PROCEEDING

ICOMS 2018

The 4th International Conference on Management Sciences
Universitas Muhammadiyah Yogyakarta, Indonesia

"Disruptive Innovation in Modern Business Era"

held in UMY, Indonesia, on March 28, 2018

Department of Management

FACULTY OF ECONOMICS AND BUSINESS

Universitas Muhammadiyah Yogyakarta

in collaboration with:

Universiti Sains Islam, Malaysia

Tamkang University, Taiwan

Khon Kaen University, Thailand

The 4rd International Conference on Management Sciences 2018 (ICoMS 2018)

March 28 2018

Universitas Muhammadiyah Yogyakarta, Indonesia

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2. Dr. Kawpong Polyorat (Khon Khaen University, Thailand)
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Preface IcoMS 2018

The 4rd International Conference on Management Sciences 2018 (ICoMS 2018)

March 28 2018

Universitas Muhammadiyah Yogyakarta, Indonesia

Dear Presenters and Delegates,

Department of Management, Economics Faculty, University of Muhammadiyah Yogyakarta, in collaboration with the Tamkang University Taiwan, Khon Kaen University Thailand, USIM Malaysia, organized an International Conference which will be held on March 28 2018.

We are proud to know that tehre is a thick manuscript submissions came to our table for this conference. In detail, there are 42 international academic manuscripts which we received from Indonesia, Malaysia, Thailand. And in this conference we choose **Disruptive Innovation in Modern Business Era** as the main theme.

Our international conference is a manifestation of the Government of Indonesia through the Directorate General of Higher Education, which has encouraged the internationalization of research and teaching in order to foster high-caliber academic institutions globally and increase competitiveness in International Higher Education.

We are very confident that our presenters and delegates will get a lot of ideas together and experience of this conference. In addition, our participants will enjoy additional insight from our plenary session keynote speakers, namely, Prof.Dr.Shu-Hsien Liao from Tamkang University Taiwan, Dr. Kawpong Polyorat from Khon Kaen University Thailand, Prof. Dr. Syadiyah Abdul Shukor from USIM Malaysia, and Punang Amaripuja, S.E., S.T., M.IT. from Universitas Muhammadiyah Yogyakarta.

Through this conference, we are committed to promote and improve our mission and academic culture synthesize global progress with local knowledge. Therefore, it is my great honour to welcome you to IcoMS 2018 in great cultural city of Yogyakarta, Indonesia. I look forward to seeing you soon in the conference.

Best wishes,

Dr. Indah Fatmawati

Chair of IcoMS 2018

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Estimating the Potential Bankruptcy on Banking Sector in Indonesia: Using Method of Altman Z – Score and Springate

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ABSTRACT

Bank as financial institutions has an essential role in a business, which functions as a financial intermediary between the individuals who have a surplus fund with the individuals who needed resources as a deficit unit. Bank in managing the operation activity do not escape from the risk of bankruptcy which can be systemic impacts on the other sectors. This study examines whether there was a difference in the potential of bankruptcy for the banking sector that has listed on Indonesia Stock Exchange using the method of Altman Z-Score, and Springate. The possibility of bankruptcy from three models compared with paired sample t-test and the significance level of 0.05.The study results demonstrate there is a difference between the potential of bankruptcy in the banking sector listed on Indonesia Stock Exchange using the method of Altman Z-Score and Springate. The analysis results also confirmed that the method of Altman Z-Score is still beneficial in predicting bankruptcy. The evidence shown by cointegration testing was more able to prove the relationship and the perspective of the long-term period. Therefore, the authors conclude that among of variables determining the Altman Z-Score has the empirical data relationship.

Keywords: Banking, Risks, Bankruptcy, Altman Z-Score, Springate.

1. Introduction

Banks as financial institutions have an important role in the economy and function as the financial intermediary between the surplus unit with the deficit unit. Banks are expected to mobilize funds and community savings to develop the banking sector in Indonesia. The banking sector in Indonesia has ups and downs. The banking crisis that occurred in 1997 has faced some fundamental problems. These issues include weak corporate governance, poor risk management, high foreign exchange lending exposure, high non-performing loans arising from unconscionable lending, especially to related business groups and the property sector, as well as the presence of foreign borrowing sectors private sector in a huge number. The vulnerable banking system affects the bank's performance that many debtors are unable to pay their debts, so the bank suffers losses. At its peak when Indonesia experienced a monetary crisis in 1997, there were several banks experiencing liquidity difficulties which had to be closed by Indonesian banks as banking authorities. The average current assets of banking companies during 2011 to 2015 shows a proper development where average current assets increased from 6,779,145 in 2011 to an increase in 2015 to 14,700,742. This condition shows that banks have good current fund reserves that can meet their current liabilities. Bankruptcy is a condition when the company suffers from insufficient funds to run its business. According to Bankruptcy Law no. 4 the Year 1998, the company is declared bankrupt based on an authorized court decision or its request if it has 2 or more creditors and the company is unable to pay at least one debt that has matured. Altman in 1968 introduced the Z-Score Analysis, an analysis that links the various ratios in the financial statements as the

variables and combined into an equation to obtain the value of Z, where the value of Z here is the value to predict the condition of the company, whether in good health or bankruptcy. Then Altman in 2000 advocated a full reestimation and replaced its market value with the equity market value in X4.Based on Altman's development results, the Z-Score formula can be used by go public companies and non-public companies where the company has no market value.

Springate (1978) used 40 companies as a sample to find a model that can be used in predicting the potential bankruptcy of a company by using multi discriminant analysis. Springate found four ratios that can be used in predicting the potential for corporate bankruptcy. The four ratios are combined in an equation formulated by Springate which is later renowned for the Springate Model.

The average fixed assets of banking companies during 2011 to 2015 shows a proper development where the average fixed assets increased from 3,116,187 in 2011 to an increase in 2015 to 8,474,383. This condition indicates that banks have good operational types of equipment in which fixed assets owned can support all banking operational activities, for example, fixed assets of ATMs that many indicate that operationalization of banking activities can support the needs of its customers.

The average current liabilities of banking companies during 2011 to 2015 indicates that short-term bank management risks increase where average current liabilities increase from 242,612,777 in 2011 to increase in 2015 to 324,956,130. This situation indicates that banks have short-term management risks which banks may have difficulty meeting their working capital needs if their customers withdraw current liabilities from Third Party Repositories such as savings and time deposits. For that, the company must be able to control its short-term debt. Increase in current liabilities is not proportional to the increase in current assets that can cause bank liquidity to be disrupted.

The average long-term debt of a banking company during 2011 to 2015 indicates that long-term bank management risks increase where the average long-term debt increased from 6,640,951 in 2011 to an increase in 2015 to 16,945,549. This condition indicates that bank risk, in the long run, is higher. If the bank is unable to manage its long-term debt properly, the bank will fail to perform its operational activities. Banks that have failed due to long-term debt that is too high ever occurred in Bank Century is categorized bankrupt. Banks are unable to return customers' funds so that the Government takes over the Bank Century which is now renamed Bank Mustika.

The average total liabilities of banking companies during 2011 to 2015 indicates overall bank management risks increased where the average total debt increased from 273,545,629 in 2011 increased in 2015 to 441,621,983. This condition indicates the overall risk of banks experiencing an increase that can affect the financial stability of banks. If the bank is not able to meet the total debt, then it can be sure the bank will go bankrupt.

The average capital of banking companies during 2011 to 2015 shows that bank's capital management increased where the average capital increase from 34,175,641 in 2011 increased in 2015 to 70,383,251. This condition is perfect for banks, where high capital shows the availability of funding from private banks will help the needs of bank operational activities to generate profits (appendix 1).

The average operating cost of banking companies during 2011 to 2015 indicates that bank efficiency is still low where the average of operational raises from 2,720,117 in 2011 increased in 2015 to 5,383,997. This condition indicates that the bank in running its operational activities is less efficient where there is an increase in the operational cost of the company. The highest operational cost problem is seen in PT. Bank Rakyat Indonesia, Tbk where the trend of increase of operational cost in 2012 is 14,08% increase in the year of 2013 equal to 14,83% and increase again in the year 2014 equal to 19,12%. If operational costs continue to increase, then it will hamper the company's profit growth (attachment 2).

The average net income of banking companies during 2011 to 2015 shows high bank profitability where average net income increased from 7,748,543 in 2011 to increase in 2015 to 12,828,560. This condition shows that the bank succeeds in carrying out its operational activities whereby the bank is able to obtain a net profit that can meet all operational needs of the bank.

2. Literature Review and Hypothesis

2.1 *Altman*

The Model of Altman z-score is a indicators to measure the potential of bankruptcy a company. A number of studies have been done to know the usefulness of financial ratio analysis in predicting the failure or bankruptcy of a company. Equation of the model of the first Altman namely:

Z = 1.2 (WCTA) + 1.4 (RETA) + 3.3 (EBITTA) + 0.6 (MVEBVL) + 1 (STA)

Keterangan:
Z = bankruptcy index
X_1 = working capital / total asset
X_2 = retained earnings / total asset
X_3 = earnings before interest and taxes/total asset
X_4 = market value of equity / book value of total debt
X_5 = sales / total assets.

1). Net Working Capital to Total Assets (WCTA)
This ratio shows the ability of the company to produce a net working capital of the overall total assets that belonged. This ratio is calculated by dividing the capital to total assets. Net Working Capital obtained with how current assets reduced by the current liabilities. Negative Net Working Capital will most likely be facing problem in covering the debts in the short term because it is not the availability of current assets which is enough to cover the debt. On contrary, the company with customers withdraw current liabilities from Third Party Funds such as savings and time deposits capital that positive value rarely faces difficulties in paying its debts. Formulation is:

$$X1 : WCTA = \frac{Working\ Capital}{Total\ Assets}$$

2). Retained Earnings to Total Assets (RETA)
This ratio shows the company's ability to generate retained earnings from total company assets. Retained earnings represent unearned earnings to shareholders. In other words, retained earnings show how much of the company's revenue is not paid in dividends to shareholders. Accordingly, retained earnings reported on the balance sheet are not cash and are not available for dividend payout or otherwise. The formulation is:

$$X2 : RETA = \frac{Retained\ Earnings}{Total\ Assets}$$

3). Earnings Before Interest and Tax to Total Assets (EBITTA)
This ratio shows the company's ability to generate profits from the company's assets, before interest payments and taxes. The formulation is:

$$X3 : EBITTA = \frac{Earning\ Before\ Interest\ and\ Taxes}{Total\ Assets}$$

4). Market Value of Equity to Book Value of Debt (MVEBVL) This ratio indicates a company's ability to meet the obligations of its capital market value (ordinary shares). The equity market value alone is obtained by multiplying the number of ordinary shares outstanding at the ordinary market price per share. The formulation is:

$$X4 : MVEBVL = \frac{Market\ Value\ of\ Equity}{Book\ Value\ of\ Total\ Debt}$$

5). Sales to Total Assets
This ratio indicates whether the company generates enough business volume compared to investment in its total assets. This ratio reflects the efficiency of management in using the overall assets of the company to generate sales and earn profits. The formulation is:

$$X5 : STA = \frac{Sales}{Total\ Assets}$$

The cut-offs used by this model are:
Z> 2.90 as health company
Z <1.20 as potential bankrupt company

Z between 1.20 sd 2.90 as the company in Gray Area

2.2. Springate

Springate formulated a prediction model of bankruptcy in 1978. In its formulation, Springate uses (Springate, 1978 in Hadi and Anggraeni, 2008). Initially, S- Score consisted of 19 popular financial ratios. After going through the Springate test choose four ratios that can be trusted to distinguish between companies that went bankrupt and who did not go bankrupt. This model can be used to predict bankruptcy with a level of accuracy of 92.5%.

Z = 1,3A + 3,07B + 0,66C + 0,4D
Information:
A = *Working Capital to Total Assets*
B = *Earnings Before Interest and Taxes to Total Assets*
C = *Earnings Before Taxes to Current Liabilities*
D = *Total Sales to Total Assets*

The cut-off value that applies to this model is 0.862. A value smaller than 0.862 indicates that the firm is predicted to be bankrupt. This model has 92.5% accuracy in the Springate test. Thus, considering all the arguments, following hypothesis has been generated:
H1: there is a potential difference bankruptcy of the banking industry listed on IDX with Altman Z_Score and Springate methods.
H2: Altman Z_Score method is better for predicting bankruptcy than Springate.

3. Methodology

3.1. Data and estimation method

Data used as the object of research in this study is variable data Altman and Springate which is decorated by the author of banking financial statements. The data used using the base year 2012 and the end of 2016. After all the data obtained, then processed using different test and ECM model.

3.2. Model specification

T-Test

T-Test Analysis uses the paired sample t-test model to prove the comparative hypothesis between Altman and Springate.

Unit Root Tests

A series is otherwise stationary if the whole moment of the series (mean, variance and covariance) is constant all the time. Phillips-Perron test (PP Test) is a standard procedure.

Johansen Cointegration Test

The combination of two non-stationary series will move in the same direction toward its long-run equilibrium and the differentiation between the two series will be constant. If so, this series is said to be mutually cointegrated between the Altman and Springate models based on the Johansen Vector Auto Regressions (VAR) approach. If vector Xt is a vector of endogenous variables in VAR with the length of lag P, then:

$$X_t = A_t X_{t-1} + A2\ X_{t-2} + \ldots + ApX_{t-p} + \beta Y_t + \varepsilon_t$$

If there is no cointegration relationship, the unrestricted VAR model can be applied. However, when there is a cointegration relationship between the series, the Vector Error Correction model (VECM) is used.

Granger Causality Test

Granger Causality test is intended to see the influence of each variable on the other variables one by one. Based on the hypothesis of Granger causality.

Empirical Model of ECM and VECM

The existence of such problems encourages other alternatives that are often called non-structural models. This approach seeks the relationship between the various variables desired. These models are often called VARs or ECMs, and VECMs are commonly used for forecasting of time-coherent data relationships. The VAR model follows done by Mougoué and Bond (1991).

4. Results and Conclusion

Descriptive statistics

The following shows general statistics of all data used, as shown in table 1 below:

Table 1: Descriptive Statistics of Altman and Springate Variables

Descriptive Statistics					
	N	Min	Max	Mean	Std. Deviation
ALTMAN	100	1.11	12.07	2.6611	1.38332
SPRINGATE	100	1.24	14.76	6.5226	3.20008
Valid N (listwise)	100				

Source: Data Processed, 2017

The ALTMAN average is 2.6611 with the standard deviation of 1.38332. The maximum value is 12.07, and the minimum value is 1.11. It can be concluded that the data is quite homogeneous and spreads between its minimum and maximum values. The results of ALTMAN descriptive data show normal data distribution.

SPRINGATE average is 6.5226 with standard deviation 3.20008. The maximum value is 3.20008, and the minimum value is 1.24. It can be concluded that the data is quite homogeneous and spreads between its minimum and maximum values. The result of the descriptive value of SPRINGATE data shows normal data distribution. The amount of observation data is 100 out of 20 banking companies retrieved data for five years (2012 - 2016).

Table 2: Variables Altman and Springate

Emitents	Year	ALTMAN	Condition	SPRINGATE	Condition
_BACA	2012	3.06	Health	2.65	Health
_BACA	2013	3.18	Health	2.95	Health
_BACA	2014	2.28	Gray Area	4.2	Health
_BACA	2015	2.46	Gray Area	2.97	Health
_BACA	2016	2.09	Gray Area	2.43	Health
_NISP	2012	2.00	Gray Area	2.16	Health
_NISP	2013	1.98	Gray Area	3.78	Health
_NISP	2014	2.19	Gray Area	3.48	Health
_NISP	2015	2.58	Gray Area	3.51	Health
_NISP	2016	2.66	Gray Area	3.87	Health
_BBCA	2012	3.32	Health	9.84	Health
_BBCA	2013	3.18	Health	8.49	Health
_BBCA	2014	2.88	Health	7.95	Health
_BBCA	2015	2.69	Gray Area	8.61	Health
_BBCA	2016	3.55	Health	8.97	Health
_BBKP	2012	1.13	Bankrupt	4.16	Health
_BBKP	2013	1.46	Bankrupt	5.2	Health
_BBKP	2014	1.36	Bankrupt	5.12	Health
_BBKP	2015	1.64	Bankrupt	5.4	Health
_BBKP	2016	1.56	Bankrupt	3.68	Health
_BBNI	2012	3.32	Health	8.84	Health
_BBNI	2013	3.16	Health	7.92	Health
_BBNI	2014	3.05	Health	8.44	Health
_BBNI	2015	3.11	Health	9.36	Health
_BBNI	2016	3.15	Health	10.4	Health
_BBNP	2012	1.93	Bankrupt	3.6	Health
_BBNP	2013	1.69	Bankrupt	4.16	Health
_BBNP	2014	1.58	Bankrupt	4.16	Health
_BBN	20	2.02	Gray	4.2	Healt

P	15		Area		h
_BBNP	2016	2.25	Gray Area	4.08	Healt h
_BBRI	2012	2.87	Gray Area	14.76	Healt h
_BBRI	2013	3.28	Health	12.84	Healt h
_BBRI	2014	3.44	Health	13.56	Healt h
_BBRI	2015	3.44	Health	13.64	Healt h
_BBRI	2016	3.47	Health	12.08	Healt h
_BDMN	2012	2.79	Gray Area	10.08	Healt h
_BDMN	2013	4.09	Health	9.72	Healt h
_BDMN	2014	4.18	Health	10.56	Healt h
_BDMN	2015	4.05	Health	9.04	Healt h
_BDMN	2016	4.08	Health	5.48	Healt h
_BMRI	2012	3.20	Health	12.44	Healt h
_BMRI	2013	4.03	Health	9.2	Healt h
_BMRI	2014	4.01	Health	10.08	Healt h
_BMRI	2015	3.72	Health	10.28	Healt h
_BMRI	2016	3.84	Health	9.68	Healt h
_BNBA	2012	4.60	Health	4.04	Healt h
_BNBA	2013	3.87	Health	5.76	Healt h
_BNBA	2014	3.37	Health	6.56	Healt h
_BNBA	2015	2.68	Gray Area	5.56	Healt h
_BNBA	2016	2.27	Gray Area	4.04	Healt h
_BNGA	2012	1.85	Bankrupt	7.12	Healt h
_BNGA	2013	2.12	Gray Area	7.6	Healt h
_BNGA	2014	2.14	Gray Area	8.6	Healt h
_BNGA	2015	2.38	Gray Area	7.84	Healt h
_BNGA	2016	2.36	Gray Area	4.04	Healt h
_BNII	2012	2.03	Gray Area	2.84	Healt h
_BNII	2013	1.79	Bankrupt	2.84	Healt h
_BNII	2014	1.80	Bankrupt	4.2	Healt h
_BNII	2015	1.87	Bankrupt	4.48	Healt h
_BNII	2016	2.16	Gray Area	2	Healt h
_BNLI	2012	1.94	Bankrupt	5.44	Healt h
_BNLI	2013	1.71	Bankrupt	4.56	Healt h
_BNLI	2014	2.40	Gray Area	4.16	Healt h
_BNLI	2015	1.25	Bankrupt	4.16	Healt h
_BNLI	2016	1.86	Bankrupt	3.44	Healt h
_BSWD	2012	3.53	Health	8.92	Healt h
_BSWD	2013	3.27	Health	9.32	Healt h
_BSWD	2014	3.05	Health	8.64	Healt h
_BSWD	2015	2.30	Gray Area	9.04	Healt h
_BSWD	2016	2.06	Gray Area	8.16	Healt h
_BTPN	2012	2.41	Gray Area	9.68	Healt h
_BTPN	2013	2.50	Gray Area	12	Healt h
_BTPN	2014	2.74	Gray Area	13.4	Healt h
_BTPN	2015	2.89	Gray Area	12.24	Healt h
_BTPN	2016	3.18	Gray Area	9.96	Healt h
_BVIC	2012	1.54	Bankrupt	4.16	Healt h
_BVIC	2013	1.98	Bankrupt	6.36	Healt h
_BVI	20	1.78	Bankru	5.72	Healt

C	14		pt		h
_BVI	20		Bankru		Healt
C	15	1.60	pt	5.48	h
_BVI	20		Bankru		Healt
C	16	1.48	pt	1.96	h
_INP	20		Bankru		Healt
C	12	1.17	pt	2.08	h
_INP	20		Bankru		Healt
C	13	1.11	pt	4	h
_INP	20		Bankru		Healt
C	14	1.11	pt	1.24	h
_INP	20		Gray		Healt
C	15	2.19	Area	4.28	h
_INP	20		Gray		Healt
C	16	2.04	Area	1.88	h
_MAY	20		Health		Healt
A	12	3.19		3.04	h
_MAY	20		Gray		Healt
A	13	2.58	Area	5.28	h
_MAY	20		Gray		Healt
A	14	2.09	Area	6.12	h
_MAY	20		Gray		Healt
A	15	1.86	Area	6.4	h
_MAY	20		Gray		Healt
A	16	1.46	Area	4.8	h
_ME	20		Gray		Healt
GA	12	1.87	Area	8.08	h
_ME	20		Gray		Healt
GA	13	1.66	Area	6.92	h
_ME	20		Gray		Healt
GA	14	2.03	Area	8.44	h
_ME	20		Gray		Healt
GA	15	1.99	Area	3.16	h
_ME	20		Gray		Healt
GA	16	2.11	Area	3.6	h
_PNB	20		Health		Healt
N	12	8.43		5.2	h
_PNB	20		Gray		Healt
N	13	2.68	Area	7.28	h
_PNB	20		Health		Healt
N	14	12.07		6.12	h
_PNB	20		Gray		Healt
N	15	2.28	Area	6	h
_PNB	20		Gray		Healt
N	16	2.43	Area	6	h

T-Test Results

The average difference test conducted on the possible rating of Bankrupt of the listed banking companies in IDX is conducted to find out whether there is a potential difference to bankrupt of banking industry companies listed on the IDX with a significance level of 0.05.

Table 2: Paired Sample t-test

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	ALTMAN - SPRINGEt	-3.86150	3.06968	.30697	-4.47059	-3.25241	-12.579	99	.000

Based on the results of the analysis with paired sample t-test obtained the level of significance of 0.000. The significance level obtained is smaller than 0.005 and causes H0 to be rejected, and Ha accepted. This case means that there is a potential difference bankruptcy banking industry listed on IDX with Z-Score model Altman and Springate.

Results of Stationary Test

This function is useful for explaining a stochastic process and will provide information on how to correlate between adjacent (Yt) data.

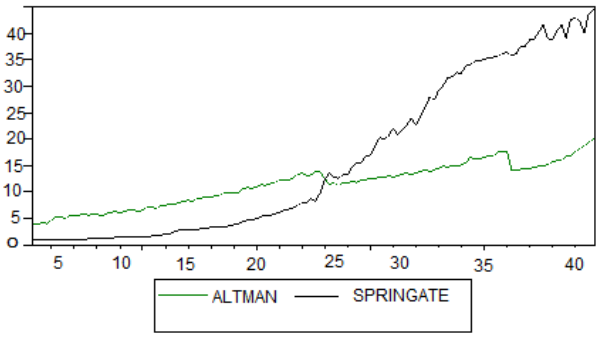

Fig. 1 : Stationary Test

We can see on the graph if the data is stationary or otherwise. So a data stationer qualifies, the relationship between stationary data with the next test step is to conclude that stationary data and later if cointegration test is done, then the data we test can support cointegration in the long term.

Table 3: Root Test

Null Hypothesis: RESID01 has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic based on SIC, MAXLAG=12)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.658109	0.0059
Test critical values:	1% level		-3.484198	
	5% level		-2.885051	
	10% level		-2.579386	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(RESID01)				
Method: Least Squares				
Date: 012/22/17 Time: 5:21				
Sample (adjusted): 2 100				
Included observations: 100 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID01(-1)	-0.204744	0.055970	-4.861907	0.0002
C	1.091174	2.756646	0.395834	0.7451
R-squared	0.099580	Mean dependent var		1.236332
Adjusted R-squared	0.092139	S.D. dependent var		32.08329
S.E. of regression	30.56952	Akaike info criterion		9.694010
Sum squared resid	113074.0	Schwarz criterion		9.739737
Log likelihood	-594.1816	F-statistic		13.38176
Durbin-Watson stat	2.038701	Prob(F-statistic)		0.000378

The results show that the original data shows stationary, since the ADF test value is smaller than its significant value, so it can be assured that the data contain stationarity. The probability of significant levels also shows significant numbers at the 5% alpha level at RESID1 (-1)

Results Test of Long Lag

As the principle of parsimony, the assumption used by Johansen's cointegration test is to find the smallest statistical likelihood test logs of ECM equations as well as VECM. From likelihood log recapitulation of ECM and VECM equations start from 1 to 3 lag 3 for 1982 s / d 2012.

Table 4: VAR Analysis

Vector Autoregression Estimates					
R-squared	0.832250	0.228642	0.987024	0.996826	0.966115
Adj. R-squared	0.825081	0.195678	0.986470	0.996691	0.964667
Sum sq. resids	88041.30	73.16218	1.64E+09	5.62E+09	927.1887
S.E. equation	27.43155	0.790770	3745.017	6933.316	2.815082
F-statistic	116.0935	6.936115	1779.994	7349.795	667.1677
Log likelihood	-578.7921	-142.5798	-1183.520	-1259.277	-298.7578
Akaike AIC	9.508815	2.415932	19.34179	20.57361	4.955411
Schwarz SC	9.645995	2.553112	19.47897	20.71079	5.092590
Mean dependent	190.6881	0.578943	92037.80	129083.2	29.96220
S.D. dependent	65.58921	0.881730	32196.17	120524.1	14.97612
Determinant resid covariance (dof adj.)		2.03E+18			
Determinant resid covariance		1.58E+18			
Log likelihood		-3449.828			
Akaike information criterion		56.58257			
Schwarz criterion		57.26847			

Vector Autoregression Estimates			
R-squared	0.835101	0.274920	0.987018
Adj. R-squared	0.820245	0.209597	0.985849
Sum sq. resids	86545.36	68.72753	1.59E+09
S.E. equation	27.92289	0.786872	3790.151
F-statistic	56.21374	4.208648	843.9530
Log likelihood	-573.5391	-138.1044	-1172.646
Akaike AIC	9.582608	2.444334	19.40404
Schwarz SC	9.835429	2.697155	19.65686
Mean dependent	190.6898	0.580984	92529.91
S.D. dependent	65.85968	0.885074	31861.06
Determinant resid covariance (dof adj.)		1.76E+18	
Determinant resid covariance		1.10E+18	
Log likelihood		-3399.602	
Akaike information criterion		56.63281	
Schwarz criterion		57.89692	

(Ctrl)

We can see and compare the results of the three output above looks not too much, and much difference when we use the lag is not the same. In this case, Lag 1, Lag 2 and Lag 3 are used. The value of R Squared is not far between 0.83 and 0.82, and this indicates a solid and correlated relationship, the same model selection value is between 56 and 58 for ALTMAN and SPRINGATE. The F statistic is also very high. So it can be concluded that the use of Lag in this equation model does not give a change in the final result.

Cointegration Test Results

Sometimes two random variables are found, each of which is a random walk but a linear combination of two or more variables is a stationary time series. If Ut Stationary, then it is certain that cointegrated. A condition in which the Ut is stationary and cointegrated, in econometrics mutually cointegrated variables are said to be in long-term equilibrium conditions or commonly called long-run equilibrium.

Table 5: Root Test Linear Trend

Null Hypothesis: D(RESID01) has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 0 (Automatic based on AIC, MAXLAG=12)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-9.15565	0.0006
Test critical values:	1% level		-3.034997	
	5% level		-2.447072	
	10% level		-2.148578	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(RESID01,2)				
Method: Least Squares				
Date: 12/19/17 Time: 8:09				
Sample (adjusted): 3 100				
Included observations: 90 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RESID01(-1))	-1.027431	0.092100	-11.15565	0.0000
C	0.977725	6.050828	0.161585	0.8719
@TREND(1)	-0.031933	0.084356	-0.378553	0.7057
R-squared	0.511265	Mean dependent var		-0.285125
Adjusted R-squared	0.503051	S.D. dependent var		46.54087
S.E. of regression	32.80881	Akaike info criterion		9.843554
Sum squared resid	128093.7	Schwarz criterion		9.912505
Log likelihood	-597.4568	F-statistic		62.24288
Durbin-Watson stat	1.987938	Prob(F-statistic)		0.000000

We can see from the results of cointegration testing that results in the value of d arithmetic> d table, which means stationary Ut occurs cointegration between variables because if a data analyzed is not stationary but mutual cointegration means there is a long-term relationship or balance between two / more variables. In the short term, there is the possibility of an imbalance called disequilibrium. The Altman model is better than SPRINGATE. This case can be seen from the R-Square coefficient of the Altman model is higher than SPRINGATE.

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