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Wealth Taxes, Carbon Inequalities and Climate Justice: New Empirical Evidence from Dynamic ARDL Simulations[1]

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Abstract

Today, high-income groups disproportionately contribute to carbon emissions, making policies targeting these groups crucial for addressing climate issues. In this context, this study empirically examines the potential relationship between wealth taxes and carbon emissions in Turkey using data from 1985 to 2021. Results obtained using the dynamic ARDL simulation approach show that a 20% increase in wealth taxes is associated with a measurable decrease in carbon emissions. This finding is also confirmed by the KRLS method. The findings provide insights into the design of progressive taxation strategies that could support climate justice.

Keywords: *Wealth Taxes, Climate Change, Carbon Emissions, Climate Justice, Dynamic ARDL Simulation*
JEL Codes: *H20, Q50, C53*

Servet Vergileri, Karbon Eşitsizlikleri ve İklim Adaleti: Dinamik ARDL Simülasyonlarından Elde Edilen Yeni Ampirik Kanıtlar

Öz

Günümüzde üst gelir grupları karbon emisyonlarına orantısız bir şekilde katkıda bulundukları için, iklim sorunlarının çözümünde bu gruplara yönelik politikalar önemli hale gelmiştir. Bu bağlamda bu çalışma, 1985-2021 yıllarına ait verileri kullanarak Türkiye'de servet vergisi ile karbon emisyonları arasındaki potansiyel ilişkiyi ampirik olarak incelemektedir. Dinamik ARDL simülasyon yaklaşımı ile edilen sonuçlar, servet vergilerinde %20'lik bir artışın karbon emisyonlarında ölçülebilir bir azalma ile ilişkili olduğunu göstermektedir. Bu durum, KRLS yöntemi ile de doğrulanmaktadır. Bulgular, iklim adaletini destekleyebilecek ilerici vergilendirme stratejilerinin tasarlanmasına ilişkin içgörüler sunmaktadır.

Anahtar Kelimeler: *Servet Vergileri, İklim Değişikliği, Karbon Emisyonları, İklim Adaleti, Dinamik ARDL Simülasyonu*
JEL Kodları: *H20, Q50, C53*

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[1] Prof. Dr. Ömer Faruk Çolak'ın anısına ithaf edilmiştir.
(*Dedicated to the memory of Prof. Dr. Omer Faruk Colak*).

1. Introduction

The scope of wealth taxation is broad, encompassing a wide range of policy implications. According to the Organization for Economic Cooperation and Development (OECD), wealth taxes are classified as "taxes on wealth, taxes on the transfer of wealth, and financial transactions" (OECD, 2024). Despite this broad range of instruments, the revenue share from wealth taxes in Turkey has gradually declined. This decline is largely attributed to deregulation policies introduced after the 1980s and a growing reliance on indirect taxation. At the same time, the erosion of wealth taxation has coincided with a marked rise in income inequality. Several studies confirm that inequality in Turkey has become increasingly pronounced, particularly after 2018 (Ozturk et al., 2022; Aktuğ et al., 2021).

As globalization accelerates, wealth concentration deepens and taxation policies shift toward indirect taxes, it becomes crucial to explore alternative mechanisms for addressing inequality (Osinubi & Olomola, 2021; Razin & Sadka, 2019). Meanwhile, environmental challenges—especially carbon emissions—have emerged as a defining global concern. Since individuals contribute to emissions at highly unequal levels, a uniform carbon tax may not represent the fairest approach (Chen, 2022). Evidence shows that carbon taxes tend to disproportionately burden lower-income groups, particularly through higher heating and electricity costs, raising equity concerns (Köppl & Schratzenstaller, 2023). By contrast, studies on individual carbon footprints consistently demonstrate that wealthier individuals are responsible for far greater emissions. This discrepancy suggests that a progressive carbon tax, with tax rates increasing alongside income or wealth, could represent a more equitable solution. Such an approach also aligns with the principle of "common but differentiated responsibility," a central tenet of the United Nations Framework Convention on Climate Change (UNFCCC) (Boroumand et al., 2022).

Nevertheless, the introduction of new taxes carries political risks and often faces public resistance, making outcomes uncertain. For example, in France, a majority of citizens view carbon taxes negatively (Douenne & Fabre, 2019). In light of these challenges, strengthening wealth taxation emerges as an alternative mechanism that could simultaneously reduce carbon emissions and address inequality. The literature increasingly highlights the redistributive potential of wealth taxes in narrowing income disparities.

Building on this perspective, the present study examines whether an increase in wealth taxes could also contribute to reducing carbon emissions. To this end, the novel dynamic ARDL simulation method is applied to assess the long-run and short-run effects of wealth taxation on emissions, while the Kernel-based Regularized Least Squares (KRLS) test is employed as a robustness check. The results from the dynamic ARDL analysis suggest that higher wealth taxes are associated with lower carbon emissions. This outcome implies a potential “double dividend,” whereby wealth taxation not only mitigates inequality but also contributes to climate mitigation.

Given that climate change disproportionately affects disadvantaged populations, environmental justice has become an integral part of the debate (Resnik, 2022). The climate justice framework emphasizes that those most responsible for emissions should contribute proportionately to addressing the problem, taking into account both current emissions and their historical accumulation (Ciplet et al., 2022). In this regard, the findings of this study add to the growing discourse on climate justice by highlighting the potential role of wealth taxes in promoting a more equitable distribution of environmental responsibility.

2. Wealth Taxes in Turkey

In this study, the OECD’s (2022) tax classification is used. The OECD groups taxes by subject matter, such as income, profits, and capital gains, and identifies wealth taxes as a separate category alongside payroll, goods and services, and other taxes. According to the OECD (2023), wealth taxes are “recurrent and non-recurrent taxes levied on the use, ownership, or transfer of wealth,” extending beyond real estate to include securities. Under this definition, Turkey’s wealth taxes fall into three groups: (1) taxes on financial and capital transactions, such as the Banking and Insurance Transactions Tax, Resource Utilization Support Fund, and Stamp Tax (Kisa & Hacikoylu, 2022); (2) taxes on ownership, including Real Estate Tax, Motor Vehicles Tax, and Valuable Residence Tax; and (3) taxes on wealth transfer, including Inheritance and Gift Tax.In Turkey, wealth taxes as defined by the OECD include taxes collected on financial and capital transactions such as the Banking and Insurance Transactions Tax, as well as taxes on net wealth like Real Estate Tax, Motor Vehicles Tax, and the Valuable Residence Tax. Additionally, wealth transfers are subject to Inheritance and Gift Tax.

Since the 1960s, when income was more fairly distributed in the long run, the share of these taxes in total tax revenues has been on a downward trend in both OECD countries and Turkey, except for some breaks. Although wealth taxes in Turkey were above the OECD average in the past, the share of these taxes has fallen behind the OECD countries in recent years (OECD, 2024).

Wealth taxes help promote social justice by redistributing resources and have less impact on economic decisions than consumption taxes (Sen & Sagbas, 2023). Milanovic (2021) advocates higher inheritance taxes, as they minimally affect capital formation and labor while supporting long-term equality of opportunity. Despite these benefits, the share of wealth taxes in Turkey's total tax revenues has steadily declined. In 2022, wealth taxes—including Inheritance and Gift, Valuable Residence, Motor Vehicles, and Real Estate Taxes—accounted for only 4.34% of revenues, rising slightly to 5.22% in 2023 despite the additional Motor Vehicle Tax (MTF, 2023; 2024). This indicates that wealth taxes, particularly inheritance taxes, are not treated as major fiscal tools in Turkey.

3. Carbon Emissions and Income Inequality

The climate crisis is one of today's most urgent global challenges. While initiatives like the European Green Deal aim to address it (European Commission, 2019), they often overlook wealth inequality, which exacerbates climate change (Wang & Lo, 2021). Carbon emissions are unevenly distributed across countries and individuals, largely driven by income and wealth (Ivanova et al., 2016; Bruckner et al., 2022). Wealthy individuals not only emit more carbon but also influence others to adopt high-emission lifestyles (Barros & Wilk, 2021). Globally, the bottom 50% of earners produce just 1.5% of emissions, the middle 40% generate 40.5%, and the top 10% contribute 48%—with the richest 1% alone responsible for 16.9% (Chancel, 2022).

Turkey reflects this global pattern. OECD (2023) data show that GDP and carbon emissions generally rise together, declining only during economic crises. This suggests that GDP growth is a key driver of emissions, raising doubts about whether equal participation in emission reduction is enough to address the problem.

According to the "polluter pays" principle (Steenge, 1997), those with a larger share of GDP should bear a greater responsibility for reducing carbon emissions. Findings from the World Inequality Index, though limited for Turkey due to transparency issues, show that income inequality has risen since the 2018 recession: the top 10% earn 54.5% of total income, while the bottom 50% receive just 12% (Chancel et al., 2022). Chancel et al. (2023) link such inequalities to higher carbon emissions, as wealthy groups drive emissions through both consumption and investment choices and influence the behavior of other groups. Data from the World Inequality Database (2023) indicate that Turkey's top 1% emit 14 times more carbon per capita than the bottom 50%.

Current climate policies often fail to address these high emitters, and instruments like carbon taxes disproportionately affect lower-income groups (Chancel, 2022). To correct this, Chancel (2022) proposes a progressive carbon tax, while Neves & Semmler (2025) suggest a "carbon welfare tax." However, such taxes face significant public resistance. Several scholars argue that wealth taxes may be a more equitable and effective solution. Kapeller et al. (2023) highlight that wealth taxes can reduce inequality, finance climate initiatives, and lower carbon intensity. Buch-Hansen & Koch (2019), Koch (2022), and Murphy & McGann (2022) emphasize their potential to curb environmentally harmful luxury consumption, while Schroeder (2021) and Palansky & Schultz (2024) stress their importance for generating resources for strategies such as the Green New Deal. Finally, Sen & Sagbas (2023) note that wealth taxes have a legal and normative basis, as the state enables property protection and capital accumulation and thus justifies higher contributions from the wealthy.

4. Literature Review

Despite the socio-economic and environmental benefits of wealth taxes, research remains limited, with most studies focusing on growth and employment (Kapeller et al., 2023). Recently, scholars have emphasized the link between wealth and carbon emissions, though empirical work on wealth taxes and emissions is still scarce. Evidence from progressive taxation and carbon pricing studies supports their potential to limit emissions, leading to proposals for instruments such as carbon taxes with revenue recycling, differentiated rates, and carbon-wealth taxes.

Carbon taxes generally reduce emissions but are less effective when rates are low (Agostini et al., 1992; Lin & Li, 2011; Pretis, 2022). To mitigate negative socio-economic effects, many recommend revenue recycling (Semet, 2024), though Chancel (2022) warns that carbon taxes can be regressive and advocates for progressive approaches. Similarly, Gevrek & Uyduranoglu (2015) argue progressive taxes are more socially acceptable, and Beiser-McGrath & Busemeyer (2024) show support varies by income. Empirical studies link wealth concentration to higher emissions (Knight et al., 2017; Fremstad & Paul, 2019; Barros & Wilk, 2021), prompting proposals for carbon wealth taxes as fairer, more effective tools (Rehm & Chancel, 2022; Neves & Semmler, 2024). These focus on carbon-intensive assets, directly targeting carbon inequality. Apostel & O'Neill (2022) further suggest that wealth taxes themselves may reduce emissions. This study addresses this gap by empirically analyzing the relationship between wealth taxes and carbon emissions, offering evidence in support of progressive taxation.

5. Empirical Analysis

Empirical evidence on the link between wealth taxes and carbon emissions is scarce. This study addresses this gap by empirically examining their relationship for Turkey over 1985–2021, using a combined Dynamic ARDL Simulations and Kernel-based Regularized Least Squares (KRLS) approach to ensure robust results. The findings aim to guide tax policy design to reduce emissions while mitigating socio-economic inequalities.

5.1. Data Set

This study analyzes the long-term effect of wealth taxes on carbon emissions in Turkey using annual data from 1985 to 2021. Alongside wealth taxes, several variables relevant to climate change are included in the model: per capita CO_2 emissions (lco2) as the dependent variable (WB Data), per capita GDP (lgdp) from WB Data (Lau et al., 2023), per capita energy use (leuse) from WB Data (2024), and Gross Capital Formation (lgcf) based on WB Data (2023). Wealth tax data (lwtax) are sourced from OECD Data (2024) and measured as a share of GDP. To ensure comparability and facilitate interpretation, all variables are expressed in logarithmic form.

5.2. Methodology

The Dynamic ARDL Simulation method was employed to examine the relationship between the independent variables and per capita carbon emissions. Developed by Jordan and Phillips (2018) to improve on the traditional ARDL model (Pesaran et al., 2001), this approach simulates the effect of counterfactual changes in weak exogenous regressors and simplifies interpretation of complex models (Zhang et al., 2021). The procedure involves first conducting unit root tests, where the dependent variable is expected to be I(1), while independent variables may be I(0) or I(1). Next, appropriate lag lengths are determined, followed by ARDL tests for short- and long-run relationships. If cointegration exists, diagnostic tests are performed, and finally, the Dynamic ARDL simulation is applied to the model.

$$l(CO2)_t = \beta_0 l(CO2)_{t-1} + \beta_1 l(GDP)_t + \beta_2 l(GDP)_{t-1} + \beta_3 ln\ (wtax)_t + \beta_4 l(wtax)_{t-2} + \beta_5 l(euse)_t$$

$$+\beta_6 l(euse)_{t-1} + \beta_7 l(gcf)_t + \beta_8 l(gcf)_{t-1} + \varepsilon t$$

Finally, in addition to the Dynamic ARDL test, KRLS is performed to test the strength of the model, thus completing all tests on the model.

5.3. Results of Empirical Analysis

As mentioned in the methodology section, the first test to be conducted before proceeding to the Dynamic ARDL test is the unit root test. For the unit root test, the dependent variable must be I(1). However, the analysis can continue if the independent variables are either I(0) or I(1). The Augmented Dickey-Fuller (ADF) test (Dickey & Fuller, 1981) and the Phillips-Perron (PP) test (Phillips & Perron, 1988) were performed. The results of these tests are presented in Table 1. The findings from the ADF and PP tests indicate that all variables meet the condition for stationarity.

Table 1: Unit Root Tests & : Determination of the Appropriate Lag Length & ARDL Test Statistics

Unit root tests				
Variables	Level ADF	1. Difference	Level PP	1. Difference
lco2	0.693	0.000	0.626	0.000
lwtax	0.554	0.002	0.692	0.000
lgdp	0.401	0.003	0.383	0.000
leuse	0.912	0.000	0.868	0.000
lgcf	0.003	-	0.000	-

Determination of the Appropriate Lag Length								
Lag Length	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	80.9076				3*10-9	-5.422	-5.349	-5.184
1	213.379	264.94	25	0.000	1,5*10-12*	-13.09	-12.66	-11.67*
2	239.625	52.491	25	0.001	1,6*10-12	-13.18	-12.38	-10.57
3	273.782	68.314*	25	0.000	1,5*10-12	-13.84*	-12.67*	-10.03

ARDL Test statistics						
EQN	Variables	Coefficient	Std.err	P-value	Min 95	Max 95
ADJ	lco2 L1	-.44268	.12161	0.002*	-.6981	-.1871
LR	lgdp L1.	.0259	.0648	0.694	-.1102	.1620
LR	lwtax| L1.	-.57336	.1443	0.001*	-.8766	-.2701
LR	lgcf |L1.	.0560	.0107	0.000*	.0333	.0787
LR	leuse | L1.	.2491	.1086	0.034**	.0209	.4774
SR	lco2 D1	-.3562	.1594	0.038**	-.6912	-.0212
SR	lgdp D1.	.0114	.0299	0.706	-.0513	.0742
SR	lwtaxD1.	-.2538	.0793	0.005*	-.4204	-.0871
SR	lgcf D1.	-.0602	.0280	0.046**	-.1191	-.0012
SR	leuse D1	1.114	.1642	0.000*	.7691	1.459
ARDL(2,0,0,1,3)	Number of obs.	28	R-squared	0.8214	Root MSE	0.0223

Note *(unit root tests): The results obtained from the ADF test indicate that the stationarity condition is met.*

Note *(Determination of the appropriate lag length): * at the far right of the numbers indicates the optimal lag length according to different criteria.*

Note *(ARDL test statistics): In the table above, probability values denoted by * indicate cointegration relationship at 1% confidence level, ** denotes cointegration relationship at 5% confidence level. In the same table, LR denotes the long run and SR denotes the short run.*

Thus, the second stage of the study begins. In this stage, after determining the appropriate lag length, the ARDL test is conducted to assess the existence of a cointegration relationship between the variables. The maximum lag length was set to 3, and the test was performed. Based on the criteria outlined below, it was determined that, despite some variation among the criteria, a lag length of 3 is the most suitable for this study. Consequently, the ARDL analysis will be conducted using the ARDL (3, 3, 3, 3, 3) model. In Table 1, the results obtained from the ARDL model with the lag length determined above are shown both in the short and long run. This test shows that the most appropriate model is ARDL (2,0,0,1,3). The results obtained from the model show that there is a cointegration relationship between the variables.

After observing the short and long-run cointegration relationships through the ARDL analysis, the next step is to conduct the ARDL bounds test to further confirm the existence of a cointegration relationship. The results obtained from the bounds test developed by Pesaran et al. (2001) are presented in Table 2. In this test, the calculated F and t statistic values are compared with the critical upper bound values. If the calculated values exceed the critical values, it is accepted that a cointegration relationship exists. In this model, the F statistic value is 3.596, which is greater than the 5% critical upper bound value. This finding confirms the existence of a cointegration relationship.

Table 2: Pesaran, Shin, and Smith Bounds Test

Test Statistic	Value	%10CV I(0)-I(1)		%5 CV I(0)-I(1)		%1 CV I(0)-I(1)		Decision
f	3.596	1.90	3.01	2.26	3.48	3.07	4.44	Rejected
t	-3.640	-1.62	-3.26	-1.95	-3.60	-2.58	-4.23	Rejected

After proving the existence of cointegration relationship, the diagnostic tests to be conducted will help to identify the presence of problems affecting the validity of the model. The first of these tests is the autocorrelation test. The test developed by Breusch-Godfrey was determined separately according to 4 lag lengths. As can be seen from the results presents in the Table 3 below, there is no autocorrelation problem in the model even at 4 lag lengths.

Table 3: Breusch-Godfrey LM Autocorrelation Test

Lag Length (p)	F	df	Prop>F
1	0.327	(1, 25)	0.5725
2	0.308	(2, 24)	0.7378
3	0.289	(3, 23)	0.8329
4	1.637	(4, 22)	0.2005

Another test used to test the model is the heteroscedasticity test. Cameron & Trivedi's IM decomposition test is used in this context to investigate whether there is a heteroscedasticity problem in the model. The results obtained from this test are presented in the Table 4 below. As can be seen from the table, the p-value is higher than the 5% significance level. Therefore, it is concluded that the residuals are homoskedastic.

Table 4: Cameron & Trivedi's IM Decomposition Test

Resource	chi2	df	p
Heteroscedasticity	13.14	14	0.5154
Skewness	6.36	4	0.1741
Kurtosis	0.23	1	0.6306
Total	19.73	19	0.4110

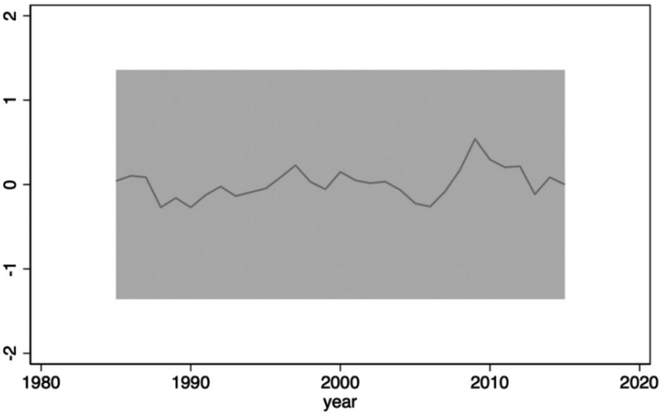
Another diagnostic test is the normality test. The results of the normality test are summarized in the Table 5 below. According to the results obtained, it is determined that the variables in the model are likely normally distributed at 5% level of significance.

Table 5: Skewness / Kurtosis Test for Normality

Number of Obs.	Pr(Skewness)	Pr(Kurtosis)	Prob>chi2
51	0.9215	0.0673	0.1593

Finally, diagnostic tests are completed by testing for structural breaks. CUSUM test is used to investigate the presence of structural breaks. According to the result obtained from this test, it is seen that there is no structural break problem in the model at 95% confidence interval. Figure 1 below shows the result obtained from the CUSUM test.

Figure 1: Cumulative CUSUM Test



Note: *The gray band in the figure above represents the 95% confidence interval.*

The results obtained from the ARDL test confirmed the existence of a cointegration relationship between the variables, indicating that the conditions for applying the Dynamic ARDL test are satisfied. Table 6 below presents the results from the Dynamic ARDL test.

Similar to the findings from the ARDL test, wealth taxes are shown to reduce per capita carbon emissions in both the short run and the long run. Among the other variables, gross capital formation did not yield statistically significant results in the short run; however, it is associated with an increase in per capita carbon emissions in the long run. Per capita energy use leads to an increase in carbon emissions in the short run, but the statistics do not fall within 5% critical value in the long run, making them difficult to interpret. Additionally, the results for GDP per capita fall outside 5% critical value, and therefore, they are not interpreted within the context of the Dynamic ARDL test for either the short run or the long run.

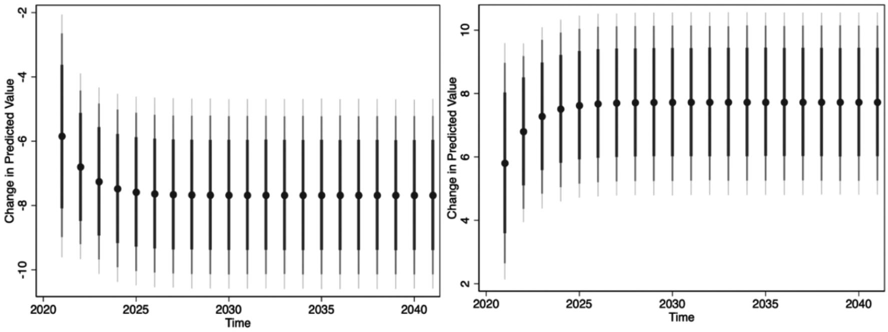
Table 6: Dynamic Simulated ARDL Estimation Results

Variables	Coefficients	Std. err.	P-value	Min 95	Max 95
dlco2 L1.	-.5183	.1377	0.001*	-.8040	-.2325
dlwtax	-.2904	.0960	0.006*	-.4896	-.0911
dlgcf	-.0179	.0387	0.648	-.0982	.0623
dleuse	.9489	.1505	0.000*	.6368	1.261
lgdp L1.	.0604	.0433	0.177	-.0294	.1502
lwtax L1.	-.1989	.0837	0.027**	-.3727	-.0251
leuse L1.	.0404	.0605	0.511	-.0850	.1660
Number of Obs.	30	R-Squared	0.84	Prob > F	0.0000

Note: *In the table above, *, ** and *** indicate the variables that are statistically significant at 1% and 5% confidence levels, respectively.*

In the Dynamic ARDL test, it is possible to obtain long-run simulation results. Since the primary objective is to observe the effects of wealth taxes on per capita carbon emissions, the impact of wealth taxes is evaluated through this test. Consequently, the variable subjected to a shock is wealth taxes. Initially, the effect of a 20% increase in wealth taxes was assessed. As illustrated on the left side of Figure 2, the long-run reduction in carbon emissions resulting from a 20% shock to wealth taxes is clearly evident. Conversely, the right side of Figure 2 depicts the scenario in which wealth taxes are reduced. As shown in the figure, a 20% decrease in wealth taxes leads to an increase in carbon emissions. However, in both graphs, the effects stabilize in the long run.

Figure 2: Impact of Changes in Wealth Taxes on Carbon Emissions



Note: Dots: estimates; bars: 67%–95% confidence intervals.

Following the Dynamic ARDL analysis, the next step was to enhance the robustness of the model through a robustness test. The recently developed Kernel-based Regularized Least Squares (KRLS) method, a machine learning approach, was employed for this purpose (Hainmueller & Hazlett, 2014). This method is frequently utilized in the literature to test robustness following the Dynamic ARDL method, as highlighted by Sarkodie & Owusu (2020). The results obtained from this test are presented in Table 7 below. The R-squared value of 0.9954 from the KRLS test indicates a high explanatory power of the model. Furthermore, the probability values for all variables are lower than the critical values, suggesting that the results can be interpreted meaningfully. A 1% increase in wealth taxes is associated with a nearly 24% decrease in per capita carbon emissions, thereby confirming the negative relationship between wealth taxes and per capita carbon emissions.

Although the Dynamic ARDL test did not yield significant results for GDP per capita, the KRLS test results indicated that a 1% increase in GDP per capita leads to an expected increase in per capita carbon emissions. Gross Capital Formation has a positive but limited effect on per capita carbon emissions. The last variable, per capita energy use, has a substantial impact on per capita carbon emissions. It is essential to change consumption habits in accordance with the climate capacity of the world. Therefore, the findings from this test are largely consistent with those from the Dynamic ARDL test. These results suggest that climate change mitigation and adaptation issues should be discussed more extensively in Turkey.

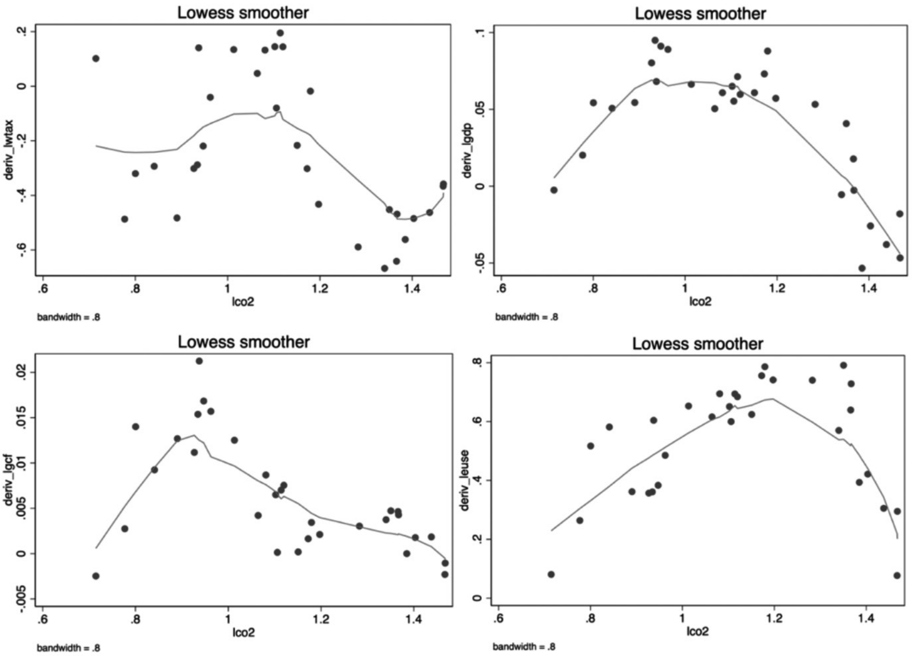
Table 7: KRLS Test Results

lco2	Avg.	Std. Err.	t	P>|t|	P25	P50	P75
lgdp	.0396	.0114	3.456	0.002*	-.0025	.0544	.0681
lwtax	-.2416	.0385	-6.261	0.000*	-.4685	-.3015	.0471
lgcf	.0061	.0021	2.914	0.007*	.0017	.0042	.0111
leuse	.5308	.0443	11.96	0.000*	.3617	.5998	.6940
Diagnostics							
Lambda	.0660	Sigma	4	R-Squared	.9954		
Tolerance	.031	Eff. Df.	11.29	looloss	.1254	Number of Obs.	31

Note: *P-25, P-50, and P-75 denote 25th, 50th, and 75th percentiles. In the table above, * indicate the variables that are statistically significant at 1% confidence level, respectively.*

Finally, in order to examine the marginal effects of the variables on carbon emissions, an additional analysis was conducted using the KRLS method. Figure 2 below illustrates the marginal effects of the variables. In the top left section, wealth taxes are displayed. The marginal effects of wealth taxes are stable, although they exhibit a decreasing trend over time. The marginal effects of GDP per capita create a curve, indicating that in the short run, carbon emissions increase with economic growth; however, in the long run, these negative effects are compensated as the marginal effects drop below zero. Gross Capital Formation has a positive but gradually decreasing effect on per capita carbon emissions. Lastly, per capita energy use, one of the most significant variables affecting carbon emissions, also shows a positive but decreasing marginal effect on per capita carbon emissions.

Figure 3: Illustration of the Point Marginal Effect of the Variables



The marginal effects analysis confirms the positive long-run results of the Dynamic ARDL test. While wealth taxes are primarily used to reduce social inequalities, this study shows they can also help mitigate carbon inequalities, offering a way to lower emissions linked to income without introducing new taxes in Turkey. However, recent regressive tax policies suggest that both inequality and emissions may continue to rise, highlighting the need to increase the share of wealth taxes in total revenue. A limitation of this study is the lack of research on wealth taxes and carbon emissions, making generalization difficult. Future studies across countries could inform more comprehensive policies tailored to national wealth levels.

6. Discussion

Socio-economic effects of carbon taxes remain widely debated, prompting proposals to make them more progressive. Wealth taxes can complement carbon taxes, promote climate justice, and reduce emissions, as confirmed by this study. Wealth concentration complicates environmental governance, as wealthy groups may influence policies to their advantage (Kenner, 2019). Proposals like a global carbon wealth tax, inspired by Piketty (2014), could generate revenue for sustainable initiatives while enforcing the polluter pays principle (Fetter, 2023; Fabre, 2024). Aligning wealth taxation with environmental justice frameworks - such as the ability-to-pay model and human rights-based approaches - can mobilize funding for mitigation and adaptation, reduce inequality, and support global climate action (Levenda et al., 2021; Boyd & Keene, 2023). Wealth taxes have also been integrated into broader strategies, such as the Global Green New Deal, offering stable, equitable revenue for clean energy transitions and sustainable development (Newell, 2025). When designed progressively, wealth taxation serves not just as a fiscal tool but as a pathway to climate justice.

7. Conclusion

Carbon taxes are cost-effective for mitigating emissions but often disproportionately burden lower-income households, exacerbating inequality and generating political resistance (Povitkina et al., 2021; Fremstad & Paul, 2019; Sommer et al., 2022). Wealth taxation, by contrast, offers a dual benefit: reducing inequality while curbing carbon emissions, both nationally and globally. This study's findings using the dynamic ARDL method show that reductions in wealth taxes correlate with higher emissions in Turkey, highlighting the need to re-evaluate fiscal policy. Historically, wealth taxes accounted for a significant share of revenue, but policy shifts since the 1980s weakened their role, increasing inequality and reliance on fossil fuels. Reintroducing progressive wealth taxes - particularly inheritance and gift taxes - can redistribute wealth, ensure high emitters contribute fairly, and support climate justice (Ivanova & Wood, 2020; Sardo, 2023). By linking social equity with environmental sustainability, wealth taxation provides stable funding for renewable energy, adaptation policies, and international just transition initiatives, operationalizing the polluter pays principle while strengthening climate governance.

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