

The Impact of ESG on Corporate Financing Decisions Before and After Covid-19: Evidence from Taiwan

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Abstract

This study examines the differences in corporate financing decisions between companies engaged in ESG activities and those that are not during the COVID-19 pandemic. Our primary focus is on listed companies in Taiwan from 2018 to 2022 and panel regression is employed for analysis. The empirical findings show that companies during the Covid-19 pandemic raise more debt. However, the effect is offset by ESG engagement. As firms conduct more ESG activities, they will raise less debt after the pandemic. Our findings shed some lights on corporate financing decisions.

JEL classification numbers: G32.

Keywords: ESG, Capital structure, Covid-19, Financing decisions.

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1. Introduction

As global warming gradually takes its toll, discussions on environmental conservation have been steadily increasing. In 2004, the United Nations introduced the term ESG for the first time in the publication “WHO CARES WINS”. Under ESG, the E (environment) primarily focuses on environmental protection, covering aspects such as environmental risks, opportunities, greenhouse gas emissions, and climate change-related issues. The S (social) component encompasses social responsibilities including customer welfare, labor relations, and diversity balance. The G (governance) aspect includes corporate governance practices, risk management, and supplier behavior, all of which are encompassed within the parameters assessed by ESG. Nakajima (2021) has previously noted that traditional corporate risk management has predominantly concentrated on financial indicators such as cash flow, return on investment, and business models.

However, in recent years, there have been various significant natural disasters and environmental upheavals, leading to enormous losses for businesses. The banking industry, investors, and international brands have all had to take this issue seriously. The World Economic Forum (WEF), summarizing the content of the Global Risk Report in 2020, emphasized that the severity of risks associated with climate change and economic stagnation exceeded expectations. The report further indicated that the economic losses incurred by global industries due to natural disasters exceeded 15% of the losses from major disasters in 2020 alone. Additionally, more than 60% of companies affected by natural disasters had not taken out relevant insurance coverage or engaged in climate risk management beforehand. This demonstrates the increasingly severe impact of climate change on businesses. Therefore, companies should pay more attention to managing climate risks and carefully devise ESG plans. This also underscores the feasibility for companies to coexist between pursuing operational profitability and environmental sustainability. Thus, implementing ESG practices is not only seen as enhancing a company's image but also as providing adequate planning and resources to stabilize business operations and enhance competitiveness in this era of unpredictable environmental changes.

At the end of 2019, the outbreak of Covid-19 caused severe damage to the global economy. The World Bank (2019) indicated that the global GDP was \$87.65 trillion, and by 2021, the overall GDP had decreased by 3.6% (The World Bank, 2021). Despite the significant impact on the global economy as a whole, an individual analysis of Taiwan's economy reveals a consistent increase in GDP. According to the National Statistics, ROC (2019), Taiwan's GDP was \$0.61 trillion. Even during the pandemic, Taiwan's economy continued to grow, with the economic growth rate in 2020 increasing by 0.33% compared to 2019.

During the outbreak of the Covid-19 pandemic, many countries implemented lockdown measures, which contrasted sharply with Taiwan's approach. These lockdowns resulted in negative economic effects. Pichler et al. (2021) have proposed that some industries closed due to insufficient demand, and labor shortages restricted other industries. For example, reduced demand upstream led to decreased orders for final goods, resulting

in reduced orders for intermediate goods from suppliers. Additionally, social distancing measures caused supply restrictions to propagate downstream, leading to shortages in inputs. Although labor and demand are not the main issues, the interconnectedness of supply and demand means that decreased demand creates production bottlenecks, leading to unemployment and ultimately reducing consumer purchasing power. Given the interrelated nature of these factors, the overall economy is affected.

Furthermore, in 2022, the United States raised interest rates from June to November, with a total increase of 1.5 percentage points, aiming to curb inflation. From a business perspective, the increased cost of borrowing raised the cost of capital for companies, resulting in higher operating costs. Coupled with decreased business volume, this ultimately led to lower company profits.

During periods of economic downturn, global financial markets experience significant volatility, prompting businesses to adjust their financing decisions to adapt to the environment. Campello et al. (2010) noted that during financial crises, companies often face a decline in external financing capacity, which may restrict investment activities, particularly for firms with relatively poor financial conditions. Moreover, during periods of external credit contraction, companies may reduce the distribution of internal earnings to substitute for external financing demand, ensuring sufficient cash to meet investment needs. Such black swan events can influence corporate capital structure decisions.

However, existing literature on the Covid-19 pandemic, such as studies by Lin (2022), Wang (2022), Wu (2022), Li (2022), Yang (2022), and Chen (2021), predominantly focuses on topics like market risk research, financial performance of companies, impact on enterprise value, and banking industry-related studies. Although ESG rating's impact on bank stock performance and relief measures during the Covid-19 pandemic are discussed, there is limited exploration of the pandemic's effects on companies engaging in ESG practices.

Therefore, this study aims to investigate the impact of the pandemic on the capital structure of listed companies in Taiwan and further analyze whether this impact differs for companies engaging in ESG practices.

2. Conceptual background and hypothesis development

Since the outbreak of the pandemic, it has presented severe challenges to governments and businesses worldwide. On March 10, 2020, the World Health Organization (WHO) declared the Covid-19 outbreak a global pandemic. Global credit and stock prices experienced a sharp decline in February and early March due to panic sentiment, leading to a \$30 trillion evaporation of global stock market capitalization. In the second quarter of 2020, global GDP plummeted by \$10 trillion.

Donthu and Gustafsson (2020) pointed out that the travel industry was deeply affected by the pandemic, with up to 80% of hotel rooms vacant, and airlines reducing their workforce by 90%. To control the spread of the virus, countries implemented lockdown policies to reduce the risk of cross-border infections. However, this also led to a severe economic downturn in tourist destinations.

On the contrary, internet-related businesses flourished during this period. With people spending more time at home, there was an increase in demand for online entertainment, food delivery, e-commerce, remote meetings, and education. Other industries such as healthcare also experienced growth during the pandemic. While there were both thriving and struggling companies during this period, overall, there were risks to the economy. The supply chain and demand were impacted by decreased consumption, and the reduction in production activities had a negative effect on employment. This, in turn, adversely affected company performance and value.

García-Pérez-de-Lema, et. al. (2022) pointed out that Spanish construction companies have relatively low autonomy over financial resources due to their heavy reliance on banks and external financing. This limited their ability to access funds during the pandemic. To overcome the virus crisis, government public policies became crucial tools to assist businesses. The European Commission passed the Temporary Framework for State Aid in 2020, enabling member states to remedy severe disruptions in their economies. Flexible options such as debt instrument conversion or restructuring were provided. From 2020 to 2022, there were a total of five amendments, including the introduction of forward-looking private investment and debt service support measures. These measures allowed EU member states to convert loans into direct grants under limited conditions or to extend the maturity or lower the interest rates within specific parameters.

In Taiwan, both central and local governments have introduced various relief and stimulus measures for industries affected by the pandemic. On April 21, 2020, the Legislative Yuan passed the "Special Act for Prevention, Relief, and Revitalization Measures for Severe Special Infectious Pneumonia" without amendments, allowing enterprises to apply for a 6-month extension for existing loans from financial institutions. Loans extended with the consent of the original financing institution, if originally guaranteed by the Small and Medium Enterprise Credit Guarantee Fund, would not be subject to the first-year guarantee fee. Additionally, the guarantee ratio for working capital loans was set at 10%, and the guarantee fee was fully covered by the Ministry of Economic Affairs during this period.

The scope of this policy was limited to specific purposes such as paying employee salaries and rent for factories or business premises. Stimulus funds were mainly aimed at assisting affected small and medium-sized enterprises with turnover or capital expenditures. The Executive Yuan concluded the relief measures by approving financing assistance and loan relief for approximately 100,000 companies. Nearly 2,000 businesses also received assistance in terms of employment. The main measures included subsidies for business equipment improvement, expansion of subsidies for enterprises to implement work-life balance measures for employees, and installment payment relief measures. These measures provided businesses with a buffer to weather the pandemic in the short term.

According to research by Morens and Fauci (2020), experts from the United States, the future outbreaks of epidemics are anticipated to occur in more diverse scenarios and even spread more rapidly. Many public health and medical studies suggest that the

primary cause of the current era of pandemics is climate change, with the true root lying in the damage humans inflict on the environment.

The trend of global temperature changes shows that temperature variations are occurring more rapidly than previously predicted, significantly impacting animal habitats and the distribution of viruses among humans. To address the global risks posed by climate change, government agencies, civil society, and global corporations have begun to formulate and implement corresponding measures, such as implementing low-carbon transition strategies. These transformations not only enhance companies' scores on ESG performance indicators but also have a certain impact on financial performance. Chen, Kuo, and Chen (2022) emphasize that by prioritizing climate change issues and strengthening investment in and implementation of relevant environmental performance indicators, the improvement in environmental performance will gradually mitigate the negative impact on financial performance and subsequently affect a company's operating profit. The disclosure of climate change-related risks and opportunities by companies has a significant impact on their financial performance. Chen (2022) believes that after the pandemic, ESG can have a greater impact on a company's return on total assets compared to normal times. In other words, during market turmoil, due to the overall decline in credit levels, non-financial ESG policies are more easily trusted by the public compared to other financial indicators. Therefore, during the pandemic, a company's positive brand image and reputation can more effectively withstand market shocks, significantly reducing its financial losses. From an investment perspective, a company's stock price rating in the market can be considered an important indicator of investment decisions. Kuo (2021) points out that companies with better ESG ratings tend to outperform those with lower ESG ratings in terms of profitability and overall company value during the Covid-19 period. Meanwhile, companies with better risk ratings are more effective in addressing and reducing potential risks, thereby generating a significant positive impact on financial performance and company value. This indicates that the better a company performs in terms of ESG, the higher its financial performance tends to be. During the pandemic, companies with higher ESG scores have better corporate resilience compared to their peers in the face of recessionary environments.

Taiwan established the "Central Epidemic Command Center for Severe Special Infectious Pneumonia" in January 2020. After the World Health Organization confirmed human-to-human transmission of the novel coronavirus, Taiwan imposed restrictions on the export of medical supplies and N95 masks and enhanced inspections. Taiwan took relevant measures when the WHO admitted to underestimating the epidemic, and in March of the same year, it enacted the "Special Act for Prevention, Relief, and Revitalization Measures for Severe Special Infectious Pneumonia" to continuously improve epidemic prevention measures and increase the supply of necessary equipment and materials. Simultaneously, relief and revitalization measures were provided for industries impacted and facing operational difficulties to help reduce their losses.

Starting in April 2021, Taiwan began administering COVID-19 vaccines to its

citizens at no cost to enhance their immunity and reduce the risk of infection, severe illness, or death. Taiwan's epidemic situation has been brought under control, attributed not only to previous experiences with SARS but also to proactive monitoring by the government before the epidemic escalated. Thus, while many countries implemented lockdowns and closed borders to combat the epidemic, Taiwanese people were able to maintain normal lives.

According to the global healthcare index by Numbeo, Taiwan consistently ranked first. Despite accumulating only 0.0039% of confirmed cases compared to the global population when the international tally reached 1%, Taiwan's infection rate remained remarkably low. This indicates that Taiwan possesses high-quality medical resources and effective supportive measures, resulting in comparatively lower economic impacts than other countries. Furthermore, global central banks' loose monetary policies since the onset of the pandemic have kept Taiwan's interest rates at a low level, incentivizing Taiwanese companies to issue bonds and raise long-term low-cost funds.

Based on securities firms' statistics, Taiwan issued a record-high amount of corporate bonds totaling NT\$851.871 billion in 2020, an increase of at least 100% compared to 2019. Additionally, the Financial Supervisory Commission reported a growth of NT\$36.176 billion in loan amounts by the end of November 2022 compared to the previous month, with small and medium-sized enterprises accounting for 64.73% of the total enterprise loan balance. On the other hand, data from the Taiwan Stock Exchange (TWSE) showed that Taiwan's stock market reached historic highs in 2020, with total trading volume increasing by approximately 70% compared to 2019. This trend continued into the following year, with the total trading volume in 2021 increasing by 60% compared to the previous year. According to market timing theory, in a rising stock market, companies should prioritize equity financing to raise funds. Moreover, the debt-to-equity ratio of companies increased annually from 2018 to 2021, with the largest increase occurring in 2020. Based on the provided information and hypotheses, we can formulate Hypothesis 1 as follows.

H₁: *During the Covid-19 pandemic, companies tend to raise less debt.*

During the pandemic, lockdown restrictions and strict social distancing measures implemented by various countries to prevent infection spread and control the transmission of COVID-19 have severely impacted physical sectors. This includes reduced product demand, supply chain disruptions, decreased operations, and other effects. As a result, many companies have turned to issuing long-term debt to enhance their liquidity or equity instruments to bolster their capital. Based on signal theory, companies with higher ESG ratings can convey favorable business conditions to the market, thereby improving their reputation and status. External stakeholders receive and identify non-financial information to assess whether to provide relevant funding to these companies.

Albuquerque, Koskinen, Zhang (2018) confirmed that corporate engagement in social responsibility can lead to lower systemic risks and higher valuations for

businesses. Li, Zhang, Zhao (2022) argue that a company's ESG rating is highly correlated with its default risk, with companies having higher ESG ratings exhibiting lower default probabilities, and vice versa. The performance of a company's ESG factors is positively correlated with the scale of debt financing and negatively correlated with financing costs. Zou, Zhang, Zhu (2022) further indicate that strong ESG performance enhances a company's debt financing capacity to a certain extent and can also reduce financing costs, thereby improving the overall debt financing capability of the company. During periods of economic uncertainty, investors tend to seek out companies with high ESG performance scores, as mentioned by Koutmos (2018), Aktas et. al. (2021), and Zhang et. al. (2021), who note that investors prefer stocks over bonds during economic slowdowns. From the perspective of banks, Kapan and Minoiu (2021) point out that banks significantly reduced their credit lines in 2020 and introduced new loan terms to lower their risk exposure, while also tightening lending standards for new loans provided to both small and large enterprises.

In summary, during the pandemic, Taiwanese listed companies faced stringent bank loan conditions while the stock market repeatedly hit new highs. If companies consistently prioritize ESG activities, they are more likely to secure financing from the equity market, which is highly recognized by investors.

Based on the provided information and hypotheses, we can formulate Hypothesis 2 as follows.

H₂: *During the Covid-19 period, companies engaged in ESG activities rely less on debt financing.*

3. Methodology

3.1 Data

The study focuses on the capital structure of Taiwan-listed companies from 2018 to 2022 during the COVID-19 pandemic, specifically examining companies engaged in ESG practices. Due to the unique nature of the financial insurance industry, this study excludes it from the analysis. The sample data collected for this research primarily originates from Taiwan Industry Economics Services (TEJ).

3.2 Model

To examine the impact of engaging in ESG during the COVID-19 period on corporate financing, we refer to the study by Srivastava et. al. (2022) and employ panel data regression analysis. In this process, we will control for company and time effects and establish the following empirical models to test hypotheses one and two:

$$LEVERAGE_{it} = \alpha_0 + \alpha_1 COVID-19_{it} + \alpha_2 ESG_{it} + \alpha_3 COVID-19 * ESG_{it} + \alpha_4 CONTROLS_{it} + \varepsilon_{it} \quad (1)$$

Where in, *i* is defined as each company and *t* represents the year.

3.3 Variable Measurement

A. Dependent Variable

The dependent variable "LEVERAGE" is measured as the proportion of total debt to total assets for each company.

B. Main variables

1. The COVID-19 pandemic, according to the Centers for Disease Control (CDC) on January 15, 2020, classified "Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)" as a category five notifiable infectious disease. This classification was intended to strengthen disease surveillance and control measures for SARS-CoV-2. Therefore, this study defines the years starting from 2020 as the years affected by COVID-19.
2. ESG is primarily measured by the overall ESG score provided by the Taiwan Economic Journal (TEJ) database. Additionally, individual indicator scores will also be utilized as variable references. The relevant indicators are as follows:
 - i. Environmental Score: Based on the company's ability to avoid environmental risks and capitalize on environmental opportunities, timely measures are taken to make dynamic adaptive choices.
 - ii. Social Score: Based on the company's ability to measure reputation and generate trust and loyalty with stakeholders and related interests.
 - iii. Governance Score: Based on the company's measures to control and manage its rights and responsibilities through incentive measures.

C. Control variables

1. Size: Logarithm of total assets of the company.
2. Profitability: Earnings before interest, taxes, depreciation, and amortization (EBITDA) as a percentage of total assets.
3. Tangible Assets: Net property, plant, and equipment (Net PPE) as a percentage of total assets.
4. Altman Z-Score: Predicts the likelihood of corporate bankruptcy.
5. Leverage: Ratio of company's debt to equity.
6. Default Probability: Proportion based on the company's default risk.

4. Empirical results and analysis

4.1 Narrative statistics and correlation coefficient analysis

This study investigates the capital structure of companies engaged in ESG activities, excluding those in the financial insurance industry due to its unique nature. The results are presented in Table 1. Firstly, it is observed from the data that the average level of leverage (LEV) in the sample is 0.440. This indicates that the impact of companies engaging in ESG activities on corporate financing during the Covid-19 period accounts for nearly half of the total.

Next, the average value of the Covid-19 variable is 0.514, with a median of 1.000.

This suggests that the impact of the pandemic on companies was significant primarily during the outbreak period from 2019 to 2020, and the influence diminished as the pandemic abated. The average value of the ESG score (TESG-Score) is 0.560, with a median of 0.556. The close proximity of the mean and median indicates that the average ESG score of the sample companies is 56%, implying that over half of the listed companies in Taiwan are engaged in ESG activities. Furthermore, the maximum value is 0.837, indicating that some companies have reached a mature stage in their ESG initiatives.

Additionally, concerning the control variables, the average and median values are as follows:

- EBITDA (earnings before interest, taxes, depreciation, and amortization): The average is 0.090, and the median is 0.084.
- Altman Z-Score: The average is 3.961, and the median is 2.799.
- Equity (leverage): The average is 1.211, and the median is 0.797.
- PPE (net property, plant, and equipment): The average is 0.252, and the median is 0.228.
- Size (log of total assets): The average is 16.134, and the median is 15.942.

All the above control variables demonstrate typical distributions.

Furthermore, this study conducted Pearson correlation coefficient analysis to observe the relationships among variables. The results in Table 2 show regression tests for various variables with leverage level to explore their relationships. The regression results in Table 2 indicate a positive correlation between the COVID-19 period (COVID) and leverage level. Thus, the empirical findings do not support Hypothesis 1 of this study: companies tend to raise less debt during COVID-19. Therefore, it is inferred that companies tend to raise more debt during the COVID-19 period rather than using equity instruments to finance and obtain funds. Through correlation analysis, it is observed that there is a positive correlation between the COVID-19 period (COVID) and TESH_SCORE⁴. Hence, the empirical results support Hypothesis 2 of this study: companies engaging in ESG activities during COVID-19 tend to raise less debt. It is thus inferred that companies engaging in ESG activities are better equipped to withstand market risks arising from unforeseeable circumstances.

Table 1: Descriptive Statistics of Variables (N=5,347)

Statistic	Mean	Median	St.Dev.	Min	Max
LEV	0.440	0.443	0.186	0.005	0.998
Covid	0.514	1.000	0.500	0.000	1.000
TESG-Score	0.560	0.556	0.086	0.299	0.837
EBITDA	0.090	0.084	0.097	-2.990	0.613
Altman Z-Score	3.961	2.799	6.017	-80.315	127.448
Equity	1.211	0.797	5.943	0.005	416.489
PPE	0.252	0.228	0.171	0.000	0.967
Size	16.134	15.942	1.442	9.757	22.326

Note: The dependent variable "LEVERAGE" is measured as the proportion of total debt to total assets for each company. The COVID-19 pandemic is defined as the years starting from. ESG is primarily measured by the overall ESG score provided by the Taiwan Economic Journal (TEJ) database. Additionally, individual indicator scores will also be utilized as variable references. Environmental Score: Based on the company's ability to avoid environmental risks and capitalize on environmental opportunities, timely measures are taken to make dynamic adaptive choices. Social Score: Based on the company's ability to measure reputation and generate trust and loyalty with stakeholders and related interests. Governance Score: Based on the company's measures to control and manage its rights and responsibilities through incentive measures. Size: Logarithm of total assets of the company. Profitability: Earnings before interest, taxes, depreciation, and amortization (EBITDA) as a percentage of total assets. Tangible Assets: Net property, plant, and equipment (Net PPE) as a percentage of total assets. Altman Z-Score: Predicts the likelihood of corporate bankruptcy. Leverage: Ratio of company's debt to equity. Default Probability: Proportion based on the company's default risk.

Table 2: Correlation Analysis of Variables

	LEV	COVID	TESG	EBITDA	ALTMAN	EQUITY	PPE	SIZE_2
LEV	1							
COVID	0.033**	1						
TESG_SCORE_4	0.097***	0.030**	1					
EBITDA	-0.152***	0.056***	0.225***	1				
ALTMAN	-0.454***	0.053***	0.005	0.240***	1			
EQUITY	0.216***	-0.006	-0.030**	-0.056***	-0.074***	1		
PPE	0.003	-0.052***	0.051***	0.084***	-0.109***	-0.014	1	
SIZE_2	0.327***	0.051***	0.482***	0.197***	-0.098***	0.044***	-0.007	1

Note 1: The dependent variable "LEVERAGE" is measured as the proportion of total debt to total assets for each company. The COVID-19 pandemic is defined as the years starting from. ESG is primarily measured by the overall ESG score provided by the Taiwan Economic Journal (TEJ) database. Additionally, individual indicator scores will also be utilized as variable references. Environmental Score: Based on the company's ability to avoid environmental risks and capitalize on environmental opportunities, timely measures are taken to make dynamic adaptive choices. Social Score: Based on the company's ability to measure reputation and generate trust and loyalty with stakeholders and related interests. Governance Score: Based on the company's measures to control and manage its rights and responsibilities through incentive measures. Size: Logarithm of total assets of the company. Profitability: Earnings before interest, taxes, depreciation, and amortization (EBITDA) as a percentage of total assets. Tangible Assets: Net property, plant, and equipment (Net PPE) as a percentage of total assets. Altman Z-Score: Predicts the likelihood of corporate bankruptcy. Leverage: Ratio of company's debt to equity. Default Probability: Proportion based on the company's default risk.

Note 2: ***, **, * represent significance levels of 1%, 5%, and 10%, respectively.

Table 3: Regression Analysis Results

Variable	I	II	III	IV	V
C	0.454***	0.494***	0.401***	0.399***	0.034***
	(0.014)	(0.027)	(0.026)	(0.013)	(0.017)
COVID	0.013***	-0.061*	0.016***	0.003*	0.011*
	(0.004)	(0.036)	(0.002)	0.002	(0.006)
EBITDA	-0.112***	-0.111***	-0.066**	-0.044	-0.192***
	(0.038)	(0.037)	(0.026)	(0.029)	(0.033)
Z-Score	-0.006***	-0.006***	-0.011***	-0.005***	-0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Equity	0.001*	0.001*	0.081***	0.040***	0.000**
	(0.053)	(0.001)	(0.011)	(0.013)	(0.000)
PPE	0.043	0.046	0.074**	0.057	0.224***
	(0.053)	(0.054)	(0.034)	(0.041)	(0.045)
Size	1.77E**	2.03E**	1.99E	-4.98E	6.29E***
	(1.32E)	(1.34E)	(1.49E)	(0.08E)	(2.22E)
Year Effects	Yes				
Firm Effects	Yes				
Observations	5379	5347	1090	3360	897
Adj.R²	0.878	0.879	0.958	0.899	0.893
F-value	41.586***	41.926***	84.915***	39.410***	27.310***

Note 1: The dependent variable "LEVERAGE" is measured as the proportion of total debt to total assets for each company. The COVID-19 pandemic is defined as the years starting from. ESG is primarily measured by the overall ESG score provided by the Taiwan Economic Journal (TEJ) database. Additionally, individual indicator scores will also be utilized as variable references. Environmental Score: Based on the company's ability to avoid environmental risks and capitalize on environmental opportunities, timely measures are taken to make dynamic adaptive choices. Social Score: Based on the company's ability to measure reputation and generate trust and loyalty with stakeholders and related interests. Governance Score: Based on the company's measures to control and manage its rights and responsibilities through incentive measures. Size: Logarithm of total assets of the company. Profitability: Earnings before interest, taxes, depreciation, and amortization (EBITDA) as a percentage of total assets. Tangible Assets: Net property, plant, and equipment (Net PPE) as a percentage of total assets. Altman Z-Score: Predicts the likelihood of corporate bankruptcy. Leverage: Ratio of company's debt to equity. Default Probability: Proportion based on the company's default risk.

Note 2: ***, **, * represent significance levels of 1%, 5%, and 10%, respectively.

5. Conclusion

The results obtained from our aforementioned equations do not align with our hypothesis one: that companies tend to raise less debt during Covid-19. Instead, we find that companies during Covid-19 lean towards raising more debt. We attribute this primarily to two factors. Firstly, in our country, enterprises are mainly composed of small and medium-sized businesses. Secondly, the source of corporate debt financing differs from countries with mature markets such as the United States and the United Kingdom. During the pandemic, the Taiwanese government implemented several measures that incentivized companies to prefer debt financing over equity financing. This included banks providing secured loans to small and medium-sized enterprises and small-scale businesses affected by the pandemic, aiding in their operational turnover needs.

Taiwan government measures to revitalize and subsidize small and medium-sized enterprises.

1. **Post-Pandemic Revitalization Project Loans:** Subsidize the interest on loans for small and medium-sized enterprises (excluding financial and insurance industries and special entertainment industries). The loan purpose must be for construction (or renovation) of factories or business premises, purchase of machinery and equipment, or operational working capital. Applying enterprises must meet the criteria of the original relief and revitalization loans, experiencing operational difficulties or closure during the post-pandemic period. Below are the maximum loan amounts and annual interest rates, with acceptance period until October 31, Republic of China Year 114 (2025).
 - a. Small and medium-sized enterprises: The maximum loan amount is 35 million yuan, with a government subsidy of 1.595% interest rate in the first year.
 - b. Small and medium-sized enterprises with less than 5 employees, or profit-making enterprises with only tax registration: the maximum loan amount is 4 million yuan, with a government subsidy of 1.595% interest rate in the first two years.
2. **Low carbon smart management loan.**
 - a. Subsidize the interest on loans for small and medium-sized enterprises (excluding financial and insurance industries, and special entertainment industries). Applicants must be enterprises transitioning towards low-carbon and smart transformation, businesses registered under specific factory registrations, or factories under specific management. The loan purpose must be for the construction (or renovation) of factories or business premises, purchase of machinery and equipment, or operational working capital. The loan amount for capital expenditure should not exceed 80% of the planned expenditure, with a maximum revolving fund of NT\$35 million. The government subsidizes the interest rate at 1.595% for the first year.
3. **Financing plan for the revitalization of small and medium-sized enterprises worth billions.**
 - a. From now until December 31, 2024, financing schemes are provided for micro, small, and medium-sized enterprises (MSMEs) and startups. Loans must be used for operational turnover, equipment upgrades, research and development of innovative products or technologies, and talent cultivation. The loan amount will be determined by banks based on the actual needs of each case, with the maximum loan interest rate not exceeding the 2-year fixed deposit interest rate plus 1% offered by Chunghwa Post.
 - The Taiwan Central Bank's Measures for Banks.
 1. Special Financing Interest Rate: 0.25% (1.25 percentage points lower than the Central Bank's guaranteed loan financing rate).
 2. Special Financing Quota: NT\$200 billion.

3. Applicable Period: April 1, 2020, to March 27, 2021.
 - Banks provide loans to businesses.
 - 1. Bank Loan Program: Banks assess and provide secured loans to small and medium-sized enterprises affected by the pandemic.
 - 2. Purpose of Bank Loans: For meeting the operational cash flow needs of businesses.
 - 3. Loan Amount and Maximum Interest Rate by Banks:
 - a. New loans guaranteed by the Export-Import Bank of the Republic of China (Taiwan) for over 90% of the loan amount.
 - i. Maximum loan amount per account up to 2 million New Taiwan Dollars
 - ii. The annual interest rate does not exceed 1% (the special lending rate of the Central Bank plus 0.75 percentage points).
 - b. New loans secured by collateral provided by the bank:
 - i. Maximum loan amount per account is up to 6 million NT dollars.
 - ii. The annual interest rate does not exceed 1.5% (the central bank's special project financing rate plus 1.25 percentage points).

During the relief and revitalization measures period, from March 2020 to June 2021, the total approved amount of enterprise loans amounted to approximately 463.44 billion NT dollars. Zhang (2022) reported that during this relief period, the total liquidity created by banks reached about 98.0 trillion NT dollars, a significant increase compared to about 89.7 trillion NT dollars before the relief efforts. This increase is primarily attributed to the rise in relief loans and current deposits, which played a positive role in stimulating economic growth. It is worth noting that the Small and Medium Enterprise Credit Guarantee Fund, as a guarantee scheme for this relief and revitalization loan program, also played a certain role, demonstrating the banking sector's higher willingness to cooperate with and implement government policies. For business entities, with the support of relief measures, they were able to alleviate the impact of the pandemic. For banks, compared to their better-capitalized peers, banks with weaker capital may continue the problem of "zombie loans" if they excessively lend. However, this also enables companies in financial distress to temporarily avoid closure during the pandemic, thereby mitigating the potential for greater economic impact.

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