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**Environment, Social, and Governance Performance and Their Affect Towards Financial  
Stability of Technology and Communication Industry in the Asian Market**

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The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics or Erasmus University Rotterdam

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## Abstract

Environment Social Government and its impact on company's finances is a topic that has been researched extensively. In this thesis, the research scope will be done on Asian technology and communication industry. All the data will be gathered from Refinitiv Eikon that consists of 306 different firms from the year 2019-2023. The regression that fits the most is fixed effect using company name as its cluster in comparison to other regression method. The main finding found significant negative effect between ESG performance and company's financial stability.

## 1. Introduction

Environment Social Governance is a measurement of impact used on a company or country regarding its sustainability. In the 2006 United Nations' Principles for Responsible Investment (PRI) report, the first issue of ESG was mentioned, which is the requirement of it being included in companies' financial evaluations (Atskin, 2020). The integration of ESG into investment decision is one of the biggest developments in financial markets currently, with an estimate of more than \$30 trillion in assets under management are invested using sustainable strategies that utilizes ESG criteria (GSIA, 2018). Investors are also concerned about the sustainable practices of firms rather than their operational and financial excellence in today's time (M. Shakil, 2020). Companies are now trying to pay attention to their environment, social, and governance factors in their operations and business practices to avoid unwanted consequences from investors and government alike (M. Shakil, 2020).

The Global Financial Risk from 2007-2008, which is a severe liquidity contraction in global financial markets that are from the US that is caused by the collapse of US housing market. The cause of this crisis is still debated, but generally experts agree that the key factors are:

When federals reduced rates from 6.5% to 1.75% between 2000 and 2001 to counter mild recession, which cause banks to extend cheaper credit. Cheaper credit is also offered to high-risk borrowers which fuels the housing bubble. Then, there are changes in banking laws which allowed them to offer subprime mortgages with risky terms like balloon payments and adjustable rates. These risky mortgage practices even targeted the people who cannot afford it, which increases the number of subprime mortgages. Another reason is the securitization by bundling subprime mortgages into mortgage-backed securities (MBSs) and sold them in capital markets, which leads to increase in bank liquidity and spread risk across the financial system.

In 1999, the Glass-Steagall Act was partially repealed, allowing banks to combine and form "too big to fail" companies. Because of the SEC's 2004 capital requirements reduction, banks were encouraged to make large investments in MBSs, which raised their risk exposure. A period of stable economic times convinced many that the worst of the turbulence was behind us. This resulted in a deregulatory mindset that supported hazardous financial practices and a disdain for warning indicators. (Duignan, 2023)

Before the time of crisis, Social Responsibility Investing (SRI) already existed but with more narrow and specific targets. Even though non-governmental groups already promote ESG during that time, investors ignore them since they only care about returns and alphas. After the crisis, ESG policies appears such as: UK's Stewardship Code and Kay Review, Sustainable Development Goals, and the rise of integrated reporting among corporations to include non-financial information(Sampe, 2018).

Multiple studies have been conducted to analyze the influencing factors of corporate ESG performance, and studies regarding the firm's ESG impact itself. (Salihi et al., 2024) analyzes which drivers influence firm's green innovation capacity and value drivers in the context of ESG. They extract empirical data from 74 companies traded in the Nigerian Stock Exchange (NSX) for years 2012–2021, where they find the more a company recognizes the importance of governance, environment, and economic governance, the higher the tendencies for companies to have capacities in green innovation. (Long & Feng, 2024) studies how national level ESG can affect greenhouse gas emissions with environment policy stringency being additional explanatory variable. The method is using panel data from 41 countries from 1990 to 2020, so this study is done on a global scale. A study has been done regarding how the ESG performance on tech companies can affect the innovation capabilities (Berkeley, 2023). The researcher used the panel regression model, Causal step approach, Bootstrap mediation effect test, 2SLS, and GMM model on China's A-listed companies from 2011 to 2019; the result of the research showed ESG disclosure can encourage business innovation by lowering corporate financing limitations.

Despite the extensive studies of ESG, it is still hard to find industry specific research regarding the impact of firms within that specific industry, much less within the specific region, country, or continent. The context that is not yet researched is in the technology and communication industry financial impact made by their ESG performance in the context of Asian market The current state of tech market indicates that heightened awareness and appreciation for ESG practices has not been fully implemented into business operation yet (KPMG, 2020). However, their ESG practices increased during covid-19 with 26% of CEO have significant input of ESG into their strategic planning, 34% says climate change have significant impact on their financial performance, 45% are working to link their growth strategy with the purpose to benefit all

societies, 55% feel their sustainability experts are very effective, and 37% believe their governance experts are very effective (KPMG, 2020). Seeing as the improvements only came from CEOs perspective, it will be important to research the impact it has on the year 2019-2023. The reason this year is chosen is because 2019 is the year when the amazon fire happened (Hughes, 2019), 2020-2022 is the year when covid-19 happens and reach its peak (Berkeley, 2023), and 2023 will be the latest data that is available in the Refinitiv Eikon. Research done on ICT (Information and Communication Technology) industry is important because it will provide how even the firms that operates within computers network and software, and less on the hardware can have an impact from their ESG performance financially. We also wanted to see if the firms within the sample would face backlash from investors or consumers from their z-score in respect with their ESG score. To conclude, the research question I want to propose would be “Can ESG performance improve the financial stability of information technology and communication firms in the context of Asian market?”

The basis of the thesis will be from the one titled “Environmental, social and governance performance and financial risk: Moderating role of ESG controversies and board gender diversity” (M. H. Shakil, 2021a). The predictor, the outcome variables, and the model will be the same; the control will be slightly different and there will be no mediating variable in this study. The reason this article is chosen is because it is within the context of specific industry (oil and gas) and the study is conducted in worldwide settings. The regression model will be OLS method that will be done on 306 IT and Communication firms within the Asian region from year 2019-2023. In this research, I will expect a better financial stability if the ESG score is high also.

The research on a different setting regarding ESG performance on company’s financial may not be unique in on itself, however the key differences this thesis will have in comparison to other research is the years being chosen and the number of companies used for data analysis. Three out of the five years being chosen, 2020 to 2022 are the period of covid-19 infections happen, which may affect policy stringency within the countries being observed. The number of firms being 306 will compensate for the lack of years being observed in comparison to other research, so the total number of observations will still be above 1,000. Another unique element in this thesis is the result of negative correlation found between ESG performance and financial stability.

## 2. Literature Review

### 2.1 ESG Performance

United Nations World Commission on Environment and Development (UNWCED) wrote in Brundtland Report in 1987, describing sustainable development goal as being able to meet current needs without disrupting the availability of resources that will be needed for future generations. There are mainly three aspects of components for sustainability: economic, environmental, and social, or generally, the 3P (People, Profit, Planet). The primary interrelated components' focus is on preserving environmental and human sustainability while expanding the scope of welfare and economic development are: Environmental concerns include those pertaining to an organization's participation in environmental management, such as carbon emissions and climate change, pollution of the air and water, biodiversity, deforestation, energy efficiency, waste management, and water scarcity. Social is associated with how a company interacts with its stakeholders. beginning with community relations, human rights, employment standards, employee engagement with a focus on diversity and gender, customer satisfaction, data protection and privacy, and community engagement. Governance has to do with disclosure and accountable, moral business management. Controllable elements include the composition and independence of the board, executive pay, oversight, internal control, and audit, including accounting reporting, organizational leadership, and successful and efficient business management.

(Commission on Environment, 1987)

### 2.2 Financial Risks

Financial risk is the possibility of an investment of assets, or business project to be operating on a loss. This type of risk can cause the parties involved to lose their assets, which may indicate to government and other institutions that they are unable to manage monetary policy and may experience bond or other debt default. For corporations, they may not only negatively impact the company through financial means, but they also risk making themselves a defaulter by taking on debt they cannot pay. For individuals, their financial decisions may cause them to disrupt their stream of income or ability to pay debt. The most common types of financial risk are credit risk, a risk to lose money when an individual was to lend money to a creditor; liquidity risk, which is

a risk to not being able to meet the full payment obligation on time; equity risk of holding equity in a particular investment (Hayes, 2023).

## 2.2 ESG Performance and Financial Stability Literature Review and Hypothesis Development

The period chosen in this study is during 2019-2024, where there is a stricter policy stringency. Because of this, I will add an additional hypothesis (H2) in case there is a possibility of negative effect between ESG performance and the z-score. The first hypothesis development will state that there will be no effect between the ESG performance and financial stability because ESG score may not be relevant in the tech and comm industry for their financial or overall performance measures.

H0: There will not be any effect between ESG performance and financial stability in the context of technology and communication industry

### 2.3.1 Supporting Research

Many studies regarding the effect of ESG performance towards financial risks have been conducted in the past in different settings or with different mediating variables. A study has been done in Korea to see if ESG activities has an impact towards financial stability that is measured by Altman's Z-score (Choi et al., 2024). The result shows financial stability is positively correlated with ESG scores, but the "E" pillar or environment plays the biggest role towards financial stability of the firm. Another research has been conducted in Germany to analyze the ROA and Tobin's Q (Velte, 2017). Studies are also being done in different industries with one being mining (Fu et al., 2024) and another being oil and gas (M. H. Shakil, 2021b).

One study even analyzes during covid-19 the role of ESG in mitigating the financial crisis during the pandemic (Broadstock et al., 2021). Study on financial risk as the outcome variable has been conducted many times, with one example being done on the correlation between environmental regulation and corporate financial risks (J. Wang & Wang, 2024). The research suggests policymakers make environmental regulation to be stricter because of the benefit it will give to both environment and businesses. The study of the risk contagion from oil market to financial



markets in a complex network point of view shows that systematic financial risk rises significantly in a time of oil crisis events (K. Wang et al., 2024).. The research also found that banks suffer more risk from the oil crisis and the oil crises have a long-term negative economic output.

A research that build a mathematical model to analyze the impact of climate change of credit risk is created with the results being that climate change has an adverse impact on the credit risk of rural finance institution; In the process of climate change, farm insurance exhibits a threshold impact that influences the credit risk of rural financial institutions; comprehensive agricultural insurance can lessen the negative effects of climate change on rural financial institutions' credit risk. It makes clear that having agricultural insurance is essential for exercising prudence (Ma et al., 2024).

There are three studies using climate risks as the predictor (Chabot & Bertrand, 2023; Fan & Gao, 2024; Liu et al., 2024). All studies have proven to show that climate risk negatively impact financial stability even in different context. Another study of climate effect on financial stability with the use of specifically sea-level rises has been conducted (Garcia-Jorcano & Sanchis-Marco, 2024).

ESG also has shown improvement in Total Factor Productivity (Xue et al., 2024). Further analysis of said research has shown improvement via reducing financial constraints and increasing government subsidies. The study of the funding of ESG performance itself has been done that shows a positive correlation between the funding and the ownership of the firm (Liang et al., 2024). The impact left by historical ESG funds' performance has a different impact on the percentage of holdings of external institutional investors and fund manager firms.

A study of ESG responsibility performance impact towards corporate resilience is also done (H. Wang et al., 2024). According to the study, heightened company resilience stems from better ESG responsibility performance; each unit increase raises the EVA rate of total assets and lowers the chance of bankruptcy. Ratings for corporate governance have a greater influence. The quality of government-business relationships, investor contact, and strategy investment intensity all moderate the performance of ESG responsibilities. There is a four-period lag in the effect of ESG performance on resilience. The performance of ESG has also shown to reduce maturity

mismatch (Wen et al., 2024). The study also shows that firms with higher ESG performance prefer long-term debt financing structure and increase trade credit and endogenous financing.

A study shows a high correlation between ESG scores and firm value in the context of emerging markets (Rahat & Nguyen, 2024). The study uses Tobin's Q and Enterprise Value to sales as proxies for valuation, ESG controversies (RepRisk) impair fundamental and multiplier-based valuations. The research design remains to be consistent even when it is used to test geographic and size sorted subsamples. There is also research being done analyzing how the stock market responds toward ESG regulation intervention (Pandey et al., 2024). The results show that during the [+1, +5] timeframe, post-event cumulative anomalous market returns were consistently negative and decreased to -1.20 percent. The market was negatively impacted by the reasonable assurance mandate. Nonetheless, ESG ratings favorably insulated firm-level investor reactions, with the governance component of ESG having the greatest influence, in line with the reservoir of goodwill concept.

ESG performance towards goodwill impairment has been researched (Zhang et al., 2024). The results are Goodwill impairment is lessened by ESG when it provides more knowledge; however, goodwill impairment is increased when ESG crowds out M&A resources. Positives and downsides of ESG impact on goodwill impairment are balanced, and manipulating ESG disclosures can lead to earnings management. The impact of ESG has been researched, with one of them being towards low carbon investment (Lu & Li, 2024). This research is done based on companies' main goal is to reach carbon neutrality which is the reason why LCI is important. The result of the research shows that ESG ratings companies promote a 2.1% increase in Low-Carbon Investing.

H1: There will be positive effect between ESG performance and financial stability in the context of technology and communication industry

### 2.3.2 Opposing Research

Despite the studies mentioned above showing negative effect between ESG performance and financial risk, there is one study showing otherwise (Wen et al., 2024). The result shows that ESG performance significantly reduces maturity mismatch. The study research the correlation

between ESG performance and maturity mismatch of investment and financing. Firms with high ESG performance have preferences for long-term debt financing and increased trade credit and endogenous financing. The loan maturity structure is gradually changing due to efficient and creative investing practices. And because of the environmental policies during covid-19, ESG performance affects maturity mismatch significantly.

H2: There will be negative effect between ESG performance and financial stability in the context of technology and communication industry

### 3. Data and Methodology

#### 3.1 Measurements and Data Collection

The research will analyze a sample of 300 communication and technology companies around Asia from 2019-2023 period. This study will use z-score as a proxy for financial risk like previous study on Korean firms (Choi et al., 2024). Other variables that will be used for control that are firm-specific, such as ROA, firm size, market to book value, and leverage are selected in accordance with previous studies (Choi et al., 2024; M. H. Shakil, 2021a). The data for every variable will be taken from Refinitiv Eikon.

##### 3.1.1 Dependent Variable

The dependent variable that we are going to analyze is the z-score of the companies being sampled as with previous study (Choi et al., 2024). The Z-score of each company is already listed in Refinitiv in the selected period. The reason for using Z-score as a proximity is because it serves as a predictive tool to assess the firm's financial soundness and default probability (Beltrame et al., 2023). A higher Z-score means lower financial risk.

##### 3.1.2 Independent Variable

The independent variable that will be used is ESG score of each company that is being sampled, which is already available in the Refinitiv Eikon. ESG score in Refinitiv considers many metrics for every pillar: Environment pillar: 20 metrics on resource use, 28 metrics on emissions and 20 metrics on innovation. Social pillar: consists of 30 metrics on the workforce, eight metrics on human rights, 14 metrics on community and ten metrics on product responsibility. Governance

pillar: includes 35 metrics on management, 12 metrics on shareholders and nine metrics on corporate social responsibility strategy

These metrics are already calculated in Refinitiv, so the data is just taken from the database.

### 3.1.2 Control Variables

#### 3.1.2.1 ROA

ROA (Return on Assets) measures how profitable the firms are based on their assets. Refinitiv calculate ROA by dividing net profit with total assets.

#### 3.1.2.2 Leverage

Leverage measures the number of debts in respect of the firm's assets, which is calculated by dividing the long-term debt by total assets, in which both data are already available in Refinitiv.

#### 3.1.2.3 Firm size

As the name suggests, it is the size of the firm by looking at its assets. We just find the natural log of the total assets:

$$\log_e(\text{Total Assets})$$

#### 3.1.2.4 Market-to-book value

Market-to-book (MTB) represents the comparison of the real market value to the firm's book value. We measure this by dividing the closing price of the shares with the book value per share of each firm. Both the closing price and the book value per share already exist in Refinitiv.

### 3.2 Research Design

This model is the base model on previous literature (M. H. Shakil, 2021a) without adding any moderating variables, which is panel data:

$$\ln(FS + 1) = \alpha_0 + \beta_1 ESG_{it} + \beta_2 LEV_{it} + \beta_3 ROA_{it} + \beta_4 SIZE_{it} + \beta_5 MTB_{it} + \varepsilon_{it}$$

FS is the financial stability of the firm, but the notation will be y in the regression, ESG is the ESG performance, LEV is the leverage, ROA is return on assets, SIZE is the size of the firm, and MTB is the market-to-book ratio. The robustness test will first check for heteroskedasticity with standard error robust regression test.

The reason the FR is put in a natural log variable is because of the distribution issues by some companies that have z-score that is too high such as Holding LTC from Thailand.

#### 4. Results

##### 4.1 Regression between financial sustainability and ESG score

The first regression that we did is OLS regression between financial sustainability and ESG score as seen on the table below. The variable of interest, ESG score, has been shown to affect financial sustainability to a significant level as seen on the p-value and the F-test. Although, the R squared indicates that there are other factors that may affect the dependent variable shown by how low it is.

*Table 1. Linear regression*

lny3	Coef.	St.Err.	t-value	p-value	[95% Conf Interval]	Sig
esg	-.004	.001	-5.24	0	-.006 - .003	***
Constant	1.771	.046	38.35	0	1.681 - 1.862	***
Mean dependent var		1.546	SD dependent var		0.659	
R-squared		0.018	Number of obs		1,504	
F-test		27.490	Prob > F		0	
Akaike crit. (AIC)		2,989.373	Bayesian crit. (BIC)		3,000.005	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

##### 4.2 Regression between financial sustainability and ESG score with controls variable

First, the discussion will be about the model fit and statistics: the F-test and the p-value indicates that the overall model is significant at the 1% level, the R squared being 58.4% also indicates that the dependent variable is explained by the independent variable along with the controls. The number of observations for this regression is 1319, which indicates that it is a good number for generalizing the population. All the statistics suggest that it is a good fit for the model.

The coefficient for the variable of interest, ESG performance, is -0.001 which is an inverse correlation with the natural logged financial sustainability of the firm. The p-value of 0.029 indicates that the correlation is statistically significant and is unlikely due to chance, however we haven't done any robustness check yet and the regression that we have done is only the OLS. As for other variables, their p-value being 0 indicates a strong significant relationship with the financial sustainability of the firm's leverage and their size having a negative impact on their financials.

Table 2. Linear regression with control variables

lny3	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Esg	-.001	.001	-2.19	.029	-.003	0	**
Lev	-2.182	.093	-23.44	0	-2.365	-2	***
Mtb	.007	.001	6.03	0	.005	.009	***
Roa	4.075	.182	22.35	0	3.717	4.433	***
Size	-.082	.01	-8.24	0	-.102	-.063	***
Constant	3.437	.215	15.97	0	3.015	3.86	***
Mean dependent var		1.564	SD dependent var			0.651	
R-squared		0.584	Number of obs			1319	
F-test		367.962	Prob > F			0	
Akaike crit. (AIC)		1,465.126	Bayesian crit. (BIC)			1,496.233	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

### 4.3 Hausman Test

The Hausman test requires three different regressions to be tested, which are: OLS, random, and fixed effect. After testing the different types of regression on Table 3, it shows that fixed effect is the better fits. The fixed effect uses company name as individual-variant and years as time-variant. We have received the results on the table below, which indicates that the fixed effect regression is preferred compared to OLS or random models because there is evidence of

correlation between the individual effects and the regressors shown by the low p-value, not to mention that fixed effect considers individuals- specific heterogeneity and provides consistent estimates.

*Table 3. Regression results comparison*

	(OLS)	(Random)	(Fixed)
	lny3	lny3	lny3
e <sub>sg</sub>	-0.0014* (0.0008)	-0.0019** (0.0009)	-0.0020** (0.0009)
lev	-2.1824*** (0.0938)	-1.5336*** (0.1565)	-0.8126*** (0.1830)
mtb	0.0070* (0.0037)	0.0047** (0.0021)	0.0040** (0.0018)
roa	4.0751*** (0.3321)	2.1090*** (0.2706)	1.7772*** (0.2441)
size	-0.0822*** (0.0112)	-0.1232*** (0.0190)	-0.2089*** (0.0443)
_cons	3.4375*** (0.2481)	4.4413*** (0.4141)	6.3329*** (0.9783)
N	1,319	1,319	1,319
r <sup>2</sup>	0.5835		0.2381
r <sup>2</sup> <sub>a</sub>	0.5820		0.2352
r <sup>2</sup> <sub>o</sub>		0.5386	0.3838
F	374.8278		29.7311
p	0	0	0

Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 4. Hausman test result

	Coef.
Chi-square test value	3,457.39
P-value	0

#### 4.4 Fixed effect regression

Because the fixed effect regression has shown to be the most fitted for the model, we will conduct 3 different fixed effect regression testing: robust, country clustering, and company name clustering.

Table 5. Fixed effect regressions

	(robust) lny3	(country) lny3	(company) lny3
esg	-0.002** (0.001)	-0.002* (0.001)	-0.002** (0.001)
lev	-0.813*** (0.183)	-0.813*** (0.192)	-0.813*** (0.183)
mtb	0.004** (0.002)	0.004* (0.002)	0.004** (0.002)
roa	1.777*** (0.244)	1.777*** (0.453)	1.777*** (0.244)
size	-0.209*** (0.044)	-0.209*** (0.034)	-0.209*** (0.044)
_cons	6.333*** (0.978)	6.333*** (0.725)	6.333*** (0.978)
N	1,319.	1,319	1,319
r2	0.238	0.238	0.238
r2_a	0.235	0.235	0.235
r2_o	0.384	0.384	0.384
F	29.731	16.573	29.731
chi2			
p	0	0	0

Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The R squared indicates that around 53.9% of the natural logged financial sustainability is explained within the model framework for all types of fixed test being tested above. The F-test



and p-value indicate significance for the robust and company clustered regressions, but indicate smaller significance on the country clustering regression. The main variable of interest, ESG, has significant negative effect of 0.002 on the  $\ln y_3$  variable. The robust standard error regression help considers any heteroskedasticity or any violations in the model.

## 5. Conclusion

The study on the role of ESG performance and financial impact still needs to be explored further, especially the ones with a negative empirical result, especially in the context of ICT industries and Asian region. The correlation between the ESG score and the z-score in this study holds significance, and with additional controls, the correlation between the two is by no means on a whim.

ESG score is used as a measure of the impact a company creates for the Environment, Social, and Governance. Financial stability can be measured by looking at a company's Altman z-score, which determines the bankruptcy of a company. The higher the score, the less likely the company will face bankruptcy. The study reveals a significant negative effect between ESG score and the financial stability of a company. The data uses Refinitiv databases of 306 companies within the technology and communication industry of Asian region. The robust panel fixed effect regression shows a p-value of 0.035, which is significant coming from ESG. The coefficient between the two is only -0.002, however the statistical significance still indicates strong correlations between the two and other variables. The research question of "Can ESG performance improve the financial stability of information technology and communication firms in the context of the Asian market?" can be answered by the ESG performance of tech and communication firms in the Asian region might not improve the financial stability and may even harm their financial performance according to the empirical results mentioned above. The results also indicate that hypothesis 2 (H2) holds a strong position in this research, and we have rejected both (H0) and (H1).

As mentioned before, this study is limited to only the Asian market of the tech industry. There needs to be more research exploring how ESG performance can affect the financial performance of tech companies. The listed companies in this study also have distributional issues on for the

outcome variable, which makes it impossible to draw the correlation without putting it on a natural log.

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Appendix

*Table 6. Sum of variables*

Variable	Obs	Mean	Std. Dev.	Min	Max
lny3	1504	1.546	.659	.039	4.775
esg	1529	51.006	20.035	1.89	92.66
lev	1527	.12	.14	0	1.23
mtb	1526	3.232	9.523	-129.088	272.07
roa	1334	.07	.07	-.3	.65
size	1527	22.421	1.346	18.938	26.747

*Table 7. Correlation tables of variables*

	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
(1) lny3	1.000					
(2) esg	-0.142	1.000				
(3) lev	-0.581	0.110	1.000			
(4) mtb	0.148	0.011	0.087	1.000		
(5) roa	0.588	0.037	-0.276	0.151	1.000	
(6) size	-0.321	0.407	0.153	-0.080	-0.147	1.000