Are Environmental Spending And Environmental Levies Beneficial To Curbing Trade Imports' Carbon Dioxide Emissions? Cyprus Experience

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Abstract: Due to the uncertainty regarding the environment in the global setting, which has drawn a great deal from stakeholders, environmental sustainability has emerged as a key concern in the process of globalization in the past few decades. Cyprus is making effort in addressing the country's climate concerns, using structural vector autoregressive model (SVAR) and time-series data from 2008 first quarter to 2021 fourth quarter, this study investigates whether environmental protection expenditure and environmental taxes are addressing Cyprus's carbon emissions embodied in trade imports. The result showed that carbon dioxide emissions, environmental protection expenditure and environmental taxes are co integrated. It was found that both environmental protection expenditure and environmental taxes promote reduction in carbon dioxide emissions embodied in trade imports in the short and long run. However, environmental protection expenditure is seen to have a greater reduction impact in carbon dioxide emissions. Contribution of variations in carbon dioxide emissions embodied in trade imports is largely explained by the variables own shocks in both short and long run, while environmental protection expenditure and environmental taxes play as supportive role. Environmental levies and protection expenditure have proven by the study to be an effective destructive factor in carbon dioxide emissions embodied in trade imports. Therefore, polices and strategies regulating them should be strengthen by the government through the finance ministry and other stakeholders in Cyprus to achieve even more success in handling environmental pollution.
Keywords: carbon dioxide emissions, environmental protection expenditure, environmental taxes

1.0 Introduction

Now more than ever, it is imperative that we identify and address the environmental problems that we face on a social and economic level. Environmental problems can affect the entire planet and are often complex, tied to socioeconomic problems. These problems cut across political divides and pose major threats to public health, safety, and productivity. These problems include, for instance, pollution of the air and water, the creation of hazardous and solid waste, soil erosion, deforestation, climate change, and biodiversity loss. Given how serious a threat these problems are to humanity's future, action must be taken. Spending by the government is a crucial macroeconomic metric.

Dogan et al. (2022) stated that Asia, European Union, United Kingdom and North America had a decrease in the CO2 emissions intensity of their trade with each other between 2000 and 2018. Though there is always opportunity for improvement, Asia continues to have the greatest CO2 emissions intensity as measured by imports and exports. Regulations pertaining to the environment and greenhouse gas emissions associated with imports as well as exports show an inverse relationship, indicating that policies aimed at preserving the environment have been successful in mitigating pollution resulting from trade.

Nevertheless, the action is not simple, and by promoting carbon leakage, it may have unfavorable adverse consequences: Businesses moving industrial capacity to nations with less restrictive environmental laws from those with stricter regulations in order to profit from loopholes in environmental laws (Beule et al., 2022). It appears possible that emission leakage is taking place because of the positive association between environmental legislation and CO2 emissions included in imports and the adverse connection with regard to CO2 emissions included in exports. With more restrictive regulations Asia, North America, European Union and United Kingdom have greater CO2 emissions in their imports relative to exports, while Asia has higher CO2 emissions in its exports.

What is government spending its money on, and how much? The subject of how much government spends on environmental protection is more recent and can be challenging to answer because of the availability of data and occasionally a lack of disclosure.

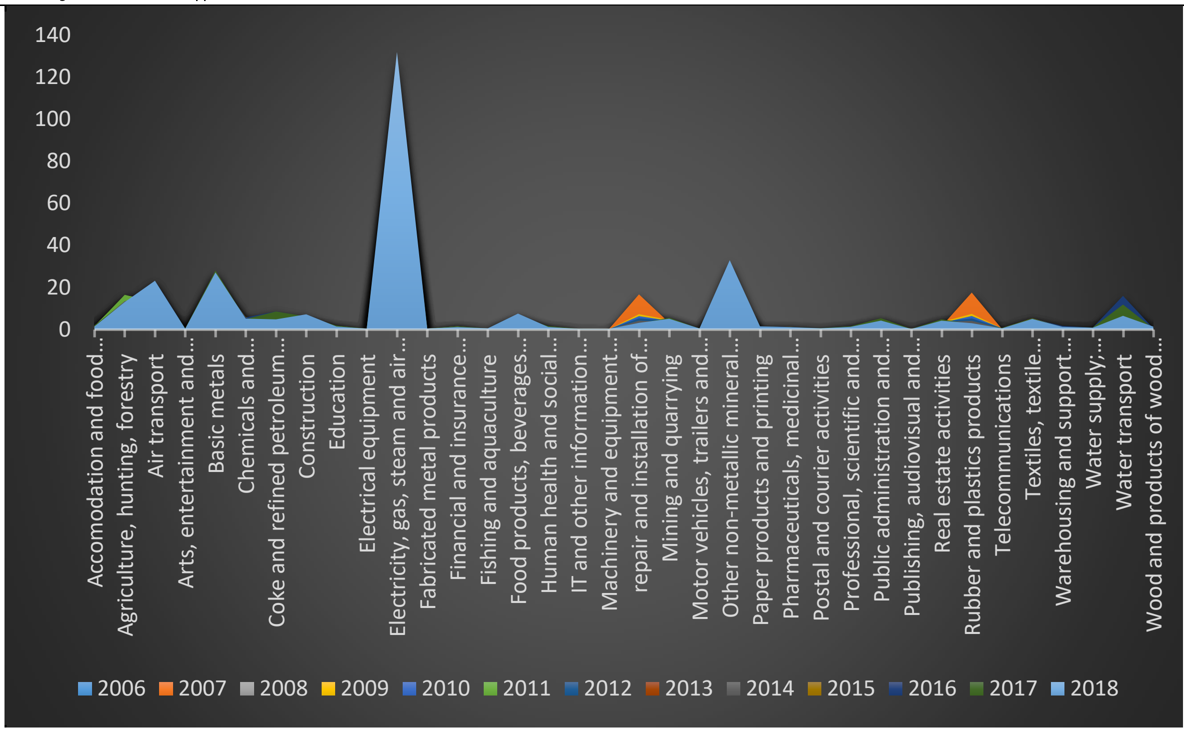

Figure 1: Cyprus CO2 Emissions by various sectors.
Source: Author's construction based on OECD data

According to Cyprus' Ministry of Agriculture, Rural Development Environment, in order for the island state of Cyprus to effectively and sustainably join the European Union in its endeavor to achieve a climate-neutral economy by the year 2050, the nation has developed a development strategy known as the Long-Term Low Greenhouse Gas emission (GHG) Development Strategy for 2050. Contributing to the European Green Deal, which is being pushed by the European Commission, and taking an equitable role in the EU's commitment to an environmentally friendly economy are the major goals of the Government.

With the completion of the elaboration and adoption of the National Energy and Climate Plan (NECP), which analyses In order to establish the foundation of the nation's long-term climate plan for the year 2050, the authorities of Cyprus is also looking into the most effective strategies and measures into the year 2050 for the achievement of specific climate goals. These include both energy and ecological targets that the nation has set as well as the policy priorities and the measures for their execution..

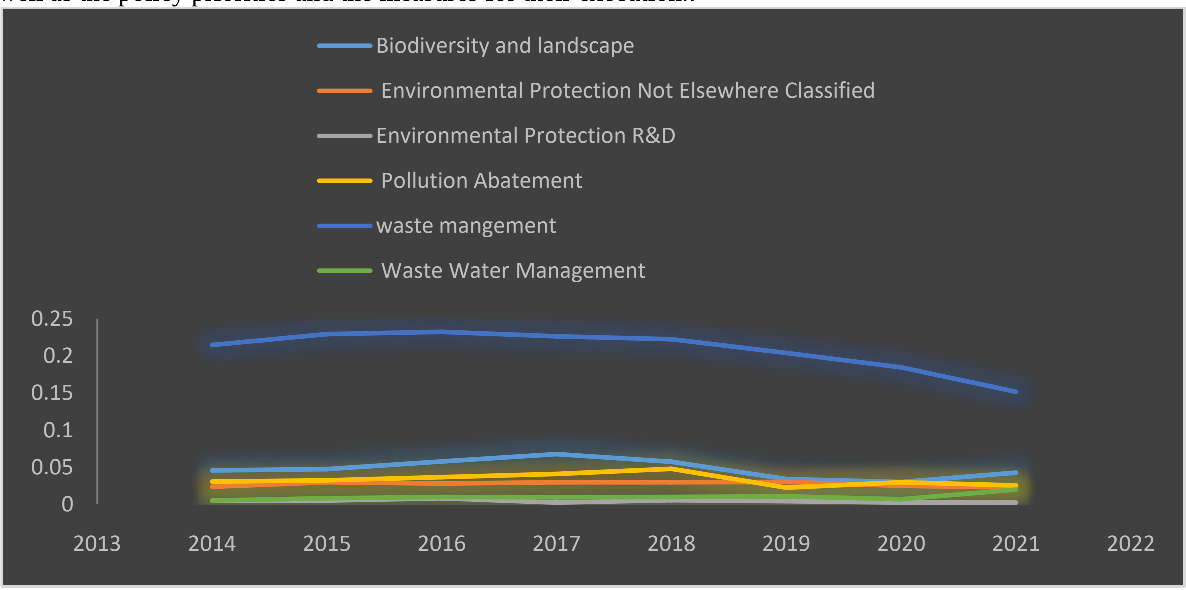

Figure 1: Cyprus government environmental spending.
Source: Author's construction based on OECD data

The International Monetary Fund (IMF) reported that in 2021, the GDP's equivalent share of environmental protection expenditures was 0.38 percent, up from 0.34 percent in 2020.Over the past few years, Cyprus has been making preparations to protect its current resources and avert the disastrous repercussions of climate change. Waste management receives the highest GDP proportion of environmental spending when compared to other categories, followed by biodiversity and landscape preservation (see figure 2).

The role of carbon taxes in promoting more environmentally friendly industrial practices and consumption patterns has received increasing attention in the literature, particularly during the past 20 years. The literature compares the advantages of implementing environmental taxes to those of other instruments, such as tradable permits and limits. Environmental taxes are a useful policy tool for lowering GHG emissions (Babatunde et al., 2017). The volume of CO2 and environmental tax reforms are negatively correlated, according to Sundar et al. (2016). This is due to the fact that the main source of greenhouse gas emissions that need to be taxed is carbon emissions.

Regarding the efficacy of environmental protection expenditures and taxes in reducing environmental harm and the carbon footprint, the most contemporary empirical literature has yielded conflicting results. Taxes on the environment may encourage technological advancement, which would lessen the issues brought on by rising emissions. The moderating effect of environmental levies on emissions is supported by a large body of empirical evidence (Farooq et al., 2019). Environmental taxes and spending on environmental protection have received less attention than sustainability studies conducted in Cyprus. Thus, this study closes this gap with evidence.

The specific objectives of the study are: to examine the effect of environmental protection expenditure on carbon emissions, determine whether environmental taxes reduces carbon emissions in Cyprus and to establish the causal relationship among environmental protection expenditure, environmental taxes and carbon emissions.

The contribution of this work falls into three main areas. This research first looks at the dynamic relationships between carbon emissions from environmental taxes and spending on environmental protection. For the field of sustainable development studies in Cyprus, this research represents cutting edge. This study examines environmental pollution in relation to the effects of environmental taxes and environmental protection spending, all of which were only looked at separately in previous studies. Second, the study's findings will aid in the formulation of more useful policies that aid Cyprus in achieving its goals for sustainable development. Finally, this study examines the effects of shocks on environmental pollution using the structural vector autoregressive model (SVAR), analyzes the research findings, and makes pertinent policy recommendations that will be crucial for scholars and decision-makers.

2.0 Literature review

In any field of study, reviewing relevant studies is an essential component. By evaluating and finding gaps in current knowledge and existing knowledge about specific situations, the library of information can grow. Unlike traditional reviews, which are narrative in style, Mengist (2020) recommends that research follow the systematic literature review (SLR) paradigm, which generates reviews through a precise, methodical, and repeatable approach.

Environmental taxes and carbon dioxide emissions

Environmental taxes are one useful policy instrument for lowering GHG emissions (Babatunde et al., 2017). The volume of CO2 and environmental tax reforms are negatively correlated, according to Sundar et al. (2016). This is true because the main source of greenhouse gas emissions that need to be taxed is carbon emissions. As stated by Hammar (2011). Tamura et al. (1996) elaborated on this topic and suggested that an environmental tax lower total carbon emissions by increasing the cost of fossil fuels, which in turn lowers demand for them. Environmental levies, when paired with member state policies and EU legislation, are a more effective strategy to reduce carbon emissions, according to Barker et al. (2001) examination of EU policies.

Furthermore, analytic research by Lin and Li (2011) showed that environmental taxes from 2014 to 2024 will only lead to a 1% reduction in GHG emissions. Environmental tariffs reduce energy consumption by promoting renewable energy sources, reducing carbon emissions, and improving energy efficiency (Clough, 2016). Micekiene et al. (2018) investigated the question of whether environmental taxes protect the environment and discovered that they do so to a considerable extent when advancements in the energy and ecological sectors are prioritized.

Dogan et al. (2022) used the fully-modified ordinary least squares (FMOLS) technique and the Pedronico integration test to examine the long-term effects of environmental levies on CO2 emissions in the G7.

The empirical results showed that environmental taxes reduce CO2 emissions, and that if stringent environmental tax laws are put in place, businesses will switch to greener manufacturing methods. The impact of environmental taxes on CO2 emissions in the E7 nations (Brazil, China, India, Indonesia, Mexico, Russia, and Turkey) between 2000 and 2020 was examined by (Sarpong et al., 2023). The results of the quantile-on-quantile and Driscoll-Kraay methods demonstrate that environmental levies lower CO2 emissions. Lastly. Between 1990 and 2015, Ahmad and Satrovic (2023) investigated how environmental rules affected the quality of the environment in ten OECD nations.

Environmental protection expenditure and carbon dioxide emissions

Recognizing how to improve environmental quality without sacrificing domestic economic growth and achieving a "win-win" outcome between environmental protection and economic development is key to the successful implementation of environmentally friendly development strategies (Elzen et al., 2016; Song et al., 2020). Lopez ´ et al. (2011) found in an empirical study on air and water pollutants that increasing overall government spending is unable to reduce pollution, but reallocating government spending toward public goods and societies does. Adewuyi (2016) asserts that government investment on environmental governance may have unfavorable long- and short-term effects.

Fiscal expenditure may indirectly affect environmental harm through the use of energy in the delivery of public goods and services, as per the findings of Galinato and Galinato (2016) research. Despite the fact that the previously listed studies have shown that government spending has an impact on environmental pollution, there is still disagreement regarding the impact route and response strategy.

From the above discussion of literature the following hypothesis are proposed:

- Hypothesis $H_{1:}$ Environmental protection expenditure does not have long run effect on carbon dioxide emissions.
- Hypothesis $H_{2:}$ Environmental tax has a reducing impact on carbon dioxide emissions.
- There causal relationship among environmental protection expenditure, environmental taxes.

3.0 Methodology

3.1 Data sources and description

Secondary data were sourced from Organization for Economic Cooperation and Development (OECD) database and Governments Finance Statistics (GFS) from IMF database from 2008 to 2021 on Environmental protection expenditure: it indicates the amount of money, as a proportion of the nation's GDP that each government spends on environmental protection initiatives. This indicator was used as independent variable for the study, Carbon dioxide emissions embodied in import: the amount of CO_2 associated with goods or products imported into a country emitted into the atmosphere. This was used as dependent variable, environmental taxes: this is a fee imposed on a tangible object that has been shown to have an adverse effect on the environment. This indicator was also used as independent variables.

3.2 Model specification

SVAR models offer an advantage over conventional large-scale macro econometric modeling due to the fact the data are readily available for easily analyzed rather than obscured behind a bulky and complex structure. According to Sims (1980), SVAR models offer a more methodical way to impose limitations, which may help the researcher identify empirical patterns that are obscured by previously used methodologies. Conversely, the outcomes of policy exercises utilizing large-scale macro econometric models are difficult to replicate and compare, and their users can readily alter the results with subjective ex post judgments. Furthermore, the greater success of SVAR models can be attributed to the disagreement over suitable specifications for simultaneous equation models created during the Cowles commission. Generally, SVAR is given by:

$$\mathrm{BY_t} = \Gamma_0 + \Gamma_1 \mathrm{Y_{t-1}} + \Gamma_2 \mathrm{Y_{t-2}} + \cdots + \Gamma_\mathrm{p} \mathrm{Y_{p-1}} + \varepsilon_\mathrm{t} \qquad (1)$$

Where $\varepsilon_\mathrm{t} \sim \mathrm{i.i.D}(0, \Sigma), B = \sigma_{ij}$ being a nonsingular$(m \times m)$ matrix of contemporaneous coefficients and εt being a serially uncorrelated m-vector of structural errors with a zero mean and a constant positive definite variance-covariance matrix which identify the effect of each independent shock, and $\Gamma_1, \Gamma_2 \ldots \Gamma_\mathrm{p}$ are $(m \times m)$ matrices.

Examining the short- and long-term dynamics of the series that the shock explains at various horizons I analyzed the forecast error in terms of shocks to the structure. The impulse response function is given by:

$$C_{ji}^{(q)} = \frac{\partial X_{j,t+q}}{\partial \varepsilon_{it}}, q = 1,2, \ldots \qquad (2)$$

Where $C_{ji}^{(q)}$ is the (j, i) element of the matrix, $\mathrm{C_q}$ depict the response of $X_{j,t+q}$ to a random shock ε_{it}.The study provides the following equation to quantify the variance decomposition effects of shocks on variables in both short- and long-term responses:

$$Y_{t+h} - Y_{t+\frac{h}{t}} = F_0 w_{t+1} + F_2 w_{t+2} + \cdots + F_k w_{t+h} \qquad (3)$$

Variance of the forecast error of the i^{th} variable then becomes

$$var(Y_{it+h} - Y_{it+\frac{h}{t}}) = \sum_{k=1}^{n} \sum_{j=0}^{h} F_{ik}^{j\,2} var(w_{kt}) \qquad (4)$$

Thus the contribution or percentage of variance of Y_{it} explained by the kth shock is given by

$$\frac{\sum_{j=0}^{h} F_{ik}^{j\,2}}{\sum_{k=1}^{n} \sum_{j=1}^{h} F_{ik}^{j\,2}} \qquad (5)$$

3.3 Estimation procedures.

For VAR to be employed, time series data must be stationary. Tests for stationarity are therefore conducted. This study uses the Augmented Dickey-Fuller (ADF) because of its capacity to adjust for autocorrelation difficulties. Test for co integrating equation in the studied series using the Johenson co integration test was conducted. In order to estimate structural vector autoregressive (SVAR) and analyze the effects among the regressors and the dependent variable, standard VAR is then estimated to help select the appropriate lag length. The best lag order, as calculated by the Akaike information criterion (AIC) and the Schwarz information criterion (SC), was employed since lag selection is crucial in VAR.

After that, structural vector autoregressive is computed. Next. The White Heteroske dacity test and AR root characteristic polynomial was then used to test the parameter residuals. To examine the dynamic behavior of the data series, impulse response and variance decomposition approaches was employed.

4.0 Empirical Results

4.1 Descriptive Statistics

On average, carbon dioxide emissions embodied in trade imports recorded 132.31, environmental protection expenditure by 0.33 and environmental taxes by 3.26. From 2008 to 2021,the highest and lowest values noted for carbon dioxide emissions as result of trade imports in millions of metric tons are 147.36 and 106.07, the highest and least government environmental protection expenditure as percentage of GDP is 0.38 and 0.27, environmental taxes also recorded 3.93 and 2.30 in millions of dollars for highest and lowest respectively

Table 1: Descriptive Statistics Result

	CO2	EPE	ETX
Mean	132.3140	0.331715	3.262143
Median	132.5095	0.325386	3.255000
Maximum	147.3580	0.376582	3.930000
Minimum	106.0690	0.265435	2.300000
Std. Dev.	11.00341	0.033724	0.363242
Skewness	-0.627013	-0.309813	-0.791970
Kurtosis	3.088812	2.247411	4.718154
Note : Carbon Dioxide Emissions (CO2), Environmental Protection Expenditure (EPE), Environmental Taxes (ETX)			

Source: Author’s calculations from Eviews

In measures of normality, regarding asymmetric of series, it can be seen from the table that all the variables have negative skewness from the average mean. The Kurtosis indicating the peakness of the distribution show from the table that EPE is platykurtic in nature, the values is 2.25 less than three (< 3) which means that in the distribution, EPE has more figures that are less than it mean value of 0.33.this implies that Turkish government budget allocation for environmental protection is below average. Environmental taxes showed leptokurtic characteristics as its value is greater than three (>3), indicating the series have more data points higher than the mean value. This could also mean environmental taxes imposition is above average. Carbon dioxide emissions demonstrate mesokurtic characteristics meaning its value is three showing that the peakness is normal.

4.2 Unit Root Test

The findings of unity root at level and first difference are shown in table 2 below. this may be shown by comparing the critical thresholds of the test statistics at 1%, 5%and 10% significance levels with the values that were observed of the Augmented Dickey-Fuller (ADF).Table 2 showed that all variables are first order differential series, at the 1, 5, and 10% significance levels. It is therefore certain that the variables are steady as a result of this null hypothesis of non-stationarity is rejected. This suggests integrating all variables at I (1).

Table 2: Unit Root Test Result

ADF at level					ADF at 1st difference			
variable	(Intercept)		(Intercept & Trend)		(Intercept)		(Intercept and Trend)	
	t-Statistic	Prob.	t-Statistic	Prob.	t-Statistic	Prob.	t-Statistic	Prob.
CO2E	-2.0236	0.2762	-2.0630	0.5618	-7.2150	0.0000***	-7.1536	0.0000***
EPE	-0.8697	0.7905	-1.1887	0.4303	-7.2553	0.0000***	-7.4276	0.0000***
ETX	-1.4072	0.5723	-1.7563	0.1587	-7.4169	0.0000***	-7.3633	0.0000***
Notes: (*) Significant at the 10%; (**) Significant at the 5%; (***) Significant at the 1%. Augmented Dickey-Fuller (ADF),								

Source: Author's calculations from Eviews

4.3 Cointegration Test

Trace statistics values are all higher than its critical values at none, at most 1,at most 2,and statistically significant at 0.05 significant level. Max-Eigen Statistic also has its value at most 1 and at most 2 greater than the critical value and also significant at 0.05 significant level. The optimal lag order determined by the Schwarz information criterion (SC) and the Akaike information criterion (AIC) is 2 lags.

The results of the Johansen co integration test are shown in table 3. The three variables are linked by cointegration, investigation has indicated that the relationship among carbon dioxide emissions, environmental protection expenditure, and environmental taxes are longer and more stable.

Table 3: Cointegration test result.

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.279130	46.93835	29.79707	0.0002
At most 1 *	0.250000	29.91894	15.49471	0.0002
At most 2 *	0.250000	14.95947	3.841466	0.0001
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.279130	17.01942	21.13162	0.1711
At most 1 *	0.250000	14.95947	14.26460	0.0388
At most 2 *	0.250000	14.95947	3.841466	0.0001
* denotes rejection of the hypothesis at the 0.05 level				

Source: Author's calculations from Eviews

4.4 Structural VAR Estimates.

It is meaningless to interprete the results of structural VAR directly since multicolinearity frequently influences the coefficients of VAR models (Boschi, 2005). Therefore, to examine the dynamic behavior of the data series, variance decomposition and impulse response approaches are employed. It can be seen from table 4 that the model's coefficients of the various variables as estimated from C (1) to C (6) are all statistically significant for most of the variables. The implication is that series is suitable to compute impulse responses and variance decomposition.

Table 4: Structural VAR Estimates results

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	1.628479	0.158172	10.29563	0.0000
C(2)	0.000627	0.000503	1.246045	0.2127
C(3)	0.017711	0.006494	2.727443	0.0064
C(4)	0.003634	0.000353	10.29563	0.0000
C(5)	0.002027	0.006258	0.323851	0.7461
C(6)	0.045539	0.004423	10.29563	0.0000
Log likelihood	209.9877			
Estimated S matrix:				
1.628479	0.000000	0.000000		
0.000627	0.003634	0.000000		
0.017711	0.002027	0.045539		
Estimated F matrix:				
1.628479	0.000000	0.000000		
0.000627	0.003634	0.000000		
0.017711	0.002027	0.045539		

Source: Author’s estimations from Eviews

Before applying the VAR model, I need to make sure that there is no residual heterosce dasticity. VAR residual heterosce dasticity Test (Levels and Squares)is employ the and the test results are shown as follows:

Table 5: VAR Residual Heteroskedasticity Tests (Levels and Squares)

Joint test:		
Chi-sq	Df	Prob.
36.63623	48	0.8843

Source: Authors compilations from Eviews

The VAR Residual Heterosce dasticity Test's null hypothesis states that the residuals are not heteroscedastic. The null hypothesis cannot be disproved since the p-value is more than 5%, indicating that the residuals are heteroskedastic (Akgiray, 1989). It's a residual-based homoscedastic model.

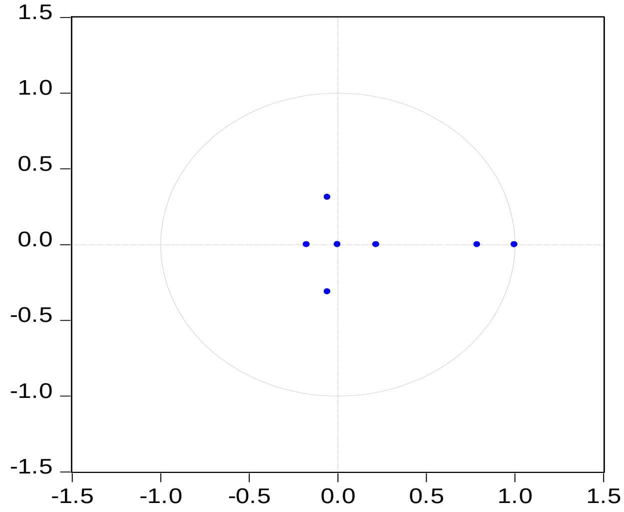

Figure 4: Inverse Roots of AR Characteristic Polynomial

Source: Author’s construction from Eviews

The estimated VAR is stable (stationary), if all roots have modulus less than one and lie within the unit circle (Lütkepohl, 1991). Figure 4, which shows the model unit roots, illustrates this. Since all roots lie inside a single circle, the VAR model variables are stationary and suitable for impulse response analysis. The system has a possibly co integrated equation, and that result also shows that the pattern of distribution of each error term is normal.

4.5 Impulse Response Analysis

The impact of environmental taxes and environmental protection spending on pollution can all be examined with the aid of impulse response analysis. Figure 5 displays the findings of this study, which sets the number of responds to 10 periods and analyzes the impulse influence of the factors with the horizontal axis representing the time intervals and the vertical axis representing the impulse response's magnitude, with the number of lead periods as 1, 5, and 10 in the short run, medium term, and long run, respectively.

Figure 5 (A) shows the response of carbon dioxide emissions embodied in trade imports to its own shocks. It can be observed that after receiving a one standard deviation shock, carbon dioxide emissions remains positive and increase through the short run to the long run. The implication is that carbon dioxide emissions embodied in trade imports promote itself in both long and short run.

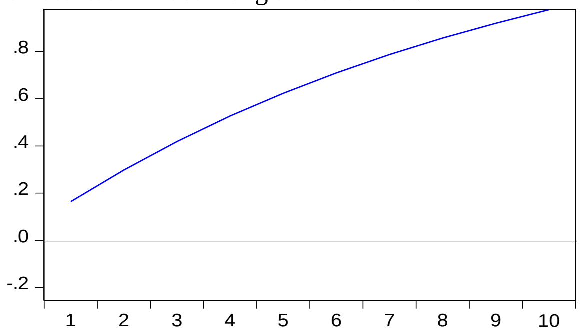

Figure 5A Accumulated Response of CO2 to CO2

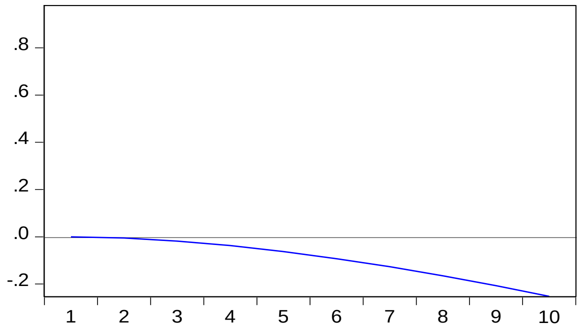

Figure 5B: Accumulated Response of CO2 to EPE

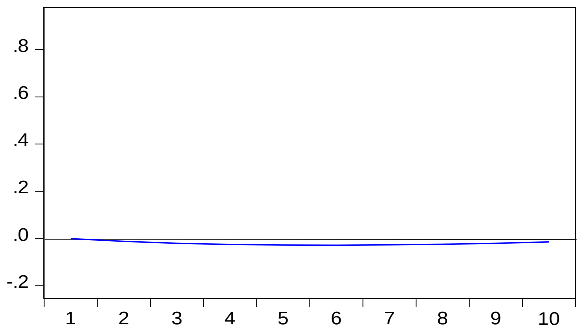

Figure 5C: Accumulated Response of CO2 to ETX

Figure 5: Accumulated response to Cholesky one S.D innovation.
Source: author's construction from E-views

According to figure 5 (B), carbon emissions embodied in trade imports is negative and continue to decline from the 1st period to the 10th period, thus from short to long run after an impulse of one standard deviation caused by environmental protection expenditure. This is similar to Adewuyi (2016) who found a reverse effect of government environmental protection expenditure on carbon emission over the long and short terms. From fig 5C, after a one standard deviation shock from environmental taxes, carbon dioxide emissions remains negative and slowly decrease through the short run to the long run. This finding is in consistence with Barker et al. (2001), they found that environmental levies are a more efficient way to reduce carbon emissions. Environmental taxes lower energy use through increasing energy efficiency, cut carbon emissions, and support renewable energy sources

4.6 Variance decomposition

In the short term, the error correction model occasionally fails to provide a realistic representation of the variables (Engle and Granger, 1987). As a result, variance decomposition emerges as a substitute for calculating the contribution of each independent variable to variations in the dependent variable. Table 8's variance decomposition measures the impact of exogenous shocks on variables over a ten-year period, accounting for both immediate and delayed reactions.

In the short run, 100% variation in CO2 is explained by the variables own shocks or innovations. The independent variables environmental protection expenditure and environmental taxes did not accounted for any variation in Carbon Dioxide Emissions. In the long run, 99.18% variation explain Carbon Dioxide Emissions own shocks. The contribution of variation by other variables are 0.10% by Environmental Protection Expenditure and 0.71% by Environmental Taxes. It is again seen that the impact of shocks of other variables in carbon dioxide emissions is very low long run.

In the short run, environmental protection expenditure explained 97.46% of variations by its own shocks, carbon dioxide emissions explained 2.53% variations in environmental protection expenditure while environmental taxes does not contribute to fluctuations in environmental protection expenditure. In the long run, variations by Environmental Protection Expenditure own shocks reduces to 88.75%.apart Environmental Protection Expenditure own shocks from environmental taxes is seen as major contributor in fluctuations as it recorded 9.29% of variance and carbon dioxide emissions contributing to 1.95%.

Table 6: Variance Decomposition Results

Period	S.E.	CO2	EPE	ETX
CO2				
1	7.756506	100.0000	0.000000	0.000000
2	8.171421	99.85765	0.018519	0.123828
3	8.861156	99.67611	0.042138	0.281756
4	9.970182	99.47149	0.068758	0.459749
5	10.57418	99.40452	0.077471	0.518009
6	11.24982	99.34090	0.085748	0.573351
7	11.93225	99.28648	0.092828	0.620692
8	12.51667	99.24618	0.098071	0.655748
9	13.10006	99.21129	0.102610	0.686101
10	13.66099	99.18191	0.106433	0.711661
EPE				
1	0.017154	2.538988	97.46101	0.000000
2	0.017958	2.450239	96.05291	1.496850
3	0.019305	2.330680	94.20340	3.465924
4	0.021490	2.187372	92.03506	5.777565
5	0.022689	2.133748	91.29699	6.569261
6	0.024035	2.082307	90.58398	7.333714
7	0.025400	2.037901	89.96482	7.997283
8	0.026573	2.004823	89.50092	8.494256
9	0.027747	1.975864	89.09515	8.928987
10	0.028878	1.951253	88.75047	9.298278
ETX				
1	0.205125	14.19492	0.446196	85.35889
2	0.207930	14.61473	2.309457	83.07581
3	0.212728	15.35268	5.237600	79.40972

4	0.220914	16.56370	9.674378	73.76193
5	0.225584	17.27501	11.72951	70.99548
6	0.231011	18.04382	13.98215	67.97403
7	0.236694	18.78975	16.19268	65.01757
8	0.241711	19.40254	18.02792	62.56954
9	0.246850	19.99216	19.79116	60.21669
10	0.251907	20.53763	21.42093	58.04144

Carbon Dioxide Emissions (CO2), Environmental Protection Expenditure (EPE), Environmental Taxes (ETX), Standard Error (S.E)

Source: Authors compilations from Eviews

In the short run, environmental taxes explains 85.35% of variation by its own innovations, carbon dioxide emissions demonstrated a major cause of fluctuations in environmental taxes apart from the variable's own shocks as it explains 17.27% of variants and environmental protection expenditure also explained 11.72% variations in environmental taxes. In the long run, carbon dioxide emissions and Environmental Protection Expenditure explain variation of 20.5% and 21.42% respectively in environmental taxes. Environmental taxes causes 58.04% variation by its own shocks.

5.0 Conclusion

Cyprus is making effort in addressing the country's climate concerns, using SVAR model and time-series data from 2008 first quarter to 2021 fourth quarter, this study investigates whether environmental protection expenditure and environmental taxes are addressing their carbon emissions embodied in trade imports.

The study has found that the three variables are linked by co integration and investigation has indicated that the relationship between carbon dioxide emissions, environmental protection expenditure, and environmental taxes is longer and more stable. Again, both environmental protection expenditure and environmental taxes have a reducing effect on carbon dioxide emissions embodied trade imports in the short and long run. Lastly, contribution of variations in carbon dioxide emissions is largely explained by the variables own shocks in both short and long run, while environmental protection expenditure and environmental taxes play as supportive role.

5.1 Policy Recommendation

In dealing with Cyprus environmental pollution, and ensuring the achievement of the Nationally Determined Contribution (NDCs) by 2030, environmental levies and protection expenditure have proven to be an effective destructive factor in carbon dioxide emissions embodied in trade imports as the study has shown. Therefore, polices and strategies regulating them should be strengthen by the government through the finance ministry and other stakeholders to achieve even more success in handling environmental pollution. It is crucial to develop comprehensive institutional, technical, and financial innovation adaptation and mitigation strategies to reduce the impact of carbon dioxide emissions. Reduced emission will enhance climate change and sustainability at large in Cyprus.

Limitation of Study

I am unable to draw conclusions about whether or not environmental taxes and spending on environmental protection have an effect on carbon emissions in other countries based on this study's investigation of the dynamic impacts on carbon emissions in Cyprus. Additionally, since other factors might also have an impact on carbon dioxide emissions, I cannot assume that spending on environmental protection and environmental taxes are the only ones that affect carbon dioxide emissions.

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