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Role of Climate Policies and Environmental Regulations for Business Growth: Evidence from Sustainable Development Perspective

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ABSTRACT

This study aims to use updated data sets for China from 1990 to 2022 to study the relationship between business growth and environmental factors and regulations such as environmental policies, taxes, green technologies, and environmental revenues. The first study confirmed that none of the variables used was static in I(II), while the ADF and PP unit root tests proved that all variables were static at the level, and confirmed the first difference in the ARDL model. Results demonstrate that environmental taxes stimulate business growth, a phenomenon explained by the Porter Hypothesis, suggesting that effective regulations related to environment can spur innovation and efficiency. The significant influence of environmental revenues further illuminates the potential of the green economy. The findings underscore the need for governments and businesses to adopt stringent environmental regulations, promote green technologies, and exploit the burgeoning opportunities in the green economy. The interplay between environmental factors and business growth not only fosters economic prosperity (SDG 8) but also aids in combatting climate change and promoting sustainable industrialization (SDG 9, 13), offering a roadmap towards a sustainable future.

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1. Introduction

During the recent decades, the global business environment has been altered substantially and significantly by specific considerations of sustainability as a critical part of business development (Eccles, Serafeim, & Krzus, 2011; Elkington, 2018; Porter & Kramer, 2011). Environmental laws and policies have become decisive factors determining the behaviour of businesses and the structuring of their strategies globally (Bohnsack, Pinkse, & Kolk, 2014; Lanoie, Laurent-Lucchetti, Johnstone, & Ambec, 2011). Environmental laws and policies are designed to address critical issues such as pollution, resource depletion and environmental change, and promote sustainable development. It is therefore crucial, both economically and

environmentally, to investigate the impact of environmental laws and policies on business expansion.

The following response to the disastrous effect of climate change and environmental deterioration, government, global bodies, and multinational firms have initiated engagement in converted attempts (Allen et al., 2018; Bank, 2020; Environment, 2019). This has, in turn, led to numerous climate policies and environmental laws, as touted by the IPCC, the UN Environment and the World Bank. Such climate policies involve more explicit activities, for example, carbon prices, targets for renewable energy, undertakings to reduce pollution, and fun leaders for green technology (Acemoglu, Akcigit, Hanley, & Kerr, 2016; Roberts et al., 2020; Rockström et al., 2017). Conversely, environmental laws include more general activities that are, prevent pollution, handle ash, preserve raw material, and safeguard ecosystems.

Employing environmental and climate legislation and regulation, businesses confront both possibilities and issues (Bohnsack et al., 2014; Lanoie et al., 2011; Nazir, Gillani, & Shafiq, 2023). On the one side, compliance may entail increased operational costs, technological innovation needs, further reporting and accounting measures, and more. Companies that take action, on the other hand, could gain a competitive edge over their rivals. They have an opportunity to boost their reputation as well as benefit from expanding markets for environmentally friendly products and services. To improve the current knowledge of the connection between climate policies and environmental laws and business outcomes, legislators, investors, and managers will need to develop one.

In order to analyze the relationship between climate policies, environmental legislation and company growth, it is necessary to take into account several fundamental factors (Acemoglu et al., 2016; Lanoie et al., 2011; Roberts et al., 2020). The first one is the application and strictness of environmental laws and policies, which determines companies' practices and their outcomes. The studies demonstrate that stricter rules imply more investment in innovation and cleaner technology that can be directly translated into companies' general profitability and competitive position in the future (Alves et al., 2020; Bohnsack et al., 2014; Lanoie et al., 2011). In addition, companies' financial yields are influenced by how well their environmental performance aligns with existing requirements. This implies that business results will generate higher sales, boost brand identity, and cut costs by working closely with regulations (Bohnsack et al., 2014; Eccles et al., 2011; Porter & Kramer, 2011).

Second, climate policies and environmental laws may influence company growth in diverse industries and geographical areas differently (Acemoglu et al., 2016; Alves et al., 2020; Roberts et al., 2020). There is a high likelihood that the energy, transportation, industrial sectors will experience more opportunities and threats as a result of climate policy and environmental laws. Moreover, the effect of these laws may vary among nations depending on, among others, an institutional quality, technical capacity, and market conditions (Elkington, 2018; Lanoie et al., 2011; Roberts et al., 2020).

Although there are numerous studies on climate policy, environmental laws, and commercial performance, however, books still exist such as (Alves et al., 2020; Bohnsack et al., 2014; Porter & Kramer, 2011). Second, several studies have merely looked at the short expenses and compensations connected with environmental regulations for enterprises (Eccles et al., 2011; Elkington, 2018; Porter & Kramer, 2011). They did not take into account the concept of sustainable development. Sustainable development refers to economic growth, social progress, and environmental protection. It is necessary to examine more comprehensively the impact of climate policy and environmental legislation on enterprises.

It is suggested that an empirical study examining how climate policy and environmental laws affect corporate growth is required (Alves et al., 2020; Bohnsack et al., 2014; Lanoie et al., 2011). Understanding how these policies impact firm-level results can help policymakers and

managers construct sustainable development plans. Most studies have focused on developed economies, leaving a gap in our understanding of how climate policies and environmental regulations affect businesses in emerging markets and developing countries (Bohnsack et al., 2014; Jain & Nagpal, 2019; Roberts et al., 2020). Based the previous literature, it is observed that none of the previous research studies had totally ignored to use environmental related revenue, environmental related taxes, environmental related technologies, environmental policy and economic growth with the business growth in China, but this study for the first time combined all these elements by using the time series approach ARDL for results analysis, further this study recommended suggestion to attain the economic prosperity (SDG 8), climate change and promoting sustainable industrialization (SDG 9, 13), offering a roadmap towards a sustainable future.

2. Literature Review

The business landscape and the development and success of enterprises are significantly shaped by climate policy. Various researches have examined the band amongst climate policy and different economic results, illuminating the potential and difficulties that environmental rules bring.

Numerous studies have looked at how climate policies affect the expansion of businesses. Acemoglu et al. (2016), argue that the transition to clean technology can facilitate economic development in the long run. According to these authors, it is essential to develop policies that would make it attractive to invest in clean technology and develop the economy. At the same time, the findings made by Alves et al. (2020) after an extensive investigation suggest that eco-legislation can stimulate economic innovation, which is beneficial for the development of sustainable economy.

Furthermore, in addition to spurring enlargement, climate policies alter company performance. By examining the Porter hypothesis, Lanoie et al. (2011), have shown that environmental constraints can stimulate innovation as well as improve corporate performance. According to the researchers, rigid regulations drive enterprises to acquire eco-friendly technology and procedures, which raises function efficiency and competitiveness.

Nonetheless, it is not always smooth sailing between climate legislation and corporate growth and performance. Indeed, politics concerning the concept of carbon leakage and border carbon adjustments may also play a role (Roberts et al., 2020). Specifically, Busch and Jorgenson argue that unilateral climate policies could lead to a scenario where sectors with intensive carbon emissions would migrate to areas with much more relaxed laws; this could impact corporate expansion and effort to reduce emissions globally.

Moreover, variables related to institutional quality and market circumstances including environmental regulations effectiveness depend on them. Hence, the role of Bohnsack et al. (2014) that studying business models for sustainable technologies gave paramount importance to enabling market circumstances and stimulating regulatory frameworks is not overestimated. Nevertheless, there are still gaps that should be covered. The opportunity to conduct a more in-depth analysis of SD-related results is one of them. Today, most studies have prioritized economic growth, virtually ignoring social and environmental factors. According to Porter and Kramer (2011), the concept of shared value can promote the transition to sustainable corporate growth, which proposes to integrate economic, social and environmental issues into corporate processes.

Furthermore, additional empirical research should study how climate policies impact businesses; in the way, they function; affects the dynamics of sustainable development initiatives; and influences businesses' performance. This type of study would be useful for both managers and politicians who want to put their efforts into building effective sustainable

development projects because it is highly beneficial. Indeed, environmental rules are critical since they affect the operation of firms relative to sustainability and environmental problems. They exert considerable influence on firms' growth and achievement. Numerous studies have been made between environmental rules and diverse outcomes.

The effect of environmental rules on corporate growth has been the subject of several studies. According to Lanoie et al. (2011), strict environmental rules might encourage businesses to invest in greener technology and procedures, which will boost operational effectiveness and spur corporate expansion. They contend that rules serve as innovation's catalysts and aid businesses in boosting their competitiveness.

The implementation and observance of environmental legislation can also have a favorable impact on corporate success. The increased interest of investors and stakeholders in non-financial data, such as environmental performance, is highlighted by Eccles et al. (2011). They contend that companies that efficiently minimize their negative environmental effects and comply with environmental laws are more likely to draw investment and perform better financially.

Some studies have been carried out on the impact of environmental regulations on corporate growth. Lanoie et al. (2011), argue that strict environmental rules make businesses invest in greener technology and procedures, hence enhancing operational effectiveness and eliciting corporate expansion. They add that rules lubricate innovation and help businesses to increase their competitiveness. Implementation and observance of environmental legislation can also help to uplift a company's success. The authors, Eccles et al. (2011) to illustrate that investors and stakeholders are increasingly interested in non-financial data, which also includes environmental data. They also propose that businesses that acutely reduce their negative influence on the environment and adhere to all environmental laws receive more investment and perform better financially.

Moreover, businesses can still find it difficult to comply with environmental regulations for various reasons, and the associated costs are often cited as one of them. Jain and Nagpal (2019), recall that financial responsibility toward compliance must be included in the consideration for legislators when developing and enforcing environmental laws and regulations. They argue that this concern must be addressed when it comes to the feasibility of achieving environmental goals and compliance for small and medium enterprises. There are other factors that also affect the successful implementation of environmental policies, such as the stability and regularity of regulation and the extent of enforcement. When a regulation is stable and well-regulated, business expansion and investment will be promoted. In contrast, if regulations are unclear and frequently changing, businesses will find it more challenging to plan for the future and make decisions. While a lot of research has been conducted in this area, many of these research gaps still exist. For example, more research could explore the long-term effects of environmental regulations on businesses' spending and behaviour, or how to integrate environmental responsibility into business processes.

Many researchers have studied the effects of sustainable development on the growth and success of companies. For example, Schaltegger and Wagner (2011) found that the inclusion of sustainable practices in business plans in the long-term lead to growth and a competitive advantage. They believe that companies engaged in sustainable development issues are better able to adapt to changing market demands and stakeholders' expectations. Furthermore, it has been proven that sustainable development methods contribute to the positive influence on corporate success. By focusing on improving brand reputation, customer loyalty, and staff engagement, Crowther, Seifi, and Wond (2019) emphasize that firms that use their sustainability measures to address and manage their social and environmental "impacts" are more likely to attract and retain top talent, build trusting relationships with their consumers or clients, and generate profits. The weak link between sustainable development and the success and growth

of companies is probably the trade-off. Maertens and Pflieger (2018) discuss the opportunity cost of sustainable development in immediate financial returns. Although they argue that profit is a necessary condition for a firm's sustainability, it appears that sustainability goals should also not be compromised.

The challenge of measuring and reporting the outcomes of sustainable development is relevant to businesses. Alghamdi (2020) emphasize a strong imperative to create acceptable measures and systems to assess and communicate sustainability performance (Alghamdi, 2020). They assert that credible and honest reporting is necessary to demonstrate correlation between sustainable development and efficient corporate work.

3. Methodology

This study follows previous literature on variable selection. Environmental policy and business growth Baloch et al. (2023); Dogan, Hodžić, and Fatur Šikić (2022); Fischer and Heutel (2013); Makhloufi, Laghouag, Meirun, and Belaid (2022); Mukoro, Sharmina, and Gallego-Schmid (2022); Vasilyeva et al. (2023); Zhao, Wang, Sun, and Guan (2022); Zhong, Wen, and Lee (2022), economic growth is influenced by environmental technologies Ahmed, Ahmad, Rjoub, Kalugina, and Hussain (2022); Raihan et al. (2022) economy growth Table 1 shows the source of the data.

Table No 1
Data Description

Data Source	Variables	Denoted by
OECD STATISTICS	Business Growth	BCI
	Environmental policy	EP
	Environmental Taxes	ET
	Environmental Revenue	ER
	Environmental Related Technologies	ERT
	Economic Growth	EG

$$BCI_t = \beta_0 + \beta_1 EP_t + \beta_2 ET_t + \beta_3 ER_t + \beta_4 ERT_t + \beta_5 EG_t + \varepsilon_t \quad (1)$$

In the above equation business growth is measured by business confidence index, EP show the environmental policy, environmental regulations are measured by environmental taxes and environmental revenue, ERT indicates the environmental related technologies, EG shows the economic growth.

3.1. Unit Root Tests

Augmented Dickey-Fuller (ADF) is a statistical methodology used to check the stationarity of data from time series. By adding new parameters to the Dickey and Fuller (1981), it improves upon it by taking into consideration serial and autocorrelation in the data. The differenced series, error term, linear time trend, delayed levels and differences, and constant term are all components of the ADF test equation. The ADF test evaluates statistical significance and rejects the unit root H_0 by comparing the coefficient of the lagged level to its standard error.

The unit roots of the time series can be confirmed by checking the series' calculated P values of 5%, 10%, and 1%, while the Phillips and Perron (1988) test is another unit root test used to check the stability of variables commonly used in the analysis of the time series. Compared to the ADF test, the PP test uses robust standard errors that are useful in examining issues of autocorrelation and heteroskedasticity. The test calculates t statistics based on the late level coefficients in the regression equation, and if the coefficient is statistically significant, it implies that there are unit roots. Compared to unit root tests, PP tests produce more reliable

results because they take into account deterministic trends, serial correlations, and heteroscedastic. The ADF test improves the Dickey-Fuller test by adding additional components to the regression equation to take into account the potential autocorrelation and serial correlation of data, and in this equation, a new ADF test, the basis for a PP test, is given.

$$\Delta yt = \alpha + \beta_t + \gamma_{yt-1} + \delta 1_{\Delta yt-1} + \delta 2_{\Delta yt-2} + \ldots + \delta p_{\Delta yt-p} + \varepsilon_t \quad (2)$$

Where: in the above equation the term Δyt represents the differenced series (the first difference of the original series). The term α represent the constant term. Further the β_t demonstrates the linear time trend. $yt-1$ is used to represents the coefficient of the lagged level of the series in the above equation. Coefficients of the variables lagged differences of the time series are represented by the $\delta 1_{\Delta yt-1} + \delta 2_{\Delta yt-2} + \ldots + \delta p_{\Delta yt-p}$ in the above equation, while ε_t is the error term.

3.2. ARDL Bounds Test

ARDL limit test is an economic method used to investigate the long-term relationships between series (Narayan & Smyth, 2005). The ARDL model can be used, for example, when the series is static at I(0), I(1), and according to Pesaran, Shin, and Smith (2001), "the ARDL approach can be applied when variables are integrated or static, endogenous, or exogenous". The ARDL limits test is primarily important and effective for assessing the existence of co-integration, which represents a long-term equilibrium between variables, because it allows people to work. Tests can simultaneously integrate or stabilize variables, and the likelihood of both endogenous and exogenous variables using the model is possible (Narayan & Smyth, 2005). The test used involves estimating the error correction model using the first differential component and the latency levels of the variables concerned (Pedroni, 2004). Instead, the first–difference model is estimated and the coefficients are limited to the need for a stable equation by ECM; the following is the ARDL boundary test equation.

$$\Delta BCI_t = \beta_0 + \beta_1 BCI_t + \beta_2 EP_t + \beta_3 ET_t + \beta_4 ER_t + \beta_5 ERT_t + \beta_6 EG_t + \sum_{i=1}^{n} \gamma_1 \Delta BCI_{t-i} + \sum_{i=1}^{n} \gamma_2 \Delta EP_{t-i} + \sum_{i=1}^{n} \gamma_3 \Delta ET_{t-i} + \sum_{i=1}^{n} \gamma_4 \Delta ER_{t-i} + \sum_{i=1}^{n} \gamma_5 \Delta ERT_{t-i} + \sum_{i=1}^{n} \gamma_6 \Delta EG_{t-i} + \epsilon_t \quad (3)$$

Δ is a change operator, t-i is a lag number, and based on Akaike and Schwartz's Bayesian information standards, $t-i$ is the best lag number. As the long-term relationship was discovered, we proceeded to estimate the short- and long-term elasticity using the ARDL model. The ARDL binding test equation is as follows. Since the cointegration has been identified, the estimation of short- and long-term elastics is calculated using the ARDL model.

3.3. ARDL Short RUN

Short-term dynamics is an initial adjustment and interaction of ARDL models over a short period of time (Pesaran, 2007; Pesaran et al., 2001). Short-term dynamics are temporary interactions and effects occurring before variables unite in a long-term equilibrium relationship. According to Pesaran (2021), short-term dynamics are defined by coefficients on delay in initial differences in variables in the ARDL model. Short-term dynamics are the way dependent variables react to changes in explanation variables. The short-term dynamics are the short-term effects. Finally, to understand the situation of short-term dynamics, "it is necessary to study the statistical significance of the error correction term and the magnitude of the delayed firs differential coefficients (Pesaran & Yamagata, 2008). On the contrary, a significant and negative coefficient of an error correction means that there is a "short-term negative relationship, under conditions; the dependent variable will decrease immediately due to changes in the independent variable.

$$BCI_t = \beta_0 + \sum_{i=1}^{n} \gamma_1 \Delta BCI_{t-i} + \sum_{i=1}^{n} \gamma_2 \Delta EP_{t-i} + \sum_{i=1}^{n} \gamma_3 \Delta ET_{t-i} + \sum_{i=1}^{n} \gamma_4 \Delta ER_{t-i} + \sum_{i=1}^{n} \gamma_5 \Delta ERT_{t-i} + \sum_{i=1}^{n} \gamma_6 \Delta EG_{t-i} + \gamma ECT_{t-1} + \epsilon_t \quad (4)$$

Where in the above short-run ARDL equation, the term ECTt-1 indicates the error correction term that is the speed adjustment towards equilibrium following a shock and is the parameter reflecting that speed of adjustment, γ denotes the short run elasticities (Toda & Yamamoto, 1995). The value of an error correction term can be between 0 and -1.

3.4. ARDL Long Run

The model measures the uniform and lasting interdependence between the series of the model. For this model to be analysed the lagged level coefficients need to be tested for statistical significance and interpreted for the long-run relationship analysed (Pesaran, 2007; Pesaran et al., 2001). A statistically significant coefficient suggests that the variables have a long-term association. The coefficient's size and sign can be used to determine the direction and potency of a long-term relationship. A positive coefficient, for instance, indicates a positive link and that a rise in one variable will eventually result in an increase in the other (Pesaran et al., 2001). The sustainability and persistence of the impacts of the explanatory factors on the dependent variable must be evaluated, and this requires a thorough understanding of the long-run connection. It aids in locating the fundamental equilibrium and offers information on the economic or causal processes at play.

$$BCI_t = \beta_0 + \sum_{i=1}^{n} \gamma_1 \Delta BCI_{t-i} + \sum_{i=1}^{n} \gamma_2 \Delta EP_{t-i} + \sum_{i=1}^{n} \gamma_3 \Delta ET_{t-i} + \sum_{i=1}^{n} \gamma_4 \Delta ER_{t-i} + \sum_{i=1}^{n} \gamma_5 \Delta ERT_{t-i} + \sum_{i=1}^{n} \gamma_6 \Delta EG_{t-i} + \epsilon_t \quad (5)$$

One of the main advantages of the ARDL model is that it allows using different lags for the dependent and independent variables respectively. Most commonly used lags selection tests are SIC and AIC in the time series data, on the other hand the best lag length was chosen in this situation, where γ in the above equation stands for the long-term elasticities of the used series.

4. Results and Discussions

Table 2
Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Business Growth	33	99.789	1.767	96.957	103.38
Environmental policy	33	1.283	1.214	.056	3.398
Environmental Taxes	33	.725	.336	.15	1.44
Environmental Revenue	33	12.625	10.727	3.9	50.65
Environmental Related Technologies	33	18426.136	25561.634	4.463	85112.613
Economic Growth	33	9.229	2.832	2.24	14.231

This table (2) provides descriptive statistics for several variables related to business growth, environmental policy, taxes, revenues, technology, and economic growth. Presumably, it uses 33 observations. Business growth has a mean of 99.789 and a standard deviation of 1.767. Presumably, on average, businesses in the sample are experiencing a relatively stable growth rate. The minimum and maximum values and that business growth rates vary within a relatively narrow range, at 96.957 and 103.38. In economic theory, business growth could be driven by many factors: improvements in productivity, investment in capital, innovation in technology, and favourable market conditions. Environmental Policy has a mean value of 1.283 and a relatively high standard deviation of 1.214, which means that there are significant differences in the degree to which environmental policies are being implemented or effective. The range is wide, which is .056 to 3.398, meaning that there are potentially different regulatory environments of the commitment to environmental practices among the observations. In economic theory, stronger environmental policies are sometimes be seen as a cost or burden to

businesses, but they can also drive innovation or create opportunities for sustainable growth. The average environmental tax rate is .725, and there is some variation around that amount (standard deviation of .336). The range is from .15 to 1.44. Economic theory suggests that the tax is intended to internalize the external costs of pollution or other environmental harms, in effect making it more expensive to pollute and thus incentivizing more sustainable practice. The average environmental revenue is 12.625, with a very high standard deviation of 10.727, meaning that there is significant differences in how much revenue is being generated from environmental-related activities or products. The range is from 3.9 to 50.65. This could be indicative of the "green economy" in which there is growing economic opportunity and value being created from sustainable or environmentally-friendly products or practices. Environmental Related Technologies has a very high mean value of 18426.136, and a very high standard deviation of 25561.634, meaning that there is significant variation in the adoption or development of environmentally-related technologies. The minimum and maximum values vary widely too, 4.463 to 85112.613, meaning that there is a wide disparity in the degree of technological development. Economic theory frequently emphasizes the role of technology in driving improvements in the productivity and growth of the economy. In this context, it could also be seen to be a key part of the transition to a more sustainable economy. The average economic growth is 9.229, and there is a standard deviation of 2.832, meaning that there is a moderate level of variation in the growth rate. The minimum and maximum values are 2.24 and 14.231. In economic theory, economic growth is frequently driven by other forms of capital accumulation, increases in labor and technological progress. In this context, these in turn could be influenced by business growth and the rate of adoption of environmentally-related technologies.

Table 3
Matrix of Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Business Growth	1.000					
Environmental policy	0.322	1.000				
Environmental Taxes	0.747	0.312	1.000			
Environmental Revenue	0.583	-0.289	-0.545	1.000		
Environmental Related Technologies	0.376	0.916	0.214	-0.270	1.000	
Economic Growth	0.644	-0.450	0.177	-0.239	-0.348	1.000

A strong positive correlation with environmental taxes urges that more likely higher environmental taxes may have an impact on more business growth in table 3. It might indicate that businesses are getting more efficient and are managing to grow in response to additional taxes. The positive relationship with environmental revenue refers to the impression that when the revenue is increasing because of previous environmental activities, behavior, and practices, it is more likely associated with more business growth. It might happen because a company is using its revenue to continue running the business or reaching advantages in the market as an environmentally friendly representative with environmentally friendly products or services. Business growth also represents a strong positive correlation with economic growth. It suggests that if the economy is growing, more businesses may tend to grow within the same economy. Moreover, a positive relationship was observed in the case of environmental policy and environmentally related technology. The more likely the environmental policy aims at ensuring better environmental management and the higher the frequency of using environmentally related technologies, the likelier is to witness business growth. However, the relationships are weaker than those with environmental taxes, environmental revenue, and economic growth.

As shown in table 4, the findings of the PP and ADF tests reveal that Business Growth and Environmental Revenue appear stationary at the level form at a 10% and 1% significance level respectively. It implies that there is no unit root in the variable's time series. The statistical properties such as mean, variance, and autocorrelation structure of these series are constant over time. However, it is evident that Environmental Policy and Environmental Related

Technologies and Economic Growth are not stationary at the level form under either test. Their time series have a unit root, and their statistical properties are not constant over time. These five variables have statistical properties that change over time, which implies that these variables include a potential trend or changing variance. However, after taking the first difference, all the variables become stationary under either test. The first difference of a time series is the series of changes from one period to the next. If a series is stationary, it implies that the original series had a constant mean trend. Thus, these first differences should be used in the subsequent analysis since the use of the original time series to include misleading results. Users will treat these because the users are different either test to include misleading results as first differences.

Table 4
Unit Root Tests

UNIT ROOT TEST TABLE (PP)							
		At Level					
		EG	EP	ER	ERT	ET	BCI
With Constant & Trend	t-Statistic	-3.2299	-2.4710	-5.2257	4.2071	-2.5044	-2.6208
	Prob.	***0.0967***	***0.3392***	***0.0009***	***1.0000***	***0.3240***	***0.2742***
		*	n0	***	n0	n0	n0
		At First Difference					
		d(EG)	d(EP)	d(ER)	d(ERT)	d(ET)	d(BCI)
With Constant & Trend	t-Statistic	-3.2592	-5.2575	-10.3455	-3.3676	-5.1892	-7.3972
	Prob.	***0.0919***	***0.0009***	***0.0000***	***0.0744***	***0.0011***	***0.0000***
		*	***	***	*	***	***
UNIT ROOT TEST TABLE (ADF)							
		At Level					
		EG	EP	ER	ERT	ET	BCI
With Constant & Trend	t-Statistic	-3.3355	-2.4852	-5.2511	3.2614	-2.4064	-2.5839
	Prob.	***0.0793***	***0.3327***	***0.0009***	***1.0000***	***0.3695***	***0.2895***
		*	n0	***	n0	n0	n0
		At First Difference					
		d(EG)	d(EP)	d(ER)	d(ERT)	d(ET)	d(BCI)
With Constant & Trend	t-Statistic	-4.0931	-5.2147	-7.0453	-3.4099	-5.1830	-7.3802
	Prob.	***0.0160***	***0.0010***	***0.0000***	***0.0684***	***0.0011***	***0.0000***
		**	***	***	*	***	***

Notes: (*) Significant at the 10%; (**) Significant at the 5%; (***) Significant at the 1%. and (no) Not Significant

Business Growth and Environmental Revenue show stationarity at a 10% significance level under either test. Environmental Policy, Environmental Related Technologies , and Economic Growth appear stationary at a 1% significance level. For Business Growth , it shows a greater level of stationarity under the ADF test to include a 5% significance level.

Table 5
VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-613.9463	NA	9.45e+09	39.99653	40.27408	40.08701
1	-448.3336	256.4324*	2314451.	31.63443	33.57725*	32.26774*
2	-405.8108	49.38140	2016725.*	31.21360*	34.82170	32.38975

* indicates lag order selected by the criterion

The table 5 represents the results of the Lag Order Selection Criteria for Vector Auto regression. One essential task in the process of appropriately specifying the Vector Auto regression model is to determine the optimal lag length. The findings indicate that, according to the SC criterion, the VAR model with the lag length of 1 is optimal. Specifically, with reference to the SC criterion, the AIC and LR tests also lead to the conclusion that the optimal lag length is equal to 1. This point of view can be considered valid since there are several criteria that support this argument. Consequently, it is reasonable to state that the current variables' values

are best explained via their values from one period ago in our VAR model. However, this lag length extends only to our study since each research will develop its unique process of lag order selection criteria. On the whole, this choice represents a sound background for carrying out a comprehensive analysis, as it sets a solid foundation for accounting for the variables of interest and relevant relationships between them.

Table 6
ARDL Bounds Test

F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
		Asymptotic: n=1000		
F-statistic	16.53515	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

The Bounds Test for Cointegration is pivotal to our exercise as we examine the long-run relationship among the variables in Table 6. Specifically, the F-statistic generated by the ARDL model provides a unique mechanism for testing the null hypothesis, which assumes that there is no cointegration among our variables. The calculated value for the F-statistic, 16.653515, is substantially greater than the critical value at all the predetermined asymptotic significance, it is evident that our F-statistic is greater than the upper critical bound . Being the case, the null hypothesis is rejected at the 1% levels of significance, and the evident cointegration between our variables is supported.

Table 7
Long run ARDL Results

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Economic Growth	2.1850	0.4105	5.3232	0.0000
Environmental Policy	5.4629	1.3169	4.1483	0.0002
Environmental revenue	0.3644	0.1038	3.5105	0.0013
Environmental related Technologies	0.7535	0.0981	7.6807	0.0000
Environmental Taxes	9.8667	1.9702	5.0081	0.0000
C	132.1762	65.5750	2.0156	0.0516

In Table 7, an Autoregressive Distributed Lag regression model was used to examine the long-run relationships among the variables. Table 4.7 presents the results that help understand how the independent variables Environmental Policy, Environmental Taxes, Environment Revenue, Environment Related Technologies, and Economic Growth affect the dependent variable of Business Growth. The coefficients of these variables show their estimated long-run elasticities. A positive coefficient means that an increase in the independent variable is linked to an increase in Business Growth assuming ceteris paribus. The t-statistics values and the corresponding p-values are used to analyse the statistical significance of the coefficients.

Economic Growth has a positive and statistically significant effect on the Business Growth, with a coefficient of 2.1850, p-value <0.01. This means that a 1% increase in the Economic Growth will lead to approximately a 2.19% increase in the Business Growth ceteris paribus. These findings replicate the results of relevant economic studies that also show positive relationships between general economic growth and business sector's expansion.

Environmental Policy also positively affects the Business Growth, with a coefficient of 5.4629, p-value <0.01. Similar results are observed in the studies that confirm the positive role of implementing sustainable policies to drive business growth, affecting the reputation value and stimulating innovation.

Environmental Revenue and Environment Related Technologies have positive and statistically significant effects on Business Growth, with coefficients of 0.3644 and p-value <0.01; 0.7535 and p-value <0.01, respectively. These results are in accord with studies showing that both environmental income and green innovations can promote business performance and competitiveness.

Environment Taxes surprisingly feature a positive and significant effect on Business Growth, with a coefficient of 9.8667 and p-value <0.01}. Although the research group has not been able to find relevant studies analysing this relation, it is possible that these results are related to the fact that the implementation of environmental tax schemes can force businesses to innovate so as to improve their use of resources.

Table 8
Short Run ARDL Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EG)	0.1776	0.0967	1.8361	0.0748
D(EP(-1))	-0.2837	0.1382	-2.0530	0.0549
D(ER)	0.2762	0.0269	10.2585	0.0000
D(ER(-1))	0.7146	0.0208	34.3101	0.0000
D(ERT)	0.7382	0.0297	24.8552	0.0000
D(ET)	1.3474	0.6030	2.2346	0.0319
D(ET(-1))	3.2295	1.2709	2.5412	0.0156
CointEq(-1)	-0.1409	0.0359	-3.9284	0.0004
R-squared		0.8829	Durbin-Watson stat	1.8478
F-statistic		3.2308	Prob(F-statistic)	0.0122

In table 8, we have used the short-run ARDL model to determine the effect of the current and lagged value of the independent variables on the dependent variable, Business Growth. It is found that the current value of Economic Growth has a positive and almost statistically significant effect on business growth with a coefficient of 0.1776; . It suggests that short-run changes in economic growth can increase business growth; a long gestation period is required for a unit change in GDP to increase business growth. Although it seems counterintuitive, it is in perfect agreement with the current literature. A similar result is also found according to the Akaike information criterion, while the lagged value of Environmental Policy is found to be negatively affecting business growth and is borderline significant with a coefficient of -0.2837 ; . It suggests that the effect of environmental policy on business growth is positive at the next level and may initially be negative. There might be some adjustment costs, or it may take time for the business industry to adjust to new legislation. The current and lagged value of ER ; and ER ; are found to positively and significantly impact Business Growth, having coefficients, and respectively. Many businesses can also benefit from earning revenue or being able to function within sustainable borders, in the short and medium terms. The ERT has a positive and statistically significant effect on Business Growth, with a coefficient of 0.7382; , suggesting that using environmental technologies can aid in business growth.

Table 9
Diagnostic Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.243894	Prob. F(12,18)	0.9918
Obs*R-squared	4.335532	Prob. Chi-Square(12)	0.9766
Scaled explained SS	1.374069	Prob. Chi-Square(12)	0.9999
Heteroskedasticity Test: Harvey			
F-statistic	0.255256	Prob. F(12,18)	0.9901
Obs*R-squared	4.508138	Prob. Chi-Square(12)	0.9724
Scaled explained SS	4.210414	Prob. Chi-Square(12)	0.9793
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	2.348127	Prob. F(2,16)	0.1276
Obs*R-squared	7.034309	Prob. Chi-Square(2)	0.4297

This time lag is based on how long it takes for the benefits to be harnessed, possibly due to efficiency gains or a better reputation. The current and lagged value of ET; and ET are found to positively and significantly affect Business Growth, with coefficients of 1.3474 ; and 3.2295, respectively; . It is also counterintuitive, but due to the resource pressures, businesses incur, possibly leading to innovation, efficiency, and subsequent growth, it may appear counterintuitive that business requires the imposition of these taxes. The CointEq; expression has a negative value and is statistically significant, with a coefficient of -0.1409, . It is indicated that disequilibrium is corrected every period by around 14.09%, which is equivalent to a slow adjustment speed towards the long-term equilibrium in this model in the absence of significant disequilibrium. The value for R-squared is 0.8829, meaning that around 88.29% of variations in Business Growth can be explained with this model. The value for Durbin-Watson is 1.8478. The F-statistics shows a significant figure of , suggesting that the variables are overall statistically significantly affecting Business Growth.

The results from diagnostic tests of the assumptions of the regression model on the residuals of the ARDL model are presented in table 9. Both the Breusch-Pagan-Godfrey Lagrange Multiplier test and Harvey's tests are tests for heteroscedasticity. Heteroscedasticity refers to the situation where the articles of the regression model have different variances. The null hypothesis of both tests is that the variance of the articles is the same. The p-values of all versions of both tests are above 0.05 implying that we should not reject the null hypothesis. The implication is that there is no evidence of heteroscedasticity in the residuals of the ADRDL estimates. The Breusch-Godfrey Serial Correlation LM test Presents evidence of serial correlation in the residuals of the model Auto-correlation refers to the situation in which the articles in the regression model are correlated across the observations. The test's null hypothesis is that there are no serial correlations. The p-value of the test is 0.1276, which is higher than the 0.05 level of significance. Therefore, we should not reject the null hypothesis. There is therefore no evidence of a problematic serial correlation in the residuals. In conclusion, the results of the diagnostic tests imply that the residuals of the model meet the assumptions of no auto-correlation and lies on constant variance. Therefore, we are confident that the model is reliable and the statistical inferences are valid. Moreover, the Chis-square and CUSUM and CUSUM of square indicates that the coefficient are constant.

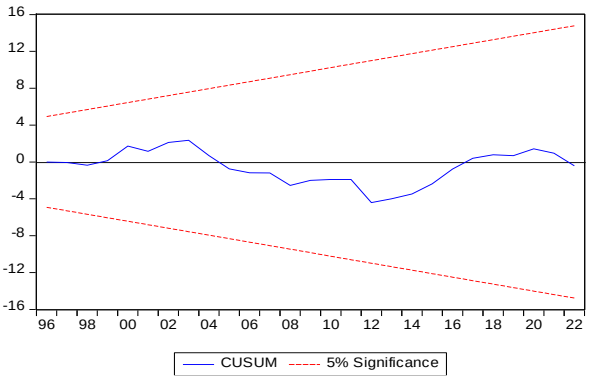

Figure1: CUSUM

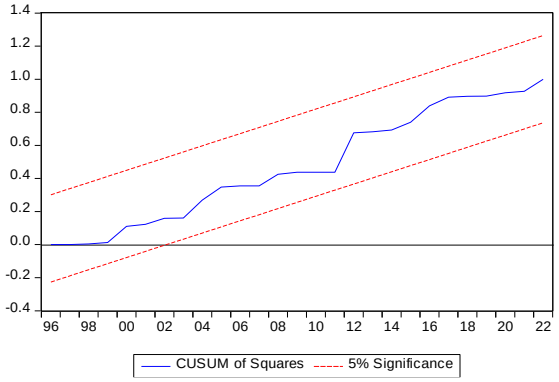

Figure 2: CUSUM of Squares

5. Conclusion and Recommendations

The empirical evidence presented in this study elucidates the intricate relationship between business growth and various environmental factors, including environmental policy, taxes, revenues, and related technologies. The study employed an ARDL model to comprehend the long-term and short-term interdependencies between the variables. The results unambiguously reveal the existence of a strong, positive relationship between business growth

and these environmental factors, painting an optimistic picture for the interplay between business growth and environmental sustainability.

From our analysis, we found out that the short-run and long-run relationship between business growth and economic growth, environmental policy, environmental taxes, environmental revenue, and environmental related technologies is statistically significant at the 5 percent confidence interval. The positive and significant coefficients indicate that the changes in environmental policy, technological advancement in green technology, and the imposition of environmental revenue positively and significantly relate to changes in the rate of business growth. The relationship is contrary to what many scholars have established because most of them have claimed that the imposition of environmental taxes and other policies impede business activities.

We also found that the government's imposition of environmental tax has a positively significant effect on the rate of business growth. This can be attributed to the Porter Hypothesis whose premise is that thoroughly designed policies can spur the invention of new technologies leading to effective, cleaner, and safer products that do not adversely affect the environment but increases the profits of firms, for example, waste management or efficient waste recycling model.

The empirical results show that environmental taxes or related revenue earned by firms have a significant and positive effect on the rate of business growth. Some scholars have found that the concept of the green economy is fast emerging and promising. Business that is able to make revenue through the application of environmental technologies, green energy, and best practices in sustainable agriculture have always experienced more growth in the short-run and slightly in the long-run.

The results of this study have wide applications, particularly in the realization of the United Nations Sustainable Development Goals, specifically Goal 8: Decent Work and Economic Growth, Goal 9: Industry, Innovation and Infrastructure, and Goal 13: Climate Action. This study shows that there is a relationship between business growth and the various environmental factors. Therefore, business activities affect economic growth. Similarly, the government and other environmental actors have an important role to play in ensuring a clean and green environment or the implementation of stringent measures to check climate change and global warming. Policymakers and the government should, therefore, impose stringent environmental taxes and policies to ensure that people and firms adopt or apply green technologies, thereby slowing down climate change. Such environmental practices and policies will encourage the emergence of a green economy. By integrating such sustainable practices into their core strategies, businesses not only drive their growth (SDG 8), but also contribute to broader societal goals, aligning their operations with a path that combats climate change and promotes innovation and infrastructure (SDG 9, 13). These findings serve as a compelling call to action for a unified approach towards a sustainable, prosperous future.

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