



Corporate Social Responsibility In Morocco: An Empirical Study Of Companies In The Casablanca-Settat Region

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ABSTRACT

Objective: The research seeks to examine the causal links between CSR practices, specifically OHS training, and mining companies' performance.

Theoretical Framework: The theoretical framework explores the evolution of CSR, emphasizing its pivotal role in societal well-being. Stakeholder theory underscores the moral duty of companies to respond to diverse stakeholder needs, shaping CSR as a model for ethical and sustainable business practices.

Methodology: Employing an econometric approach, the study scrutinizes the causal connections between CSR variables and overall company performance. OHS training is recognized as a critical CSR component, influencing employees and the broader community. The chosen case study, Managem, ensures a focused analysis of homogeneous sustainability-related data over a decade (2013-2022), providing robust insights into CSR's impact on mining enterprises.

Results and Conclusion: The Granger causality test reveals that Occupational Health and Safety (OHS) training significantly causes short-term performance in mining companies, emphasizing its crucial role in influencing immediate metrics. However, the reverse causation, where performance influences OHS training, lacks statistical support.

The cointegration test investigates the long-term relationship between OHS training and performance, indicating a lack of cointegration. This suggests an absence of a stable, long-term equilibrium relationship between these variables.

In summary, the study underscores the substantial impact of OHS training on short-term performance in the mining sector. However, it doesn't find robust evidence supporting a stable, long-term relationship between OHS training and overall company performance. These findings contribute to CSR literature and stress the importance of continuous research and strategic considerations for integrating sustainable practices within corporate frameworks.

Research implications: The research finds a significant short-term positive impact of OHS training on company performance. However, it indicates a lack of a stable, long-term relationship between OHS training and overall performance. Implications include the need for continuous CSR research, strategic considerations for mining companies, industry-specific insights, policy considerations, and the importance of balancing short-term gains with long-term sustainability. The study provides a methodological framework for future research in this area.

Originality/Value: This study provides distinct insights by uncovering the immediate impact of Occupational Health and Safety (OHS) training on mining companies' short-term performance. Its novel contribution lies in revealing that there is no enduring, stable relationship between OHS training and overall company performance, adding unique perspectives to CSR literature.

Keywords: *Corporate Social Responsibility (CSR), Corporate Performance, Mining companies, Morocco, Occupational Health and Safety (OHS), Responsible Practices.*

I. Introduction

The global mining sector, characterized as an extractive industry, confronts distinctive challenges in the realm of Corporate Social Responsibility (CSR). As the sustainable management of natural resources assumes paramount importance, particularly amidst the increasing scarcity of certain raw materials, mining companies are compelled to adopt practices that ensure the preservation of fragile ecosystems and secure the long-term viability of their operations. The imperative to strike a delicate balance between operational necessities and environmental protection necessitates the rigorous integration of CSR into the operational strategies of all mining entities.

Environmental challenges, ranging from deforestation to water and air pollution, further compound the sector's complexities. Achieving sustainability demands a careful equilibrium between economic development and environmental protection. This requires mining companies to implement innovative technologies and processes that minimize their ecological footprint and mitigate the adverse consequences of their activities.

Simultaneously, the relationship between mining companies and local communities assumes critical importance. Operating in regions where local populations heavily rely on natural resources for their livelihoods, CSR mandates transparent and inclusive management of relations with these communities. This involves addressing community concerns, equitably sharing benefits, and fostering local development. Collaboration with local stakeholders not only strengthens community ties but also mitigates the negative social impacts associated with mining activities.

Moreover, mining companies are obligated to assume responsibilities towards various stakeholders. This entails engaging in constructive dialogues with governments, NGOs, investors, and other stakeholders to ensure collective and ethical decision-making. Transparency in business relationships, regulatory compliance, and the adoption of best governance practices collectively enhance the credibility and sustainability of mining companies.

In the specific context of Morocco's Casablanca-Settat region, a major economic center for the mining sector, these challenges take on a distinctive dimension. The region's diverse mineral resources position it as a strategic anchor. Mining companies based in Casablanca-Settat significantly contribute to local economic activity and play a vital role in the national economic fabric. It is within this dynamic context that the study of CSR within the region's mining companies assumes particular importance, offering tangible insights into how these companies adeptly integrate social and environmental dimensions into their day-to-day practices.

Within the expansive landscape of CSR, this study narrows its focus to the specific realm of Occupational Health and Safety (OHS) training. It delves into the nuanced relationship between OHS training and the overall performance dynamics of mining companies. The motivation behind this investigation lies in the imperative to understand how responsible business practices, particularly in the domain of employee well-being, shape the success and sustainability of mining enterprises.

What is the nature of the relationship between the Corporate Social Responsibility (CSR) practices of companies in the mining sector in the Casablanca-Settat region of Morocco and their performance?

The primary inquiry addressed by this article revolves around the examination of Corporate Social Responsibility (CSR) practices, with a specific emphasis on Occupational Health and Safety (OHS) training within mining companies. The investigation employs a dual approach: a detailed analysis of CSR practices, particularly OHS training, and an econometric study to evaluate the causal links between OHS and a mining company's performance. The performance assessment is measured by basic earnings per share, providing a comprehensive perspective within the scope of this research.

II. Theoretical framework

1. Emergence of Corporate Social Responsibility

The growing prominence of Corporate Social Responsibility (CSR) over the years can be attributed to a multifaceted evolution spurred by various influential events. As the concept traces its roots back to Bowen's foundational work in 1953, it has undergone significant transformations, particularly gaining traction as a pivotal consideration in managerial circles since the 1970s. This transformation has been catalyzed by a profound reflection on the externalities stemming from corporate activities, as elucidated in scholarly works such as those by Carroll (1979) and Sethi (1975).

The burgeoning interest in CSR among managers, public officials, and members of civil society reflects a response to a series of impactful events that unfolded over the years. The past decades have been marked by ecological disasters, ethical dilemmas, and societal challenges, each prompting a reevaluation of the role and responsibilities of corporations. For instance, catastrophic incidents like the Bhopal disaster and controversies surrounding genetic engineering have drawn attention to the potential negative externalities of technological advancements and industrial practices.

The economic landscape of the 1980s contributed to the narrative of corporations as drivers of progress, economic growth, and societal well-being. However, the subsequent economic downturn in the 1990s disrupted

this narrative, leading to a reevaluation of societal expectations from corporations. As companies faced financial crises and engaged in widespread layoffs, citizens became more discerning and critical, demanding increased transparency and a heightened focus on corporate social responsibility in their interactions with businesses.

The power dynamics between corporations and the public have also been influenced by media exposure, which played a pivotal role in shedding light on corporate malpractices and scrutinizing the ethical dimensions of business decisions. High-profile scandals involving companies like Enron and WorldCom further fueled public skepticism, intensifying the call for greater corporate accountability and responsibility. The past two decades have witnessed ecological disasters and controversies—ethical, health-related, and safety-oriented—prompting a reevaluation of technical development, mass production, and the profit-centric ethos of the market economy. While the 1980s propagated the narrative of corporations as custodians of societal values, the economic crisis of the 1990s brought about a noticeable reversal of these values. Citizens have become more discerning and demanding of companies, calling for increased transparency and displaying a heightened focus on corporate social responsibility in their purchasing decisions.

The augmented power of corporations has given rise to a counterforce represented by civil interest groups and the media. This counterforce amplifies societal pressure on companies, contributing to the dissemination of controversies and mobilizing public opinion and public authorities. Civil society reacts spontaneously to social plans and vehemently denounces management practices. Notable economic and financial crises, exemplified by the cases of Enron, WorldCom, and Elf, coupled with global summits and the forces of globalization, have elevated global awareness concerning social and environmental issues.

Contemporary consumer trends reflect a heightened sensitivity to the societal dimensions of business. The embrace of fair trade, the demand for organic products, the ascendancy of social rating agencies, and the popularity of ethical investment funds all underscore consumers' nuanced expectations from corporations. Beyond consumer behavior, public initiatives such as the United Nations' Global Compact, the European Commission's Green Paper, and legislative actions like France's CSR laws have bestowed upon CSR a strategic significance for companies. These initiatives create an environment conducive to organizations that integrate social and environmental dimensions into their core business activities.

2. Corporate Social Responsibility (CSR) - A model for ethical and sustainable business practices

The concept of Corporate Social Responsibility (CSR) represents a paradigm shift in the role and obligations of companies within society. At its core, CSR advocates that companies go beyond their immediate operational concerns and actively consider potential negative externalities arising from their activities, such as pollution, unemployment, and poverty. This theoretical framework, reminiscent of a doctrine, addresses growing concerns about the disproportionate power wielded by corporations and their managers in contemporary societies.

The essence of CSR lies in the acknowledgment that companies, owing to their substantial economic, financial, or technological power, bear moral obligations to society at large. This perspective aligns seamlessly with stakeholder theory, underscoring the moral duty of companies to respond justly to the diverse needs of various stakeholders. These stakeholders encompass a broad spectrum, ranging from shareholders and consumers to local communities, civil society, and public authorities.

CSR envisions a company that transcends the conventional pursuit of wealth accumulation for shareholders. Instead, it aspires to create a harmonious equilibrium among the often divergent interests of stakeholders. This vision of a socially responsible company extends beyond a narrow focus on profit maximization, emphasizing the importance of considering the broader impact of business activities on society.

Key stakeholders, such as shareholders, have a vested interest in the company's financial success, but CSR emphasizes that this success should be achieved ethically and sustainably. Consumers, on the other hand, are increasingly attuned to the social and environmental footprint of the products and services they support. Local communities expect companies to contribute positively to their development, while civil society and public authorities demand transparency, ethical conduct, and active participation in societal well-being.

Embracing CSR entails adopting a long-term perspective on organizational objectives, strategic decision-making, and profit generation. Socially responsible companies recognize that sustainable success is intrinsically linked to positive societal impact. As such, they prioritize initiatives that not only benefit their bottom line but also contribute to the welfare of communities and the environment.

The theoretical postulate of CSR also maintains that responsible behavior is not incompatible with better financial performance. Such conduct contributes to creating an institutional environment conducive to economic activity. Voluntary adherence to responsible principles is deemed preferable to regulatory intervention. Responsible corporate behavior is posited to promote economic, social, and political stability, thereby mitigating social criticism of the private enterprise system. According to Ashley (2005), CSR is a commitment to society that goes beyond legal obligations, reflecting both globally and locally, with the aim of contributing to sustainable social well-being. However, in emerging countries like Brazil, CSR practices are often misunderstood as philanthropy, making it challenging to align them with the organization's true objectives. The difficulties in adopting and improving CSR practices in Latin America have been attributed to cultural factors and complex politico-economic scenarios. Multinational companies, as argued by Munro et al. (2018), must consider the context of the countries in which they operate to implement effective CSR projects.

Despite the challenges, Bizarria, Moreira, and Barbosa (2018) assert that extending legal responsibility goes beyond mere willingness to help, encompassing socially ordered institutional commitments. In conclusion, this work underscores the importance of companies surpassing legal obligations, comprehending cultural and politico-economic contexts, and implementing genuinely effective CSR for the betterment of society. Embracing CSR not only aligns with ethical principles but also contributes to a sustainable and harmonious coexistence between businesses and the communities they serve (Taisa Schefer Roveda and al.2022).

In summary, the concept of CSR advocates for a holistic approach to business, emphasizing the moral responsibilities that companies bear toward society. By aligning with stakeholder theory and adopting a long-term perspective, socially responsible companies strive to navigate the complex landscape of diverse and sometimes conflicting stakeholder interests, transcending mere wealth accumulation for shareholders to contribute meaningfully to the greater good.

III.METHODOLOGY

The adopted methodology for this article represents a comprehensive endeavor aimed at unraveling the intricate causal relationships that bind a company's overall performance to its initiatives in Occupational Health and Safety (OH&S) training. The core focus of the econometric studies is a nuanced exploration of the impact of integrating Corporate Social Responsibility (CSR) into managerial decision-making processes. Specifically, the study seeks to illuminate the causal connections between various CSR variables and the company's overall performance, evaluated through the lens of basic earnings per share.

Central to this methodological framework is a meticulous scrutiny of the company's overall performance, deliberately focusing on key indicators such as basic earnings per share. The primary objective is not merely to identify correlations but to understand the causal links between these performance metrics and the company's initiatives in the realm of occupational health and safety (OHS) training. Importantly, OHS is recognized as a critical component of CSR, and its inclusion in the study signifies a strategic choice driven by the acknowledgment of its profound impact on both employees and the broader community.

The strategic choice of a specific mining company, Managem, as the primary case study adds depth to the analysis. By concentrating on a particular sector, the study can delve into the nuances of homogeneous sustainability-related data spanning a significant period, ensuring the consistency and reliability of the econometric analyses.

The temporal scope of the study spans a decade, from 2013 to 2022, a duration deemed sufficient to capture long-term trends and patterns. This deliberate choice ensures the accumulation of robust data, a prerequisite for conducting thorough and reliable econometric analyses.

The overarching ambition of these analyses transcends statistical exploration. It aims to cast a comprehensive light on the intricate mechanisms through which CSR practices, especially those intertwined with OHS training, exert influence on the holistic performance dynamics of a mining company. By elucidating these causal relationships, the study aspires to contribute valuable insights into the symbiotic interplay between CSR initiatives, OHS training, and the overall success and sustainability of mining enterprises, thereby advancing the understanding of responsible and impactful business practices in the mining industry.

By investigating the causal relationship between company performance and OHS training, we aim to answer two main questions:

- Does OHS training cause mining company performance in the short term, or vice versa?
- Does OHS training cause mining company performance in the long term, or vice versa?

To answer these two questions, we will successively perform the Granger test and the cointegration test.

IV.RESULTS AND DISCUSSIONS

1. Granger test of causality

The Occupational Health and Safety (OHS) training variable is measured by the percentage of the workforce trained in OHS and is represented by D_s , where D refers to sustainable development and s refers to OHS (Occupational Health and Safety). The mining company's performance is still measured by basic earnings per share in dirhams and is represented by P_e , as in the previous test.

The question is whether OHS training causes performance in the short term ($D_s \rightarrow P_e$) or whether performance causes OHS training in the short term ($P_e \rightarrow D_s$).

The Granger causality test yields the following two estimates:

$$\text{Estimation 1: } P_e_t = \sum_{i=1}^n \alpha_i P_e_{t-i} + \sum_{j=1}^n \beta_j D_{s_{t-j}} + v_t$$

$$\text{Estimation 2: } D_{s_t} = \sum_{i=1}^n \gamma_i D_{s_{t-i}} + \sum_{j=1}^n \delta_j P_e_{t-j} + v_t$$

By default, the error estimates u_t and v_t are uncorrelated.

Estimate 1 means that the performance of a mining company (Pe) at time t is related to its past performance and past OHS training. Estimate 2 states that OHS training at time t is related to past OHS training and past performance of the mining company.

Since only the past can cause the future, if OHS training (Ds) causes a mining company's performance (Pe), then the change in the value of variable Ds (OHS training) should precede the change in the value of the company's performance (Pe). This reasoning is equally valid in the opposite direction, i.e. in the case where a mining company's performance (Pe) causes OHS training (Ds).

OHS training causes performance: $Ds \rightarrow Pe$

The hypotheses are presented as follows:

H_0 : OHS training does not cause performance.

H_1 : OHS training causes performance.

OHS training is measured by the percentage of the workforce trained in OHS. Basic earnings per share measure corporate performance. The values of these variables are presented in the table below:

Managem	Percentage of workforce trained on SST	Basic earnings per share in MAD
2013	70%	44.1
2014	60%	19.9
2015	56%	22.4
2016	65%	31.5
2017	75%	87.9
2018	70%	27.00
2019	56%	-23.40
2020	60%	22.50
2021	56%	86.20
2022	70%	161.60

From estimate 1, we can write the unconstrained and constrained models.

The unconstrained model: $Pe_t = K + a_1 Pe_{t-1} + \beta_1 Ds_{t-1} + u_t$

The constrained model: $Pe_t = K + a_1 Pe_{t-1} + u_t$

To estimate the coefficients of the unconstrained model, we resort to a linear regression of the variable Pe_t as a function of the variable Pe_{t-1} and Ds_{t-1} . This gives the result below.

Dependent Variable: PE				
Method: Least Squares				
Date: 09/07/23 Time: 04:25				
Sample (adjusted): 2014 2022				
Included observations: 9 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	381.7152	117.8519	3.238940	0.0177
PE(-1)	1.216343	0.403744	3.012655	0.0236
DS(-1)	-596.2598	194.4568	-3.066284	0.0220
R-squared	0.682503	Mean dependent var	48.40000	
Adjusted R-squared	0.576671	S.D. dependent var	54.61364	
S.E. of regression	35.53367	Akaike info criterion	10.24004	
Sum squared resid	7575.848	Schwarz criterion	10.30578	
Log likelihood	-43.08018	Hannan-Quinn criter.	10.09817	
F-statistic	6.448922	Durbin-Watson stat	2.381928	
Prob(F-statistic)	0.032005			

These data allow us to write the unconstrained model as follows:

The unconstrained model:

$$Pe_t = 381.7152 + 1.216343 Pe_{t-1} - 596.2598 Ds_{t-1} + u_t$$

$R^2 = 0.682503$; $n = 9$; $SCRU = 7575.848$.

To estimate the unconstrained model, we ran a linear regression of the variable Pe_t against the variable Pe_{t-1} .

Dependent Variable: PE				
Method: Least Squares				
Date: 09/07/23 Time: 03:40				
Sample (adjusted): 2014 2022				
Included observations: 9 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	24.34793	25.93857	0.938677	0.3791
PE(-1)	0.680505	0.539886	1.260461	0.2479
R-squared	0.184981	Mean dependent var	48.40000	
Adjusted R-squared	0.068550	S.D. dependent var	54.61364	
S.E. of regression	52.70853	Akaike info criterion	10.96056	
Sum squared resid	19447.32	Schwarz criterion	11.00439	
Log likelihood	-47.32253	Hannan-Quinn criter.	10.86598	
F-statistic	1.588761	Durbin-Watson stat	1.099641	
Prob(F-statistic)	0.247892			

Based on this data, the constrained test model can be written as follows:

The constrained model: $Pe_t = 24.34793 + 0.680505 Pe_{t-1} + u_t$

$R^2 = 0.184981$; $n = 10$; $SCR = 19447.32$

- **Calculation of the F statistic**

$$F = \frac{(SCR - SCRU)/c}{SCRU/(n - c - 1)} = \frac{(19447.32 - 7575.848)/2}{7575.848/(10 - 2 - 1)} = 5.4845546$$

- **F-statistic threshold calculation**

$$Fs = F_{(n-k-1)}^{0.05} = 5.14325285$$

- **Test results**

The F statistic is above its critical value F_s at a certain level of significance (in this case 5%). We reject the H_0 hypothesis in favor of H_1 . In other words, OHS training causes company performance in the Granger sense.

Performance causes OHS training: $Pe \rightarrow Ds$

The hypotheses are presented as follows:

H_0 : Performance does not cause OHS training

H_1 : Performance causes OHS training

From estimate 2, we can write the unconstrained and constrained models of the Granger causality test as follows:

The unconstrained model: $Ds_t = K + a_1 Ds_{t-1} + \beta_1 Pe_{t-1} + u_t$

The constrained model: $Ds_t = K + a_1 Ds_{t-1} + u_t$

To estimate the coefficients of the unconstrained model, we resort to a simple linear regression of the variable Ds_t as a function of the variables Ds_{t-1} and Pe_{t-1} . This gives the following result:

Dependent Variable: DS				
Method: Least Squares				
Date: 09/07/23 Time: 05:01				
Sample (adjusted): 2014 2022				
Included observations: 9 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.694561	0.228017	3.046101	0.0226
DS(-1)	-0.171340	0.376230	-0.455415	0.6648
PE(-1)	0.001264	0.000781	1.618451	0.1567
R-squared	0.309814	Mean dependent var		0.631111
Adjusted R-squared	0.079751	S.D. dependent var		0.071667
S.E. of regression	0.068750	Akaike info criterion		-2.255492
Sum squared resid	0.028359	Schwarz criterion		-2.189750
Log likelihood	13.14971	Hannan-Quinn criter.		-2.397362
F-statistic	1.346652	Durbin-Watson stat		1.809407
Prob(F-statistic)	0.328775			

These results enable us to write the unconstrained model of the Granger causality test.

The unconstrained model:

$$Ds_t = 0.694561 - 0.17134 Ds_{t-1} + 0.001264 Pe_{t-1} + u_t$$

$$R^2 = 0.309814; n = 10 ; SCR = 0.028359$$

For estimating the coefficients of the constrained model, we resort to a simple linear regression of the variable Ds_t as a function of the variables Ds_{t-1} . This gives the following result.

Dependent Variable: DS				
Method: Least Squares				
Date: 09/07/23 Time: 05:08				
Sample (adjusted): 2014 2022				
Included observations: 9 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.572915	0.238879	2.398352	0.0476
DS(-1)	0.092212	0.376354	0.245014	0.8135
R-squared	0.008503	Mean dependent var		0.631111
Adjusted R-squared	-0.133139	S.D. dependent var		0.071667
S.E. of regression	0.076288	Akaike info criterion		-2.115460
Sum squared resid	0.040740	Schwarz criterion		-2.071632
Log likelihood	11.51957	Hannan-Quinn criter.		-2.210040
F-statistic	0.060032	Durbin-Watson stat		1.603501
Prob(F-statistic)	0.813473			

These results enable us to write the constrained model of the Granger causality test.

The constrained model: $DS_t = 0.572915 + 0.092212 DS_{t-1} + u_t$

$R^2 = 0.008503$; $n = 10$; $SCRR = 0.040740$

- **Calculation of the F statistic**

$$F = \frac{(SCRR - SCRU)/c}{SCRU/(n - c - 1)} = \frac{(0.040740 - 0.028359)/2}{0.028359/(10 - 2 - 1)} = 1.528033429$$

- **F-statistic threshold calculation**

$$Fs = F_{(n-k-1)}^{0.05} = 5.14325285$$

- **Test results**

The F statistic is below its critical value F_s at a certain significance level (in this case 5%). We therefore accept the H_0 hypothesis. In other words, the performance of a mining company does not cause OHS training in the Granger sense.

All in all, OHS training causes performance in the Granger sense, but performance does not cause OHS training in the Granger sense. This result is confirmed by the Granger causality test on eviews software, as shown in the image below.

Date: 09/07/23 Time: 04:41			
Sample: 2013 2022			
Lags: 1			
Null Hypothesis:	Obs	F-Statistic	Prob.
PE does not Granger Cause DS	9	2.61938	0.1567
DS does not Granger Cause PE		9.40209	0.0220

The result shows that the probability of performance causing OHS training is 15.67%, well above 5%. The H_0 hypothesis is therefore retained. On the other hand, the probability that OHS training causes company performance is 2%, well below 5%. We therefore reject the H_0 hypothesis in favour of H_1 . In other words, OHS training causes company performance.

Now we need to verify the existence of a long-term relationship between OHS training and performance. This is done using the cointegration test and the error correction mechanism.

2. Cointegration test

The first step is to perform a stationarity test to ensure that OHS training (Ds) and company performance (Pe) are integrated at the same order. Next, we estimate the equilibrium equation.

Step 1: Test for variable stationarity

As we saw earlier, the Pe variable is stationary without any differentiation. In other words, its order of integration is 0, as shown in the image below.

Null Hypothesis: PE has a unit root		
Exogenous: Constant		
Lag Length: 3 (Automatic - based on SIC, maxlag=3)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-16.18742	0.0000
Test critical values:		
1% level	-5.119808	
5% level	-3.519595	
10% level	-2.898418	

*Mackinnon (1996) one-sided p-values.

Now we need to see whether the Ds variable is also stationary without any differentiation. To do this, we run the single-root test on the eviews software at level 0. The result is shown below:

Null Hypothesis: DS has a unit root		
Exogenous: Constant		
Lag Length: 3 (Automatic - based on SIC, maxlag=3)		
		t-Statistic
		Prob.*
<hr/>		
Augmented Dickey-Fuller test statistic		-11.37876
Test critical values:	1% level	-5.119808
	5% level	-3.519595
	10% level	-2.898418
<hr/>		
*MacKinnon (1996) one-sided p-values.		

The probability that the variable Ds (Training on SST) has a single root without any differentiation is 0.01%, well below 5%. We therefore reject the Ho hypothesis in favor of H1. In other words, the Ds variable is stationary without any differentiation. Its order of integration is therefore 0, as is the variable Pe (company performance). The two variables Ds and Pe are therefore integrated to the same order 0.

Now we need to estimate the equilibrium relationship between OHS training and company performance.

Step 2: Estimate the equilibrium relationship between Ds and Pe

Given that the necessary conditions are met, the equilibrium relationship between the two variables can be estimated using the Ordinary Least Squares method.

The equilibrium equation is: $Pe_t = \beta_0 + \beta_1 Ds_t + u_t$

To estimate the coefficients, we resort to linear regression of the variable Pe_t as a function of the variable Ds_t . The results follow.

Dependent Variable: PE					
Method: Least Squares					
Date: 09/07/23 Time: 06:34					
Sample: 2013 2022					
Included observations: 10					
	Variable	Coefficient	Std. Error	t-Statistic	Prob.
	C	-182.6074	142.6974	-1.279682	0.2365
	DS	361.4065	222.4277	1.624827	0.1429
	R-squared	0.248125	Mean dependent var		47.97000
	Adjusted R-squared	0.154140	S.D. dependent var		51.50819
	S.E. of regression	47.37241	Akaike info criterion		10.73081
	Sum squared resid	17953.16	Schwarz criterion		10.79133
	Log likelihood	-51.65407	Hannan-Quinn criter.		10.66443
	F-statistic	2.640062	Durbin-Watson stat		0.609144
	Prob(F-statistic)	0.142854			

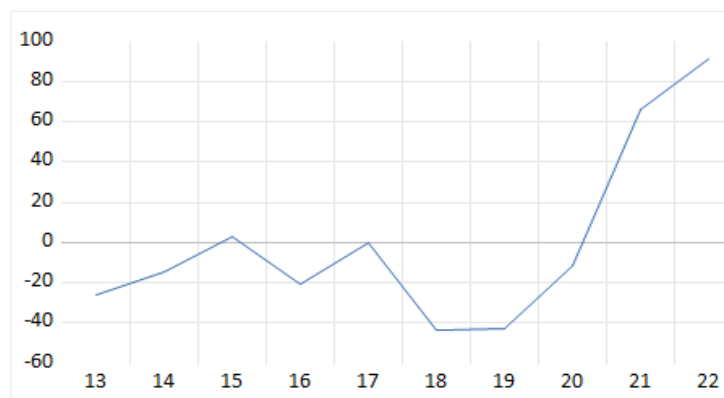
Based on this input, the following equation applies:

$$Pe_t = -1826074 + 361.4065 Ds_t + u_t$$

The residual of the equation is therefore:

$$u_t = Pe_t + 1826074 - 361.4065 Ds_t$$

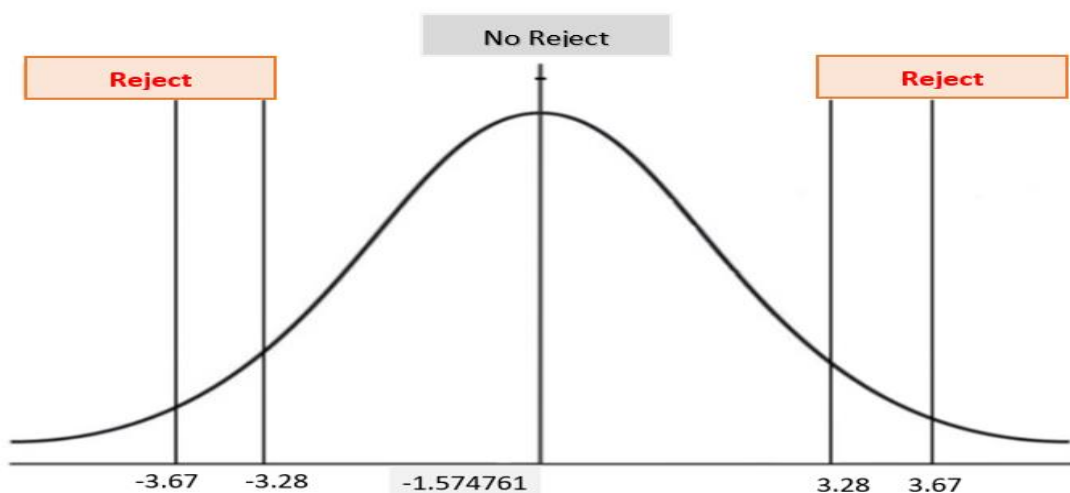
The graph of the residual estimate between company performance and OHS training follow.



The next step is to carry out a single root test on the u_t residual to see whether it is steady or not. The result of the test follows.

Null Hypothesis: RESID01PEDS has a unit root		
Exogenous: None		
Lag Length: 2 (Automatic - based on SIC, maxlag=3)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.574761	0.1041
Test critical values:	1% level	-2.937216
	5% level	-2.006292
	10% level	-1.598068
*MacKinnon (1996) one-sided p-values.		

T-Statistic is -1.574761. This value lies within the non-rejection zone of the critical values of a residual regression based on a cointegration test for a critical level of 5% and for a size below 50, as the following figure illustrates.



The T-statistic value lies in the non-rejection zone of the H_0 hypothesis. Consequently, the residual has a unique root. The variable u_t is therefore not stationary. Consequently, the variables Pe and Ds are not cointegrated. This result is confirmed by the Engel-Granger cointegration test between the two variables as shown in the image below.

Cointegration Test - Engle-Granger		
Date: 09/07/23 Time: 07:23		
Equation: UNTITLED		
Specification: PE DS C		
Cointegrating equation deterministic: C		
Null hypothesis: Series are not cointegrated		
Automatic lag specification (lag=1 based on Schwarz info criterion, maxlag=1)		
	Value	Prob.*
Engle-Granger tau-statistic	-1.446514	0.7851
Engle-Granger z-statistic	-33.68769	0.0000
*MacKinnon (1996) p-values.		
Warning: p-values may not be accurate for fewer than 20 observations.		

The Engle-Granger Tau-Statistic probability is 78.51%, well above 5%. This means that the H_0 hypothesis is accepted. In other words, the Pe and Ds variables are not cointegrated.

V. Conclusion

In conclusion, this study delves into the intricate relationship between Corporate Social Responsibility (CSR) practices, specifically Occupational Health and Safety (OHS) training, and the overall performance dynamics of a mining company. The overarching goal is to uncover the causal mechanisms that underscore the symbiotic interplay between these elements and contribute valuable insights to the understanding of sustainable business practices.

The investigation revolves around two primary questions: Does OHS training cause mining company performance, or is it the other way around? To answer these questions, the Granger test and the cointegration test are employed, providing a robust analytical framework.

The Granger causality test scrutinizes the short-term causal relationship between OHS training and performance. The results reveal that OHS training causes performance, as evidenced by statistical tests and a thorough examination of historical data from the mining company Managem. This underscores the pivotal role of OHS training in influencing the short-term performance metrics of a mining enterprise.

On the flip side, the study also explores whether performance influences OHS training in the short term. The Granger causality test results indicate that, statistically, performance does not cause OHS training in the short term.

Further analysis extends to the long-term relationship between OHS training and performance using the cointegration test. Unfortunately, the results suggest that OHS training and performance are not cointegrated, indicating a lack of a stable, long-term equilibrium relationship between these variables.

In conclusion, while OHS training emerges as a significant driver of short-term performance in the mining sector, the study does not find substantial evidence supporting a stable, long-term relationship between OHS training and overall company performance. These findings contribute to the growing body of knowledge in the field of CSR and highlight the need for ongoing research and strategic considerations in integrating sustainable practices within corporate frameworks.

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