or actively seeking employment. There is a

considerable range, from 12.95% in Jordan to 81.24% in Sweden, indicating variability between countries. The mean fossil fuel subsidies represent 1.27% of GDP, which implies that, on average, countries spend a limited portion of their economic resources on fossil fuel subsidies. However, the maximum value of 27.78% implies that in some countries, like Algeria, fossil fuel subsidies represent a significant portion of GDP.

Table 2. Descriptive statistics

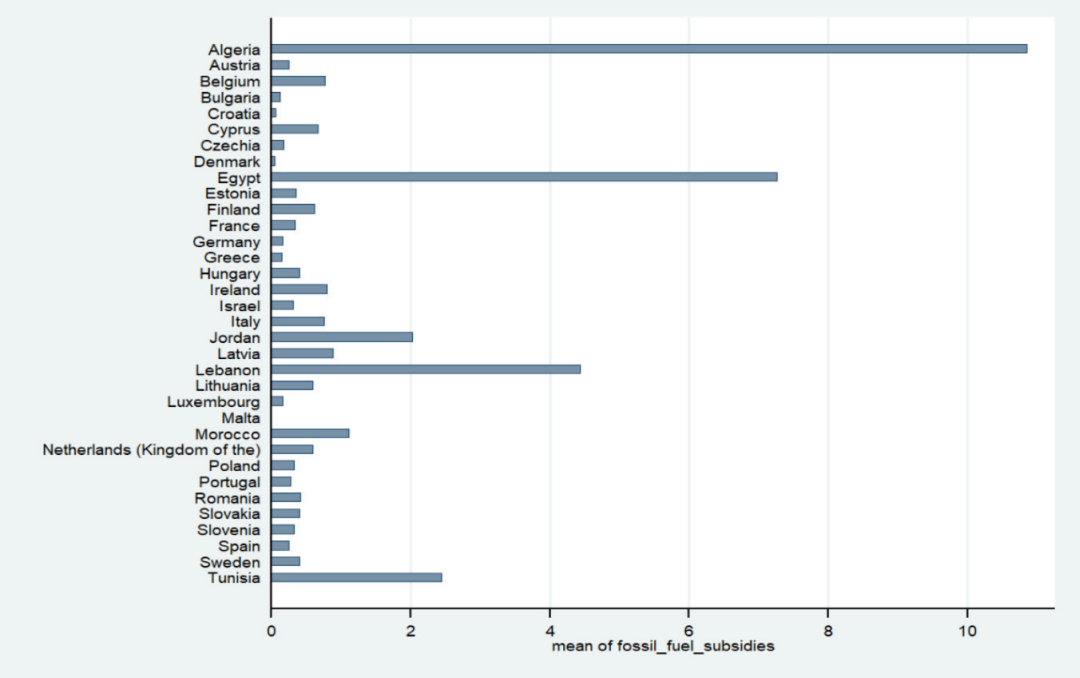
Variable	Obs	Mean	Std. Dev.	Min	Max
female_labour_force	442	59.874	18.432	12.953	81.244
fossil_fuel_subsidies	382	1.277	2.717	0	27.778
fertility_rate	442	1.782	.554	1.13	3.778
log_GDP_per_capita	442	10.356	.6	8.832	11.894
unemployment_rate	442	10.351	6.366	2.378	31.679
urban_population	442	73.123	13.761	42.704	98.153
Women_political_participation	442	.91	.158	.203	1

Figure 1. Mean percentage of women participating in the labour force across countries



To motivate our study, we provide a visual comparison of the mean percentage of female labour force participation and mean fossil fuel subsidies across different countries in the dataset. Figure 1 highlights the differences in female labour force participation between countries. Figure 2 displays significant variation in fossil fuel subsidies across countries. For example, Algeria shows a high level of subsidies (close to 10), whereas the majority of European countries have little or no subsidies (values around 0).

Figure 2. Mean fossil fuel subsidies across countries



In this study, we employ the Method of Moments Quantile Regression, as proposed by Machado and Santos Silva (2019), to examine the impact of fossil fuel subsidies on female labour force participation rates. The Method of Moments Quantile Regression is used to capture the distributional effects of fossil fuel subsidies across different labour force participation rate 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 labour force participation rates distribution. This is particularly important in labour market studies, where the impacts of labour force participation may differ at lower and upper levels. This method comprises three important steps: first, the estimation of a location model (which models the conditional mean); second, a scale model (which addresses heteroskedasticity); and third, a quantile model (which specifies the location in a distribution). Method of Moments Quantile Regression can deal with econometric specifications that have individual effects, while addressing problems of endogeneity, thus providing more accurate estimation results (Lee et al., 2023; Usman et al., 2024).

Consider the panel quantile regression at τ-th quantile with a given set of explanatory variables as:

$$QFLPR_{it}(\tau/Z_{it}) = \beta_0 + \beta_1 fossil\_fuel\_subsidies_{it} + \beta_2 log\_GDP\_per\_capita_{it} + \beta_3 fertility\_rate_{it} + \beta_4 unemployment\_rate_{it} + \beta_5 urban\_population_{it} + \beta_6 women\_political\_participation_{it} + \eta_{it} \quad (1)$$

Where $QFLPR_{it}(\tau/Z_{it})$ shows the conditional quantile distributions of the predicted variable. The term FLPR refers to the dependent variable (female_labour_force), while Z represents explanatory and control variables. β and η denote a vector of estimators and the error term, respectively. Additionally, t represents the year (2010–2022) examined in the study and i is a sample of countries.

Before our analysis, we examine the assumptions that are needed. These consist of the cross-section dependence (CD) test, slope heterogeneity, unit root test, and cointegration test. These are critical to ensure the robustness and validity of the Method of Moments Quantile Regression model. Accordingly, the test for cross-section dependence, such as the Pesaran (2004) CD was carried out in this study to check for possible cross-sectional dependence across countries. The null hypothesis assumes cross-sectional independence. Slope heterogeneity checks for relationship variations across different quantiles with Blomquist and Westerlund (2013). The Karavias and Tzavalis (2014) panel unit root test is applied to confirm the stationarity of the dataset. Last, the cointegration analysis verifies the long-term equilibrium relationships between the variables with Kao (1999).

RESULTS AND DISCUSSION

Table 3 illustrates the correlation matrix for dependent and independent variables. Significantly, a negative correlation of -0.618 exists between fossil fuel subsidies and female labour force participation rates. The strongest positive correlation is observed with log GDP per capita and women's political participation.

Table 3. Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)female_labour_force	1.000						
(2)fossil_fuel_subsidies	-0.618	1.000					
	(0.000)						
(3)fertility_rate	-0.707	0.561	1.000				
	(0.000)	(0.000)					
(4)log_GDP_per_capita	0.805	-0.427	-0.574	1.000			
	(0.000)	(0.000)	(0.000)				
(5)unemployment_rate	-0.650	0.477	0.396	-0.634	1.000		
	(0.000)	(0.000)	(0.000)	(0.000)			
(6)urban_population	0.139	-0.148	0.022	0.318	-0.126	1.000	
	(0.003)	(0.004)	(0.646)	(0.000)	(0.008)		
(7)women_political_participation	0.702	-0.503	-0.569	0.591	-0.420	0.105	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.028)	

Table 4 presents CD test results indicating the presence of significant cross-sectional dependence on all study variables. The CD-test values are all notably high, with p-values confirming strong statistical significance. This suggests that observations across different countries are not independent, which means that shocks or changes in one unit are likely to affect others. The findings suggest the need to control for CD in our study, ensuring robust statistical modeling.

Table 4. CSD results

Variables	CD-test	p-value
female_labour_force	50.31	0.000
fossil_fuel_subsidies	15.95	0.000
fertility_rate	9.33	0.000
log_GDP_per_capita	66.51	0.000

unemployment_rate	25.36	0.000
urban_population	51.16	0.000
women_political_participation	25.44	0.000

Table 5 summarizes the results of testing for slope heterogeneity in our dataset. Both p-values indicate strongly significant results, confirming evidence of slope heterogeneity within the dataset. This shows that the relationship between the variables varies significantly between different groups or under different conditions. This has important implications in statistical models as it suggests that using a single model to describe the relationship might be inappropriate, and group-specific or condition-specific models would be appropriate.

Table 5. Testing for slope heterogeneity

	Delta	**p- value**
	-9.950	0.000
Delta_ adj.	-7.132	0.000

Table 6 presents the outcomes of the unit root test based on Karavias and Tzavalis (2014). The null hypothesis states that panel data have a unit root. The test has shown that the series is mixed at levels, and some of the series require differencing to attain a stationary state. This establishes how the data should be handled in further analysis, especially for determining whether the series is stationary or non-stationary and whether the data needs to go through first differencing.

Table 6. Karavias and Tzavalis (2014) unit root test results

	I(0)	**I(1)**
female_labour_force participation_rate	-4.775***	-
fossil_fuel_subsidies	-3.466	-11.657***
fertility_rate	0.001	-0.136**
log_GDP_per_capita	-0.048***	-
unemployment_rate	-4.310***	-
urban_population	-0.077***	-
women_political_participation	-0.007	-0.058**

Kao test for cointegration is presented in Table 7. This test helps to determine the nature of the variables' relationship over time. The findings show a long-term relationship between these variables.

Table 7. Kao test for cointegration

Estimates	Stats	p-value
Modified Dickey–Fuller t	2.344	0.009
Dickey–Fuller t	1.965	0.024
Augmented Dickey–Fuller t	3.977	0.000

To provide further evidence beyond the conditional mean and to uncover the heterogeneity in the impacts, we utilise the Method of Moments Quantile Regression. Estimation results are summarized in Table 8. Fossil fuel subsidies have a negative coefficient in all quantiles (10th, 50th and 90th percentiles). However, the negative impact of these subsidies on female labour force participation is more pronounced in countries with low female labour 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 labour 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 labour force participation is low, these subsidies may further entrench existing gendered structures in the labour market, thus limiting women's economic opportunities. However, as we move to countries where female labour 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.

Other interesting findings indicate that the fertility rate, while it has a strong positive effect on the median and upper quantiles, significantly reduces the dependent variable at the 10th percentile. This suggests that in countries where female labour force participation is low, higher fertility rates significantly diminish labour force participation. Women's political participation demonstrates a robust positive effect in all quantiles, but it is particularly pronounced at the 90th quantile, implying that in countries with high female labour participation, political engagement may enhance this effect even more. Log GDP per capita remains a crucial driver of outcomes, with its impact increasing at higher quantiles, reinforcing the notion that economic growth benefits countries with already high female labour participation. Similarly, the unemployment rate has a disproportionately larger negative effect on the lowest quantile, highlighting the need for job creation policies targeted at countries with lower female labour force participation.

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 the South Mediterranean systematically underperforms relative to Europe, regardless of female labour participation level, pointing to deeper institutional and policy barriers. The fact that the South Med dummy becomes more negative at the 90th quantile indicates that the "best" countries in Europe achieve significantly higher female labour force participation rates compared to the "best" countries in South Med.

Table 8. Estimates of Method of Moments Quantile Regression

Variables	Location	Scale	Q_10	Q_50	Q_90
fossil_fuel_subsidies	-1.015***	0.095	-1.181***	-1.011***	-0.869***
	(0.294)	(0.056)	(0.284)	(0.294)	(0.324)
fertility_rate	2.995***	3.228***	-8.695***	3.148***	7.903***
	(0.983)	(0.393)	(1.971)	(1.006)	(1.501)
log_GDP_per_capita	10.241***	1.545***	7.562***	10.313***	12.589***
	(1.123)	(0.455)	(1.766)	(1.098)	(0.870)
unemployment_rate	-0.446***	-0.116***	-0.647***	-0.441***	-0.269*
	(0.107)	(0.030)	(0.073)	(0.107)	(0.151)
urban_population	0.013	0.039**	-0.053	0.015	0.073**
	(0.040)	(0.016)	(0.066)	(0.040)	(0.023)
women_political_participation	16.012***	2.506**	11.667***	16.131***	19.822***
	(1.959)	(0.975)	(2.186)	(1.972)	(2.769)
_cons	-57.004***	-22.392***	-18.183	-58.062***	-91.048***
	(10.363)	-(4.370)	(16.510)	-*(10.047)	(8.537)
Region Dummy	-20.105***	-0.353	-19.493***	-20.122***	-20.642***
south_med	(0.830)	(1.020)	(1.982)	(0.831)	(1.738)
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 (Baum et al., 2010). Region dummy is included in the estimation to account for regional differences.

CONCLUSIONS AND POLICY CONSIDERATIONS

This study sheds light on the relationship between fossil fuel subsidies and female labour force participation across different levels of participation. By employing quantile regression, in 34 Euromed countries from 2010 to 2022, we reveal that lower quantiles, fossil fuel subsidies exhibit a strong negative effect on female labour force participation, suggesting that countries dependent on subsidies limit opportunities for women. At the 90th quantile, the effect is less negative, suggesting that in countries where the female labour force is high, the adverse impact of subsidies is weaker. This may indicate that regions with high female labour force participation have institutional settings and policies that favour a reduction of the negative effects of fossil fuel subsidies.

The empirical results show that log GDP per capita is positively associated with female labour force participation, with a larger effect at higher quantiles, implying that economic development creates greater labour market integration for women. However, unemployment rates negatively affect female labour 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 labour force participation across all quantiles, supporting the idea that higher gender representation in policymaking translates into more inclusive labour policies. Lastly, the South Med dummy variable is consistently negative, and its impact becomes more pronounced at the 90th percentile, indicating that the female labour force participation gap between South Med and Europe widens at higher levels of female labour force participation. While female labour force participation is already lower in South Med, the barriers to female labour 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.

Policy recommendations for the Euromed countries to increase female labour force participation can be made, taking into consideration the challenges posed by the countries' structures. Given the negative links between fossil fuel subsidies and female labour force participation, governments should gradually reduce these subsidies and reallocate funds toward policies that enhance female labour market participation. Investments in education, childcare, and training programmes for women should be prioritised to facilitate their participation in the labour market. Fossil fuel subsidies reforms should be complemented by gender-sensitive policies to prevent job displacement for women. Green energy policies should include provisions that actively support women's inclusion in renewable energy employment. Moreover, the strong positive correlation between women's political participation and female labour force participation suggests that gender-balanced policymaking leads to inclusive labour policies.

Limitations of the present study can motivate future research in the field. Future studies could examine sectoral variations or socio-cultural parameters that may enrich our understanding of the links between energy subsidies and female labour force participation.

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 the use of the available funding for female-support and targeted social programmes can lead to long-term improvements in female labour force participation.

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