How Financial Ratio Can Predict The Corporate Bankruptcy in Japan

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Abstract
Bankruptcies can be caused by many factors such as global financial crisis, poor companies and individual financing that can lead to bankruptcy. This study investigated the relationship between firm financial characteristics and control variable with corporate bankruptcy in Japan from 1991 to 2020. This study applied the ordinary least square method analysis. The results showed that retained earnings to total asset, total debt to total asset, and gross domestic product had significant impact on corporate bankruptcy in Japan. This study recommends for firms to assure the stability of profit and issue new or extra share to generate more cash flow. In addition, it is recommended that the governments help firms with insolvency relief tool such financial aid and ensure the stability of Japan's gross domestic product to reduce the chance of bankruptcy.
Keywords: Corporate Bankruptcy, Global Financial Crisis, Firm Financial Characteristics, Least Square Method and Gross Domestic Product.

Introduction
Bankruptcies can be referred to as a legal process that involves a person or business that is unable to repay its outstanding debts (Tuovila, 2021). Ding et al (2008) stated that bankruptcy is a situation where the company is unable to pay its liabilities, priority dividends and has overdrawn its accounts. Some of the factors that influence bankruptcies are poor management of financing by corporations and individuals, and financial crisis. The Japanese were suffering from a recession that continued to the notable economic bubble (happened in 1980), also known as economic stagnation, which lasted until 2002 (Abe, 2010). After the economic stagnation, Japan's economy continuously facing huge collapses as many corporations were facing financial issues such as corporate bankruptcies had declared about

16,365 number of cases in 1997, which indicated that it was more than 12.5% out of 14,544 cases in 1996 (Shirata, 1998).

According to Imahashi (2021), a study from the specialist Tokyo Shoko Research announced that the COVID-19 pandemic that occurred in Japan resulted in an increase of 1,026 cases (about 26% of all business failures) from January 2021 until August 2021. Therefore, if the financial ratio of retained earnings to total assets is high, it is expected for the corporations to obtain more profits, whereas if total debt to total assets in Japan corporation's is increasing, it shows that there is a possibility of bankruptcies because of the amount of debt incurred.

Other than that, current liability to total assets could also be one of the reasons for the inability to have a higher asset to finance liability. Meanwhile for working capital to total asset, if their debts are higher, it will influence bankruptcy too. A downfall in gross domestic product will cause distraction for corporations. The number of bankruptcies fluctuates greatly over time so bankruptcies prediction are important in order to estimate the bankruptcy risk of a company or firm to survive in future (Harada and Kageyama, 2011).

Consequently, this study investigated the relationship between firm financial characteristics of retained earnings to total assets, total debt to total assets, current liability to total assets, working capital to total assets and domestic product (GDP) to determine whether it can influence the corporate bankruptcy in Japan. Japan is one of countries that was affected by the outbreak of COVID-19 based on a study that stated at least 1,100 companies in Japan had gone bankrupt as the COVID-19 pandemic battered the world's third largest economy (Khaliq, 2021). Therefore, this study attempted to seek the extent of financial characteristics and GDP on corporate bankruptcy in Japan to fill this gap.

Literature Review

According to Tian and Yu (2017), the financial ratio distress showed a great impact on corporate bankruptcy whereby, based on the research done by Claessens et al (2003), the only way for a corporation to find the solution if they are facing with unbalanced financial ratio is by bankruptcy, which shows that about 644 corporations are struggling with the financial. The research by Tian and Yu (2017) showed the Japan economy used Retained Earnings/Total Asset, Total Debt/Total Asset, and Current Liability/Sales, whereby all of these can affect the corporate bankruptcy. Therefore, the three variables show that the result is statistically significant to bankruptcy for three years ahead.

By referring to Altman (1998), retained earnings to total assets is known as an estimation of how much the corporation makes profits in terms of total assets. It shows that there is a positive significant between retained earnings to total assets and corporate bankruptcy. This can be supported from research conducted by Kamal (2012), whereby the retained earnings to total assets had a positive effect on bankruptcy, thus if the ratio of retained earnings to total assets is low, the company covered its costs by borrowing rather than funding from the retained earnings. Based on Supriyanto and Darmawan (2018), if the retained earnings of the corporation is higher, there are less chances of financial distress.

Other than that, total debt to total asset can be defined as a computation to calculate how much assets can be paid by debt rather than the equity. The relationship of total debt to total assets with corporate bankruptcy shows that it is positively significant. Based on the study conducted by Tian and Yu (2017), total debt to total assets and current liability to total sales were strongly related to predicting the corporate bankruptcy, especially in Japanese economy, while ratios of equity to total liability was more suitable in the European economy. Beaver (1966) found that total debt over total assets and net income over total assets also predict business failure far better than 50% for each year.

Besides that, current liability is known as a short-term liability which must be paid within a short period (Khan, 2016). Based on Wu et al (2010), the capability of corporations to pay their short-term liability as bankrupt firms have greater current liabilities. It was reported by Al-Kassar and Soileau (2014) that the relationship is negatively significant to corporate bankruptcy, indicating that if the ratio is higher, the possibility of bankruptcy is lower. As stated by Mihalovic (2016), this variable is important to find out if bankruptcies in corporations will happen.

Moreover, working capital to total assets is the difference between the present assets of a corporation and its current liabilities. According to Mihalovic (2016), working capital to total assets is known as a significant forecaster of firm bankruptcy. This shows that the relationship between working capital to total asset with bankruptcy is positively significant because in the previous study by Supriyanto and Darmawan (2018) and Kamal (2012), the ratio indicated the capability of corporation to obtain its working capital showing that an increase of the ratio shows that their liquidity is better. According to Altman, (2002), Chuvakhin and Germania, (2003) a business entity with a negative working capital will experience difficulty meeting its obligations.

Gross domestic product (GDP) can be the cause of bankruptcy when sales of a company are decreasing due to a negative growth causing a bad impact on the country. Therefore, the gross domestic product and corporate bankruptcy have a significantly negative relationship. It could be seen according to the study by Moravec (2013) that as the GDP becomes greater, there are fewer bankruptcies in corporations. Due to a higher GDP, aggregate demand will also increase. Other than that, Macerinskiene and Mendelsonas (2013) found that fluctuations of inflation the same as fluctuations of GDP growth have the biggest influence on insolvency rates of construction sector.

Research Design
This study focused on the methodology that had been used in analysing the relationship between firm financial characteristic and GDP toward the corporate bankruptcy in Japan. The dependent variable of the study was corporate bankruptcy in Japan, whereas the independent variables were retained earnings to total asset, total debt to total asset, working capital to total asset, current liability to total asset, and control variable is GDP. A multiple regression technique was used to estimate the ordinary least square (OLS) method from 1991 until 2020. The OLS method is a procedure to determine the best fit line to data set (Miller, 2006).

The Model

This study followed the model specifications by Bakar and Tahir (2009); Gurau and Van der Sar (2013); Lucian et al (2010) to analyse the relationship between retained earnings to total assets, total debt to total asset, current liability to total asset, working capital to total asset are independent variables, and gross domestic product toward the dependent variable which is corporate bankruptcy in Japan.

$$BANKR = \alpha + \beta_1 RETA + \beta_2\ TDTA + \beta_3\ CLTA + \beta_4\ WCTA + \beta_5\ GDP + \mu \text{ (Equation 1)}$$

Where, BANKR refers to corporate bankruptcy in Japanese yen unit, RETA refers to retained earnings to total assets, TDTA refers to total debts to total assets, CLTA refers to current liability to total assets, WCTA refers to working capital to total assets and the control variable, and GDP refers to gross domestic product.

Data Description

This study used data from Thomson Reuters DataStream. The data collected was taken in a time series of about thirty (30) years of data sample beginning from 1991 until 2020. For a dependent variable, which is corporate bankruptcy, the data was taken from the Thomson Reuters DataStream focusing on Japan. Meanwhile, the independent variables which were retained earnings to total asset, total debt to total asset, current liability to total asset, working capital to the total asset were also gathered from the Thomson Reuters DataStream and focused on the automotive sector, whereby eight (8) companies in Japan were taken whose operation was established from 1988. An automotive company was chosen due to the availability of complete data for further investigation. Macroeconomics data, also known as the gross domestic product (GDP), was also collected from the Thomson Reuters DataStream. The Japanese automotive companies for data collection are shown in Table 1:

Table 1
Japanese Automotive Companies

Years Established	Name of Japan Automotive Company
1988	Nittan Valve Co.
1988	Kasai Kogyo Co.
1988	TBK Company Ltd.
1988	Univance Corp.
1988	Lead Co. Inc.
1988	Tachi-S Co., Ltd.
1988	Fine Sinter Co., Ltd.
1988	Mitsubishi Motors

Analysis and Findings

Table 2 shows that the dependent variable corporate bankruptcy (BANKR) was normally distributed, which is shown by the Jarque-Bera probability value of more than 5% level of significance. In addition, generally, all variables (which were total debt to total asset, current liability to total, working capital to total asset and gross domestic product) were not significant because the value was more than 5% level of significance, which indicated that all the variables were normally distributed except for retained earnings to total asset with the value of 0.044670, which was less than 5% level of significance.

Table 2
Descriptive Statistic Analysis

	BANKR	RETA	TDTA	CLTA	WCTA	GDP
Mean	13379.93	1.276183	2.019867	3.515900	0.191753	524911.9
Median	13870.00	1.101042	2.072148	3.608719	0.045194	529004.4
Skewness	-0.047782	1.102897	0.237814	0.013101	0.238857	-0.352093
Kurtosis	2.104537	2.671377	1.785722	2.121693	1.630542	2.293312
Jarque-Bera	1.013732	6.216898	2.125866	0.965138	2.629534	1.244107
Probability	0.602380	0.044670	0.345441	0.617196	0.268537	0.536841
Observation	30	30	30	30	30	30

Table 3 shows that the t-statistic result had three significant values, with probability lower than 5% level of significance for three independent variables that were retained earnings to total assets, total debt to total assets, and gross domestic product. This result indicated that relationship existed with the corporate bankruptcy. The other variables, which were current liabilities to total assets, and working capital, showed insignificant values that indicated no relationships existed with corporate bankruptcy.

Table 3
Multiple Linear Regression

Variables	Probability	Coefficient
Constant	(0.3589)	-15565.78
Retained earnings to total asset (RETA)	(0.0012)	-5492.425**
Total debt to total asset (TDTA)	(0.0270)	3000.251*
Current liability to total asset (CLTA)	(0.1528)	-2395.357
Working capital to total asset (WCTA)	(0.0865)	-3229.737
Gross domestic product (GDP)	(0.0133)	0.074176**
F-statistic	(0.000000)	20.19556*
R^2	0.807966	
Adjusted R^2	0.767959	
Durbin-Watson stat	1.529225	

Significant **, * at 1%, 5% level of significance.

Furthermore, the F-test result shows that overall independent variables significantly influenced the dependent variable (corporate bankruptcy) with value of probability F-test less than 5% level of significance. Next, the coefficient of determination (R2) showed that 80.80% of the total variation in the corporate bankruptcy was explained by the changes of all independent variables, while the remaining of the total variation could not be explained.

From Table 3, the retained earnings to total asset and total debt to total assets significantly impacted corporate bankruptcy in Japan. This showed that with an increase in retained earnings to total asset by 1 unit, the chances to firm to face bankruptcy decreases by 5492.435 units. However, total debt to total asset showed that an increase in the total debt to total asset ratio by 1 unit, the chances of firms to face bankruptcy increases by 3000.251 units. This result is supported by Tian and Yu (2017), where the coefficient estimates on the liability ratios of total debt to total asset are clearly positive and significant, indicating that a company with a high liquidity ratio is expected to face bankruptcy.

Nevertheless, the results for working capital to total asset and current liabilities to total asset were not significant and showed no relationship towards the corporate bankruptcy. This result was similar to the studies of Nabila and Mat (2021) and Liana (2014), whereby working capital to total asset and current liabilities to total assets were not significant in predicting financial distress.

Lastly, control variables (gross domestic product) significantly impacted corporate bankruptcy in Japan, as it was shown that increase in the gross domestic product will increase the chances of firms to be free from bankruptcy, as gross domestic product will create more opportunities to business to growth and expand their business. According to Moravec (2013), as GDP increases, aggregate demand increases due to the acceleration effect, and indicates that the higher the GDP, lessen the chances of bankruptcy.

Conclusion and Recommendations
This research was conducted to investigate the impact of retained earnings to total asset (RETA), total debt to total asset (TDTA), current liability to total asset (CLTA), working capital to total asset (WCTA), and gross domestic product (GDP) towards the corporate bankruptcy in Japan. The first objective of this study was to investigate the relationship between firm financial indicators and corporate bankruptcy. This objective was proven to be achieved where there were two significant variables for this study, which were retained earnings to total assets (RETA) and total debt to total assets (TDTA). The second objective was to investigate the relationship between Gross Domestic Product (GDP) and corporate bankruptcy in Japan. This objective was proven to be achieved where the result of gross domestic product (GDP) was significant. However, two variables were not significant: current liability to total assets and working capital to total assets.

Therefore, there are few recommendations for firms and the government to reduce corporate insolvency based on the findings of this study. The government needs to ensure that there is stability of Japan's GDP and provide financial aid (including reducing corporation taxes) to businesses, which would help them reduce costs while boosting profits. Besides, the government needs to develop an insolvency relief tool policy that would allow businesses to postpone insolvency procedures and gain vital time to restructure their businesses. As for the firms, they need to ensure stability of their profits and issue new or extra shares to generate cash flow and settle off current commitments. These recommendations will help to reduce and avoid corporate bankruptcy in Japanese companies.

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APPENDICES

Table 1: Operationalization of Indicators

Variables	Description of Data	Sources	Unit	Abb
Corporate Bankruptcy	Corporate bankruptcy for 1991 to 2020	Thomson Reuters DataStream	Japanese Yen	BANKR
Retained Earning to Total Asset	Retained earnings to total asset for 1991 to 2020	Thomson Reuters DataStream	Japanese Yen	RETA
Total Debt to Total Asset	Total debt to total asset for 1991 to 2020	Thomson Reuters DataStream	Japanese Yen	TDTA
Current Liability to Total Asset	Current liability to total assets for 1991 to 2020	Thomson Reuters DataStream	Japanese Yen	CLTA
Working Capital to Total Asset	Working capital to total asset for 1991 to 2020	Thomson Reuters DataStream	Japanese Yen	WCTA
Gross Domestic Product	GDP for 1991 to 2020	Thomson Reuters DataStream	Japanese Yen	GDP