BEYOND THE EFFECT, AN EXAMINATION OF ELEMENTS EMPOWERING WOMEN IN POLITICS ON C02 REDUCTION: FROM AN ECONOMETRIC APPROACH

Research Article

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Abstract

Demonstrating the existence of Gender differentiation in the context of women's involvement in the environment in contrast to their male peers in the same field, have been complex if somewhat paradoxical. The current paper examines this general trend from an alternative dimension. We focused on factors that assist and empower women in politics to adopt policies that retroactively reduce the level of C02 emissions. In doing so, Nordic and Central European countries from 2002 to 2021 were selected. A stepwise-fixed effect, random effect, and quantile regression analysis have been performed. The findings demonstrated that, indeed, a greater number of women holding seats in parliament led to C02 reduction, whereas, variables such as the absence of corruption, academic freedom, respect for fundamental rights, and government effectiveness showed a significant effect by assisting in women's mission. Reversely, regulatory quality and freedom of association don't contribute to women's embracing policies that mitigates the level of C02. The quantile regression reported that all the variables (also women in politics) correspondingly affect C02 quantities, nevertheless, this collective effect only materializes in the upper percentile. The current research overcomes the myopic findings between women in politics and environement, by illustrating facilitator factors and drafting lessons from the European countries.

Keywords: C02 emission, Women in politics, Environmental governance, quantile regression, Panel data.

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INTRODUCTION

The question of why women are so likely to portray positive environmental behavior still remains abstract. Perhaps, the eco-feminism[2] theory might provide a more reasonable answer (Nightingale, 2006). According to their theory, this pro-environmental altitude could be linked to a larger dimension such as so-called, historical patterns, cultural norms, and social factors, which in turn position women in a subsistence-oriented role (Terry, 2009). Terry sees this positive environmental propensity from a societal scope. However, this appears to be simultaneously obsolete and realistic, for instance, many women in some areas around the world have access difficulties to clean water, while simultaneously working to feed their families. As a result, this environmental degradation affects them more than anyone, therefore, their involvement in politics is certainly a prerequisite for the environment (McKinney, 2014).

Ecological feminists have also interpreted this pro-environmental attitude from a more structural logical sense, in which the existence of domination for both the environment and women exists, thus this simultaneous exploitation reinforces each other (Errington, 1990; Warren, 2018). One example of how gendered institutions negatively impact both women and the environment can be explained through a framework of economic value that views women's unpaid work as unproductive and natural resources as a gift to humanity, hence increasing their behaviorism that is based on consecutive extraction, as a turn reinforcing this senseless attitude of over-exploitation (Warren, 2018).

Nevertheless, as more women have been participating in the environmental adaptation and sustainability process, many countries have been experiencing a decent environmental performance due to the increase in the number of women holding political positions, although, other authors consider this gender differentiation probabilistic rather than realistic (Wängnerud, 2009a), and when they discover the above connection between women and environment it is either intricated and projects multidimensional results than a straightforward point (Wängnerud & Sundell, 2012b). Nonetheless, this doesn't negate the positive outcome that women have on the environment. Norgaard and York (2005) assert that countries with greater percentages of female participation are more prone to ratify and sign climate treaties. Likewise, when women's political status are higher, by holding stronger political positions, the amount of c02 reduces in proportions (Ergas, & York, 2012). Shandra et al. (2008) also reported that, countries that endorse political and gender equality are associated with lower deforestation. The following outcome may be, because, women are unlikely to support deforestation legislation, however many authors have associated this propensity with political affiliation rather than a mere gender differentiation.

[2] Ecofeminism argues that the domination of women and the degradation of the environment are consequences of patriarchy and capitalism (See; Ottuh, 2020).

The movement of exploring the effect of women's participation in the decision-making process had been examined by scholars (Ergas & York, 2012; Mavisakalyan & Tarverdi, 2019), alternatively, previous findings might quite appear paradoxical, as juxtaposing the environment and women have not been supported by certain authors (see; Lv & Deng, 2019), yet, previous papers haven't explored which factor assist in women's favorable environmental policies adoption, not exactly in the sense of why women are more prone to preserve the environment, but rather from the spectrum of factors that facilitates women the support to embrace and protect the environment. Although (Mujeed et al., 2021) explored facilitator factors, but their study was directed toward technological development, and R&D. Therefore, the current paper applies several new variables that have been neglected before, such as; (*the absence of corruption, freedom of association, regulatory quality, academic freedom, respect for fundamental rights, and the level of effectiveness in the bureaucratic systems*). We believe, certainly, women contribute to environmental betterment, to some extent, however, we hypothesize several facilitator factors should be first established to attain such as environmental performance. Additionally, after examining the attributive factors, the current paper will explore the cumulative effect of the selected variables on the main factor (Women in politics). Finally, the paper's geographical scope focuses on Nordic and Central European countries. Due to their high environmental performance scores, human capital development, and democratic level (in regard to our variables) these countries would provide us with a salient framework for our empirical investigation. Thus, to attain our objective, we will first perform a stepwise-fixed effect method to demonstrate facilitator factors, further, a tripartite model involving of; a random effect, fixed effect, and quantile regression to assess the overall effect of all the factors.

Overview of Literature papers

A common belief is that societies with a higher emphasis on equality and social inclusion are more prone to perform better than others. According to this idiosyncrasy, many authors have proven the accuracy of this theory. And clearly by referring to the renowned sustainable development goals, that provides us with a higher pragmatic approach, in which; participation, equality (Political, economic, gender), and empowerment had been included in their agenda as a global fixed goal. Apparently, a significant body of literature on environmental policies, political theory, ecology attitudes, and environmental justice proved that women are more inclined to convey a positive attitude toward the environment than men, this strong frequency of pro-environmental justice can be linked to their perceiving of climate change as a global threat, as a result, adopting several preferential environmental policies—which in the best scenario, could assist in mitigating environmental degradation (Buckingham, 2010a; McCright, 2010; Dietz et al., 2002).

Prominent authors such as Ergas & York (2012), quantitatively studied this theory by using a cross-nation data and found evidence that nations with higher

political standing for women have fewer CO2 emissions. Providing further support for the existence of an association between women in politics and ecology, Fredriksson and Wang (2011) discovered that female members of the US House of Reps favor tougher environmental regulations, compared to their male peer members of the same House. Fraune (2016) also revealed the existence of gender differences in the context of energy policy drafting among U.S. and German legislators. In addition, according to an estimation published by (Rachel's Network), containing the poll result of congress-women in the U.S. from the period 2001 to 2010. İt indicated that women regularly support, and are in favor of environmental laws and regulations more than males, regardless of their political affiliation.

However, this is only in the U.S context, as authors such as Fielding et al. (2012) revealed paradoxical findings in which, political orientation plays a significant role in mediating environmental concerns among Australian legislatures. A similar result had been concluded by (Jensen, 2000), where the author examined the relationship between party affiliation and environmental attitude in the Norwegian parliament. Jensen (2000) also deduced that the perception of environmental threats is driven by the legislator's parliamentary party—and not by their gender. In another study, Sundström and McCright (2014), validated the previous arguments by focusing on the Swedish parliament, in which political affiliation, largely, explains this pro-environmentally attitude rather than gender gap contextualization.

Moreover, the cause-and-effect relationship between C02 emission and Women is also evident in recent studies, in a panel of 21 mixture nations (Asian and African), Saleem et al. (2018) showed a one-way effect relationship between co2 emission and maternal hazards of mortality. The author showed how can an extensive carbon dioxide emission could be harmful to women in the maternity process. Indeed, environment and climate change affect directly or indirectly women—for instance, (Ergas and York, 2012) mentioned the direct impact of pesticides on women's well-being. Similarly, Silva et al. (2019) reported an association between breast cancer and chemicals (Pesticides). The authors have investigated several women with confirmed breast cancer in a region located in Brazil, after conducting several analyses, unequivocally, an association validating their theory has been reached. According to the findings, exposure to pesticides causes breast cancer, as result, further supporting the direct effect that environmental risk factors have on women. Another research conducted by WHO revealed that exposure to chemicals (Pesticides) increases the likelihood that a woman may experience an abortion. Likewise, Researchers that study the relationship between gender and natural catastrophes have discovered that poor rural women in the world are substantially influenced by natural catastrophes. And because of this, these women are more exposed to the threat of climate change, which will undoubtedly increase more frequently in the future with greater intensity (Denton, 2000; Buckingham et al., 2005b, Stevens, 2010).

Henceforth, it is believed that this environmental deterioration caused by humans, which in their turn, are reversely consequential for women, could explain women's inclination to preserve the environment (McKinney & Fulkerson, 2015).

Unfortunately, there is an unprecedented lack of representation of women in the climate change discussion forums and policy-making institutions, especially disadvantaged women and the Intergovernmental Panel on Climate Change (IPCC) is not an exception, with only a scant number of positions occupied by women (Ergas & York, 2012; Buckingham, 2010). The authors also continued by stating that, these organizations exclusively ignore the fact that women are crucial partners in natural resources as well as the first potential victims of environmental destruction. And indeed, this collides with reality, as women are frequently key players in preserving their local ecology (The case of the Kenyan Green belt) and they actively work alongside NGOs and other organizations by participating in climate change policy implementation. (Bell & Braun, 2010). Moreover, a study carried out by (Buckingham et al., 2005b) demonstrated that municipalities with a higher proportion of women demonstrated greater recycling rates than other municipalities with scarce women on board. Salahodjaev & Jarilkapova (2020), Kennedy & Kmec (2018), also found that a higher percentage of female lawmakers have a high commitment to protecting the environment, this propensity of pro-environmental behavior can be noticed in the number of anti-deforestation policies adopted by women. Another study by (Kronsell et al., 2016; Basarić et al., 2016) explored the association between women and infrastructure development and showed that women in politics have a higher chance of establishing sustainable transportation systems, in the context of consumption and adopting sustainable policies directed to infrastructure. Clearly adopting sustainable transportation systems could take time and require extra funds in order to renovate and restructure the whole infrastructure, however, Kronsell et al, 2016 suggest, due to low corruption in the system, particularly, in cabinets where women hold the majority of sits, the likelihood of misallocation in funds are limited. Even, Eisler & Yoshida (2003), noted that women can perhaps be the seeking response for Green hourse gas emssion (GHG) mitigation.

This positive trend had been withheld by many authors, certainly, women who are involved in politics contribute to C02 reduction, but this can't be taken into account as the asserted findings and theory by previous authors might only be partially realistic, as C02 emission reduction would probably take time to fully transpire (Lv & Deng, 2019). Similarly, other studies reported no gender differentiation in the context of environmental

preservation. Jones (1997), investigated Argentines' chamber of deputies and the U.S representative's house. The author found that gender differentiation only exists in legislatures addressing gender equality, women's rights, children, and education, while the above-mentioned issue of environment, showed a reversed result. Supported by Reingold (2003), who found no discernible gender differences between Arizona and California legislators in terms of either climate policy positions or priorities. Thombs (2021) also suggested that achieving more political equality is a prerequisite for a society to flourish, however, there is inconclusive evidence suggesting that this can unequivocally reduce C02 emissions.

METHODOLOGY

In this study, we aim to explore factors assisting women in politics to take preferential policies that mitigate the level of c02 emissions. In doing so, variables such as the absence of corruption, freedom of association, regulatory quality, academic freedom, respect for fundamental rights, and the level of effectiveness in the bureaucratic systems were selected as candidate variables. On the other hand, the women in parliament factor were used as a proxy for women in politics. In addition to this, the paper focuses on Nordic and Central European countries from 2002 to 2021. First, we checked the existence of a relationship between women in politics and C02 emissions to proceed with our analysis, after finding an association, we further employed a fixed effect stepwise model to explore the attributive factors that empower women's pro-environmentalism attitude. Hence the following equation was developed for this part of the study:

$$\mathrm{C02}_{it1} = \alpha_{it} + \mathrm{WIP}_{it2} + u_{it} \quad (1)$$

$$\mathrm{C02}_{it1} = \alpha_{it} + \mathrm{WIP}_{it2} + \mathrm{ACR}_{it3+}\ \mathrm{FAA}_{it4} + \mathrm{RQ}_{it5} + \mathrm{AFCE}_{it6} + \mathrm{RFR}_{it7} + \mathrm{GE}_{it8} + u_{it} \quad (2)$$

Where C02 is the level of carbon dioxide emitted by Nordic and central European countries, WIP is women in politics, ACR denotes the absence of corruption, FAA is freedom of association and assembly, RQ is regulatory quality, whereas, AFCE and RFR represent academic freedom and respect of fundamental rights, whereas GE denotes the level of bureaucratic effectiveness in the selected countries, β1 - β5 are the parameters to be estimated, *uit* is the fixed effect.

Followed by a panel quantile regression analysis joined with a fixed effect. In this step, we are seeking to examine the effect of all the above-mentioned variables (including women in politics) on C02 emissions. In comparison to OLS regression, the quantile regression, which was introduced by Koenker and Bassett, has significant advantages. For example, panel quantile regression models are more reliable, and do not need the use of distributional assumptions. Additionally, this approach may accurately represent the properties of the whole conditional distribution of all variables (Sherwood & Wang, 2016). Many growing literature

papers developed a quantile regression with additive fixed effect, see (Canay, 2011; Albulescu et al., 2019; Cheng et al., 2018), hence we employ these equations to examine determinants of C02 emissions reduction.

$$\varrho_{it}\{\mathrm{T}_k \mid \alpha_I, \chi_{iT}\} = \alpha_I + \chi_{it}\beta(\mathrm{T}_k) \qquad 3$$

where y1t is the conditional quantile, x1t is a k dimensional vector of explanatory variables, β(τk) is the slope of coefficients, such as the parameter of interest and αi is the fixed effect parameter.

$$\underbrace{\operatorname{argmin}}_{\alpha} \sum_{i=1}^{K}\sum_{i=2}^{N}\sum_{i=3}^{T} \omega_K \rho_{tk}\left\{\Upsilon_{i,t} - \alpha(\tau)'\mathrm{X}_{i,t} - \beta_i\right\} + \mu\sum_{i=}^{n} |\beta_i|\; i = 1, \dots N, t = 1, \dots . T \qquad 4$$

Where i denotes for the countries (N), t the number of observed per country, K denotes quantile index, X are explanatory variables (Matrix), whereas ptk is the quantile loss function. Wk denotes for relative weight on the K-th quantile see, (Zhu et al., 2016). The turning point can be seen from μ. Finally in order to proceed with our analysis we consider using a more specific equation that relates to our study:

$$\varphi_{\gamma i.t}(\mathrm{T}|\mathrm{X}_{i,t}) = \alpha_{1,t}C02_{i.t} + a_{2,t}WIP_{i,t} + a_{3,t}ACR_{i,t} + a_{4,t}FAA_{i,t} + a_{5,t}RQ_{i,t} + a_{6,t}ACFE_{i,t} + a_{7,t}RFR_{i,t} + a_{8,t}GE_{i,t} + \beta_i \qquad \mathbf{5}$$

Results and Findings

The descriptive statistics are shown in Table 1, Nordic and central European countries have an average of 6.97 of C02 emission with a maximum likelihood of 13.7 emission tons. While the standard deviation is 3.226 (originally this high STd is linked to the the amount of C02 emissions which is evelauted as a metric tons per capita in contrast to other variables which are estimated by percentage). on average the number of women in parliament is 32% with a maximum percentage of 47%, and the standard deviation is less than one. Absence of corruption and freedom of association seems to be high with a maximum of 0.95% and 0.97% respectively, demonstrating a strong dedication to fundamental rights and a near-total lack of corruption. Additionally, regulatory quality, academic freedom, and respect for fundamental rights appear to be higher than 70%, providing us a glimpse of the high level of human capital and social qualities in the selected European countries.

Table 1. descriptive statistics

variable	mean	Median	Maximum	Minimum	Standard deviation

C02	6.976	7.669	13.75	0	3.223
WIP	0.322	0.355	0.476	0	0.117
ACR	0.797	0.861	0.969	0.493	0.170
FAA	0.801	0.814	0.959	0.541	0.103
RQ	1.443	1.513	1.900	0.482	0.320
ACFE	0.867	0.883	0.955	0.493	0.092
RFR	0.866	0.869	0.957	0.669	0.071
GE	1.536	1.649	2.234	0.486	0.472
C02: Carbon dioxide emissions, WIP: Women in politics, ACR: Absence of corruption, FAA: freedom of association, RQ: Reugulatory quality, ACEF: academic freedom, RFR: respect for fundamental rights, GE: Government effectiveness.					

The correlation in Table 2 indicates a positive association between the absence of corruption, regulatory quality, academic freedom, fundamental rights, and government effectiveness with value of 0.03, 0.09, 0.30, 0.25, and 0.15, respectively. On the other hand, women in parliament have a negative association with C02 emissions. However, all the selected factors are adversely and positively associated with women in parliament indicator. Hence, as these factors increase the probability of women's empowerment increases alongside, implying their positive effect of creating more favorable conditions. Additionally, the presence of multicollinearity was checked, it can be seen from the VIF results that the model is not suffering from any collinearity, thus maintaining all the variables.

Table 2. Correlation results

	C02	WIP	ACR	FAA	RQ	ACFE	RFR	VIF	1VIF
								7.57	0.132
C02	1							6.2	0.161
WIP	-0.111	1						5.69	0.175
ACR	0.037	0.8490	1					5.24	0.190
FAA	-0.067	0.713	0.560	1				4.08	0.245
RQ	0.099	0.733	0.739	0.608	1			3.49	0.286
ACEF	0.309	0.447	0.396	0.691	0.591	1		2.73	0.363
RFR	0.251	0.745	0.853	0.550	0.769	0.561	1	7.57	0.132
GE	0.157	0.840	0.838	0.690	0.829	0.527	0.754	6.2	0.161
C02: Carbon dioxide emissions, WIP: Women in politics, ACR: Absence of corruption, FAA: freedom of association, RQ: Reugulatory quality, ACEF:									

academic freedom, RFR: respect for fundamental rights, GE: Government effectiveness.

Table 3 estimate variables mediating women's positive environmental altitude; first, we checked if there is truly a relationship between gender and C02 emissions, as can be seen from the table, when women hold a certain political position the level of c02 emission is reduced by 29.02%. This implies that, as more women get involved in national environmental policies, the likelihood of witnessing a decrease in C02 becames more plausible in nordic and central European countries. This negative effect on C02 remains the same throughout the model, unchanged, particularly, when we included other candidate variables. Moreover, other variables such as the absence of corruption also reduces the amount of C02 emissions. Unequivocally this signifies, that states with higher transparency levels and governmental integrity perform better in addressing environmental threats, although, this might seem feeble in the context of mitigating climate change, however, less corruption affects indirectly the environment by providing more opportunities for women in the sense of establishing systems that are based on meritocracy and gender equality, and as women are less inclined to corruption, this affects, alternatively the environment, observe **table 3**. Additionally, academic freedom and fundamental rights are both pillars of women's empowerment. Certainly, emphasizing in human rights and preserving gender equality will enhance women's effectiveness to engage further in environmental activities, hence retroactively, this will introduce other potential stakeholders in the political sphere. Similarly, an open academic platform will assist women to acquire all the recent academic tools to be better equipped for forthcoming environmental threats. On the other hand, regulation quality (1.571) and freedom of association (2.281) don't have any effect on women's empowerment, albeit, the former (Regulatory qualities) projectieng a negative value. Whereas, government effectiveness has a positive effect on c02 emission, for instance, an increase of 1% in the level of public official's effectiveness in Nordic and central European countries, women's involvement in the environment increases by 4.32% which in turn decreases the amount of c02 by 24%, observe **table 3.**

Table 3. Fixed effect model, Factors contributing to women's favorable environmental altitude

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	C02	C02	C02	C02	C02	C02	C02
WIP	-29.02***	-26.55***	-29.02***	-29.58***	-24.71***	-28.65***	-24.15***
	(4.988)	(4.566)	(5.001)	(4.995)	(4.836)	(4.923)	(5.153)
ACR		40.087***					
		(7.105)					
FAA			2.281				
			(4.339)				
RQ				-1.571			

				(1.213)			
ACFE					12.658***		
					(2.979)		
RFR						18.656**	
						(8.228)	
GE							4.321***
							(1.494)
_cons	16.33***	-16.47***	14.50***	18.78***	3.965	.046	8.126**
	(1.62)	(5.995)	(3.838)	(2.488)	(3.292)	(7.36)	(3.25)
Observations	160	160	160	160	160	160	160
R-squared	0.183	0.326	0.185	0.192	0.271	0.21	0.226
Standard errors are in parentheses							
*** p<.01, ** p<.05, * p<.1 Jarque-Bera normality test: 0.068 Ramsey test 0.111							
C02: Carbon dioxide emissions, WIP: Women in politics, ACR: Absence of corruption, FAA: freedom of association, RQ: Reugulatory quality, ACEF: academic freedom, RFR: respect for fundamental rights, GE: Government effectiveness.							

Following our investigation into which factors assist in women's favorable environmental performance, we decided to examine the impact of all factors on the environment when they are all included altogether **Tables 4, 5,** and **6**. According to the fixed effect and random effect results, women in parliaments appear to be maintaining their effect on the environment. Subsequently, deducing that women's policy indeed leads to pollution reduction, moreover, less corruption leads to higher integrity among politicians, thus reversely decreasing the level of C02 emissions. Indeed, when we look back at our data, we are focusing on a combination of Nordic and central European countries, and, statistically speaking, half of these selected countries, rank in the least corrupt countries, if somewhat first, therefore, reinforcing our assumption that lower corruption improves the environment. Guarantee freedom of association appears to be only significant in the random effect model, implying that less restriction on liberty increases environmental activities and provides greater reassurance to environmentalists, in terms of assembly and denouncing environmental degradation (observe the fixed effect and random effect results, **table 4 and 5)**. Similarly, regulatory qualities de facto enhance environmental quality by affecting negatively gas emissions. Academic freedom and fundamental rights both also contribute to environmental performance in the selected countries. Certainly, these countries are well known for their perfect human right score, as a result, they established a positive cohesion between academicians and public authority, by collectively addressing environmental challenges. The table also shows that governmental effectiveness has a positive effect on the environment, which means that an increase in effectiveness among governmental bodies, the likelihood of environment ameliorating is predicted to increase by 3.36%(fixed effect model) and 6.92% (random effect model), respectively; see **table 4 and 5.**

Table 4. Lower quantile with fixed effect, (Dependent variable C02)

Variable	Coefficient	Lower Quantile	

		Q0.05	Q0.10	Q0.15	Q0.20	Q0.25	Q0.30	Fixed Effect
WIP	Coefficient	-18.50	-16.83	-14.34	-9.505	-8.463	-7.049	-16.85***
	T-value	-1.65	-1.61	-1.35	-0.99	-0.97	-0.93	(-3.82)
ACR	Coefficient	1.27	7.781	5.851	-9.007	-11.22	-11.54	40.19***
	T-value	0.13	0.66	0.56	-0.8	-1.25	-1.72*	(4.93)
FAA	Coefficient	-16.841	-25.714	-22.832	-23.471	-24.591	-24.59	-5.675
	T-value	-1.06	-2.05**	-2.64***	-2.99***	-3.61***	-3.38***	(-1.21)
RQ	Coefficient	-11.215	-7.833	-3.631	-4.285	-4.39	-4.168	-4.257***
	T-value	-3.72***	-3.64***	-1.95*	-2.3**	-3.21***	-3.94***	(-3.38)
AFCE	Coefficient	24.735	25.666	20.574	19.284	18.883	17.407	19.21***
	T-value	1.98**	2.85***	1.88*	1.89*	1.95*	1.73*	(5.86)
RFR	Coefficient	29.486	30.696	19.516	36.115	39.025	38.245	-28.22**
	T-value	1.7*	1.38	0.96	1.8*	2.46**	2.99***	(-2.71)
GE	Coefficient	6.02	3.633	4.185	5.803	6.137	6.034	4.643**
	T-value	1.86*	1.07	1.56	2.35**	3.13***	4.12***	(3.36)
Const								-8.302 (-1.24)
Obs	160							
*** p<.01, ** p<.05, * p<.1								
C02: Carbon dioxide emissions, WIP: Women in politics, ACR: Absence of corruption, FAA: freedom of association, RQ: Reugulatory quality, ACEF: academic freedom, RFR: respect for fundamental rights, GE: Government effectiveness.								

Furthermore, the real effect of women in politics on the level of c02 emitted by Nordic and central European countries, begins to materialize in the middle quantile regression Q0.40 Q0.45Q0.50… to Q0.85. As more countries accentuate on political equality, the number of women holding governmental positions correspondingly increases, notably, this considerable hike of women involved in politics affects negatively by hampering the level of C02 emission, see **table 5 and table 6.**

Table 5. Intermediate quantile with random effect, (Dependent variable C02)

Variable	Coefficient	Middle Quantile						
		Q0.35	Q0.40	Q0.45	Q0.50	Q0.55	Q0.60	Random effect
WIP	Coefficient	-9.231	-13.639	-15.414	-14.93	-14.603	-14.709	-16.99***
	T-value	-1.51	-3.02***	-3.58***	-3.03***	--3.21***	-3.05***	(-4.56)
ACR	Coefficient	-14.157	-14.356	16.608	-14.544	-16.867	-17.74	-8.389**

	T-value	-2.78***	-3.63***	-3.32***	-3.82***	-4.46***	-4.84***	(-2.82)
FAA	Coefficient	-16.848	-11.661	-10.838	--9.525	-7.77	-6.341	-14.40***
	T-value	-2.17**	-1.69*	-1.95*	-2.52**	-2.53**	-1.92*	(-4.37)
RQ	Coefficient	-3.1	-3.311	-2.765	-2.577	-2.526	-2.39	-4.611***
	T-value	-2.82***	-3.75***	-3.6***	-3.21***	-3.44***	-2.31**	(-3.97)
AFCE	Coefficient	10.308	7.029	6.739	4.834	2.031	-0.685	15.40***
	T-value	0.98	0.75	0.88	0.98	0.42	-0.15	(4.62)
RFR	Coefficient	42.972	44.837	43.254	45.047	48.266	50.175	32.05***
	T-value	3.8***	5.9***	5.64***	7.82***	8.52***	6.09***	(5.47)
GE	Coefficient	5.503	5.99	5.805	5.65	5.867	5.607	6.716***
	T-value	4.38***	6.56***	6.94***	9.19***	8.59***	6.57***	(6.92)
const								-14.11*** (-4.10)
*** p<.01, ** p<.05, * p<.1								
C02: Carbon dioxide emissions, WIP: Women in politics, ACR: Absence of corruption, FAA: freedom of association, RQ: Reugulatory quality, ACEF: academic freedom, RFR: respect for fundamental rights, GE: Government effectiveness.								

Table 6. Upper quantile, (Dependent variable C02 emission)

Variable	Coefficient	Upper Quantile				
		Q0.65	Q0.70	Q0.75	Q0.80	Q0.85
WIP	Coefficient	-12	-11.16	-1.312	-11.27	-16.385
	T-value	-2.26**	-2.14**	-1.76*	-1.64	-2.63***
ACR	Coefficient	-17.063	-13.589	-16.882	-16.461	-16.304
	T-value	-4.52***	-3.36***	-3.59***	-3.46***	-4.71***
FAA	Coefficient	-9268	-9.755	-11.084	-10.7	-12.381
	T-value	-2.58**	-2.68***	-3.11***	-2.44**	-275***
RQ	Coefficient	-2.41	-1.44	-2.184	-1.293	-1.307
	T-value	-1.82*	-1.01	-1.73*	0.86	-0.57
AFCE	Coefficient	0.937	5.558	5.998	6.707	7.723
	T-value	0.19	1.42	1.75*	1.82*	1.55
RFR	Coefficient	45.267	36.046	39.174	35.872	35.371
	T-value	4.64***	3.96***	3.82***	3.25***	3***
GE	Coefficient	5.76	4.561	-5.988	5.7	7.038
	T-value	5.57***	2.92***	3.45***	3.02***	3.85***
*** p<.01, ** p<.05, * p<.1						

C02: Carbon dioxide emissions, WIP: Women in politics, ACR: Absence of corruption, FAA: freedom of association, RQ: Reugulatory quality, ACEF: academic freedom, RFR: respect for fundamental rights, GE: Government effectiveness.

Moving to the lower quantile, Regulatory quality, Academic freedom, and government effectiveness show a significant positive coefficient of 1.89, and 4.12 at Q0.20 and Q0.30 percentiles, respectively **table 4.** Implying that with every 1% increase in bureaucratic effectiveness and Academic freedom, C02 emission reduces by -2.85%. Whereas a negative value can be detected in the regulatory quality, interestingly this negative sign remains unchanged throughout all the percentiles, except it gradually increases in the upper quantile by 0.86, (see Q0.80 percentile) **table 6.** On the other hand, we discern from both tables (middle and upper quantiles), how low corruption among Nordic and Central European officials affect negatively their emission quantities.

DISCUSSION

The paper aimed to explore factors that assist in women's favorable environmental outcomes by adopting policies that reduce the level of C02 emissions in Nordic and central European countries. The findings demonstrated that a greater percentage of women in European countries leads to lower c02. The fixed effect model revealed that the absence of corruption and academic freedom have both positive and significant effects on women's environmental missions, compared with previous findings, we are in line with (Mujeed et al., 2021; DiRienz et al., 2019). Given how corruption impacts the environment in varied ways —boosting the representation of women in political institutions should result in an increase in environmental quality, for instance a higher proportion of women in central government is associated with lower levels of bribery, which is associated with improved environmental outcomes, thus producing a bidirectional spiral effect—by simultaneously affecting corruption and c02 emissions. Furthermore, academic autonomy and patent publication equip women with the most cut-edging green technology, subsequently, assisting them within their ecological footprint reduction agenda.

Furthermore, respect for fundamental rights empowers the degree to which women engage in drafting pro-environmentally policies, nevertheless, for such aspect to materialize, the state should consider including the environmental degradation's effect on human as a fundamental right in their constitution. However, this can be complex, as judges can't introduce new rights into the constitutions, without a greater belief in the reliability, and the magnitude effect of the latter issues—in the sense of general application at a national level, unless it is infringed on one of the major human fundamental rights. In this sense, we refer to a case. For instance, a German court provided a more reasoning argument for how respect for human rights causes individuals to defend the environment indirectly by complaining against the c02 emission, by painting the latter issue as a violation of their basic human rights (Winter, 2022). Interestingly, this could have been more straightforward if the issues in question impacted the plaintiff's

property, health, or other major rights. But, the court contended the inexistence of direct or indirect impact of C02 emission on the person's rights, hereby their constitutional rights haven't been violated (Winter, 2022). Alternatively, the court has based on a proportionality scope, which prevents a single generation to consume a large proportion of c02, while, relatively leaving a small share of reduction effort for the upcoming generation—wherein they bear the responsibilities of a more degraded environment. This implies, although respect for fundamental rights might be a crucial key to c02 reduction, however, incorporating the effect of c02 with other fundamental rights would be more adequate, as addressing the issue will be easier in such a case, nonetheless, considering the impact of C02 emission as a violation of a person's fundamental rights would be unlikely in the present condition, if not in the upcoming future, particularly, when knowing the economic impact of such a decision.

On the other hand, the quantile regression revealed a significant impact of all the variables on C02 emissions. Hence, in order to reduce the negative impacts on the environment caused by the growing levels of Carbon dioxide emission, ensuring a healthy political climate, bolstering regulatory quality, and curbing corruption are all essential. Indeed, creating effective policies to stop environmental degradation may depend on the macro level of bureaucratic effectiveness. These findings are in line with (Gani, 2012), Implying, that the quantity of CO2 emissions may be impacted by a number of governance-related factors, and government effectiveness, regulatory qualities, and the guarantee of human freedom are one of these aspects of governance.

Accordingly, the presence of women in the political spectrum is another component of c02 reduction. For instance—greater portion of women are more inclined to adopt sustainable initiatives, regardless of their economic outcomes (uz Zaman et al., 2021). Such as embracing business contracts with higher compliance measures that promote c02 reduction for the interested entities. Therefore, it is possible to assume that the enforcement of these agreements might contribute to the development of a more compliance-oriented system that encompass a myriad of entities (Companies, firms, and manufacturers) that adheres to contracts that involves of complying from referring parties with national environmental standards. However, all the variables are only significant in the upper quantile, The same confirmation had been suggested by (Lv & Deng, 2019), indeed, state characteristics and women in politics might have certain portion of positive impact on c02 mitigation, althought this will take a certain time to materialize.

CONCLSUION

People ignore that utopia can be defined from a sustainable perspective, and to proceed in this direction, collective inclusion, and citizens' participation is a prerequisite step, regardless of gender differentiation. The main purpose of this paper was to investigate factors that assist women to embrace positive environmental policies that reversely affect the level of C02 emission. One thing can be considered different about this study from previous ones, first, we weren't

seeking to explore how women in politics affect the environment, certainly, previous authors provided us with a straightforward point, however, we were more interested in exploring factors that facilitate and empower women's pro-environmental altitude. In doing so, Nordic and Central European countries have been selected from 2002 to 2021. First, a stepwise-fixed-effect model was employed, we discovered that in countries with a higher percentage of women on board, regardless of their governmental or municipal positions, their impact on C02 emission reduction is unequivocal.

Following these findings, we further analyzed how other selected variables empower women. Clearly, the absence of corruption, academic freedom, respect for fundamental rights, and higher effectiveness in the bureaucratic systems facilitates women's C02 mitigation. Indeed, when countries value fundamental rights and embrace greater political equality, the level of environmental degradation caused by excessive pollution decrease, this can be linked to the increase of other potential stakeholders (women) in the public sectors, thus experiencing, not only a more harmonized system that is channeled by an egalitarian mechanism—but also reinforces community inclusiveness to better be equipped with forthcoming environmental challenges. Alternatively, regulatory quality and freedom of association don't show any impact on women's environmental positive outcomes. Furthermore, we performed a quantile regression to examine the effect of all the variables including women in politics. The findings revealed that the cumultative effect of the used variables considerably reduce carbon emission, however, a collective significant impact can only be noticed in upper percentiles, implying that, although a direct effect exists, however, this might, presumably take time to materialize.

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Table 7. Apprendix 1. Variable summary

Variables	Description	Source
C02 emissions	CO2 emissions (metric tons per capita)	World development indicators
WIP	The proportion of seats held by women in national parliament (%)	World development indicators
ACR	the extent to which the executive and the public administration, more broadly, do not abuse their office for personal gain. Scaled to range from 0 (lowest score) to 1 (highest score)	The global state of democracy indices
FAA	Freedom of association and assembly. Scaled to range from 0 (lowest score) to 1 (highest score).	The global state of democracy indices
RQ	Regulatory quality, ranging from -2.5 to 2.5	World governance indicators
AFCE	Freedom of academic and cultural expression. Scaled to range from 0 (lowest score) to 1 (highest score).	The global state of democracy indices
RFR	Respect of Fundamental Rights Scaled to range from 0 (lowest score) to 1 (highest score)	The global state of democracy indices
GE	Government effectiveness, ranging from -2.5 to 2.5	World governance indicators

Table 8. Selected countries for the study

Finland
Iceland
Norway
Sweden
Austria
Czech Republic
Germany
Hungary