LONG-TERM CO-INTEGRATION OF STOCK MARKET INDICES: STUDY CASE IN INDONESIA, THE UNITED STATE, HONG KONG, JAPAN, KOREA AND SINGAPORE PERIOD 2009-2019

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Abstract

In 2019 global economic growth has been downgraded to 3 percent, below previous projection 0,6 percent. As recent softness abates, world growth is projected to edge up to 3,4 percent in 2020 and to 3,6 percent in 2021. National Association for Business Economic (NABE)'s survey produces risk of recession enhances and threatens global economic growth. One of indicators of recession is the inverted yield curve of the United State during trade war between the United State and China. In this research used quantitative approach by using time series over January 2nd, 2009 to October 31st, 2019. Variables of this research are; Indonesia (^JKSE) as dependent variable, Japan (Nikkei 225), Korea (KOSPI), Hong Kong (Hang Seng) and Singapore (Straits Times Index) as independent variables. Engle-Grager co-integration test implemented in this research in three steps which is descriptive test to know the data, second unit root test used to selecting the stationary data after get the stationary data moved to third step co-integration test using Engle-Granger. The result is there are co-integration relation between Indonesia and the United State. But Japan, Korea, Hong Kong and Singapore is none. Means the United State has big impact in Indonesia export/import, investment, and capital market.

Keyword: Economic Growth;Recession; Stock Price Indices; Co-integration; Engle-Granger

1. Introduction

National Association for Business Economic (NABE)'s survey produces risk of recession enhances and threatens global economic growth. Because of recession, it effecting the depression of economics activity such as jobs, investment, and company profits (Sudjijono, 2008). Inversion in yield obligation of U.S. is an indicator before recession happened. Inverted yield curve occurs when the interest rate on short-term bonds are higher than the interest rates paid by long-term bonds. Which means that long-term bond should be higher than short-term bond and it occurred risk for investor. Inverted yield curve is a graph that is drawn from plots of interest rates on various bonds that have the same credit rating but have different maturities, at any given time (Muttaqiena, 2019).

Investment is one of important variable in developing economic growth. After trade war sentiment threatened occurred on May 13th, 2019, Dow Jones Industrial Average (DJI) index decreased 2,38 percent, S&P index also 2,4 percent so do NASDAQ Composite index 3,41 percent. It also impact on Shanghai index decrease 1.1 percent and Hang Seng index decrease 2,1 percent on opening price, May 14th, 2019. If the United States economic slowed, financial market also will decrease. Then the value of China investment will also decrease (Sudjijono, 2008). Japan (Nikkei 224), Hong Kong (*Hangseng*) and South Korea (Kospi) are representative reference for Asian stock market movement (Inggrid, 2008). Slowed of world economic affected to others country even advanced countries or emerging and developing countries. "*The slowdown in the world economy is affecting Singapore in all areas"* said Analyst from OB Assest Managmenet, Anthony

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From previous research, Sari and Dewi (2017) contend that Shanghai Composite Index (SHCOMP), Nikkei 225 (N225), Korean Composite Stock Price Index (KOSPI), Taiwan Capitalization Weighted Stock Index (TAIEX) and Straits Time Index (STI) has co-integration between Jakarta Composite Index (JKSE) with research period 5 years ago (2012-2016). By using Johansen procedures which is divided into two steps: multivariate co-integration test technique and bivariate test to know which one is dominant. W. Mohti, et al (2018) examined Asian emerging and frontier stock markets regional and global integration by using daily data from December 2009 to April 2017 and two methodologies. (1) The Gregory and Hansen's cointegration tests concluded that there are long run links connecting Indonesia, Korea, the Philippines and Thailand with Japan (the regional benchmark). The emerging market (exception of China, India and the Philippines) displayed evidence of long run connection with the global market (proxies by the US). In a frontier market, Pakistan shared similar long run relationship with Japan and the US.

The aim of this research is to analyze long term cointegration stock exchange between Indonesia as dependent variable, Singapore, Hong Kong, Japan, Korea and the United State as independent variables period over Januari 2009 to October 2019. The data is from closing price for each country, then analyze the stationary data and Engle-Granger cointegration test.

2. Theoritical Review and Methodology

2.1 Theoritical Review

2.1.1 Investment

An investment is the current commitment of dollars for a period of time in order to derive future payments that will compensate the investor for (1) the time the funds are committed, (2) the expected rate of inflation during this time period, (3) the uncertainty of the future payments (Reilly & Brown, 2012). According to (Singh, 2016) invesment is the commitment of funds with a long-term time framework, the objective being additional income to regular receipts and growth in the value of funds of an investor.

2.1.2 Stock Market

Capital market is an non-bank financial institution has securities and tranding or in other words capital market is a place to sell and buy shares (Rusdiana, 2017). So can be concluded that capital market is a place for transaction instrument for capital market that has long-term more than one year or long-term instrument.

2.1.3 Stock

Shares are investment instruments used to obtain funds from the public investors and by purchasing shares issued, investors will get proof of ownership in the form of shares in the company (Hidayat, 2010). In share there several variety, there are; (1) Bonus Shares are shares of *agio* shares, which are the difference between the price of the shares at the time of a public offering and the nominal price of the shares. (2) Preferred Stock is a mixture of ordinary shares with fixed income securities which are routinely distributed in the form of dividends. (3) Common Stock is a stock in which the shareholders who own it represent ownership in the company for the amount of capital invested.

2.1.4 Stock Price

Stocks have different values or prices depending on the market buying or selling these shares.According to ((Hidayat, 2010) the stock price has five types, there are nominal prices, prime price, opening price, market price and closing price.

2.1.5 Stock Indices

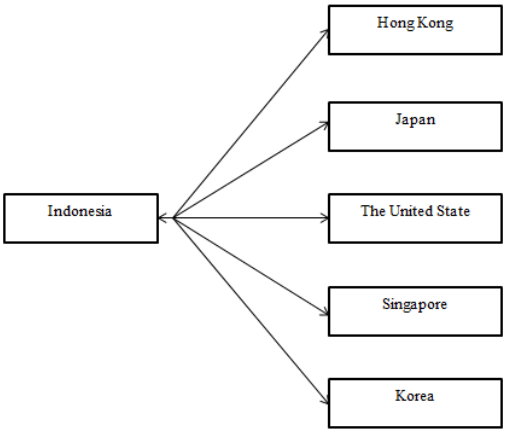
Stock index is a portfolio to measure the price of a market or part of that market (idx.com). Market index is used for decision makers of stock transactions made by investors, where stock investment transactions occur every time with a variety of different problems, stock price movements require identification and presentation of information and are specific (Sunariyah, 2011).

2.1.6 Co-integration

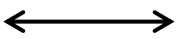
Cointegration is a relation between two or more variables that moves in the same time, despite following the trends but the movement will not separate far because they are linked together in certain meaning. Cointegration reflects the movement between two time series data over a certain time period but does not reflect the correlation between the two data sets (Siddiqui, 2009).

2.2 Research Framework

Stock market trading in a country's capital market can be a benchmark of good or bad economic ability of a country. Relations between a country's stock market are related to other countries, this relationship is called the contagion effect. Contagion effect is a condition where a significant increase in relations between several financial markets after the shock transmitted in several countries (Dornbusch et al., 2000). Capital market stated has a co-integration relation if both of market has same movement and correlation between stock indices. According to previous research (Windu et al., 2017) analyze co-integration of stock exchange in Indonesia, Malaysia and South Korea and there is a long run co-integration between each of them. More widely, (Majeed et al., 2016) investigating a long run relationship between ASEAN stock market indices and developed stock market indices of US and Japan. The result is there are a long run relationship exist among ASEAN-5 countries and developed countries, Japan and US indices. This study used to examine long-run co-integration of stock indices in pair or whole in Indonesia, Korea, Hong Kong, Singapore, the US and Japan. Theoretical framework can be seen in figure 1.1 below:



Explanation:

 : Cointegration between stock market indices

2.3 Hypothesis

H_1 : Dow Jones Industrial Average (^DJI) has long-run co-integration with Indonesia Composite Index (JKSE)

H_2 : Nikkei 225 (^N225) has long-run co-integration with Indonesia Composite Index (JKSE)

H_3 : Hang Seng (^HSI) has long-run co-integration with Indonesia Composite Index (JKSE)

H_4 : Korean Composite Stock Price Index (KOSPI) has long-run co-integration with Indonesia Composite Index (JKSE)

H_5 : Straits Time Index (STI) has long-run co-integration with Indonesia Composite

Index (JKSE)

2.4 Methodology

This research method used is quantitative method. Quantitative method is a method for measuring in behavior, knowledge, thoughts or attitude (Cooper & Schindler, 2011). According (Darmawan, 2013) quantitative method uses numerical data as a parameter of knowing information about object. The purpose of this study is descriptive, because in this research is finding long-run co-integration between stock market indices in Japan, the US, Singapore, Indonesia, Korea and Hong Kong. Descriptive is a research to know independent variable value either one or more variable without using comparation, or causality with other variable (Siregar, 2013). In other words descriptive is to measure an object without knowing the correlation between factors or variables before. By illustrate the characteristic or function from one or more variables (Indrawati, 2015). Types of investigation used in this research is correlational.

The data set used in this study contains the daily price indices of 6 (six) major stock markets including Indonesia, Japan, Korea, Hong Kong, Singapore and the United State (Dow Jones Industrial Average (DJI)) spanning over January 2nd, 2009 to October 31st, 2019. The data used in this research are the secondary data. Sekaran and Bougie (2013) explained that secondary data refer to information gathered by someone other the researcher. Secondary data is data used by organization that are not proceed (Siregar, 2013). The data include from official website of www.yahoo-finance.com, www.investing.com. Because each country has a different operating time so the amount of daily closing data is also different. According to Ali et al. (2011) states that every holiday on an exchange, there is no information that changes on that day from the previous day, which means that the previous day's information can be used to describe information on holidays. So that the data is empty because the holiday will be replaced with data before the holiday.

The Enger-Ganger test is to analyzing the existence of stock market co-integration. To test the existence of cointegration can be done by using the two-step Engle-Granger test method. Following the steps briefly (Rosadi, 2012: 201):

1. Test the presence of unit roots in the variable Ytdan Xt (for example by using the ADF test). The unit root order must be the same and have the value d. If the hypothesis of the unit root is rejected, then the hypothesis of integration between variables will be rejected.
2. Next, estimate the regression equation between Ytd and Xt (or generally, between Ytdan Xt1, Xt2, ..., Xtk), and save the residual from this regression (this residual is called et).
3. Perform a unit root test of the residual et obtained in step2. If the hypothesis of a unit root is rejected, then it is concluded that Yt and Xt cointegrated (or in general, between Ytd and Xt1, Xt2, ..., Xtk cointegrated). It is important to note that in testing universal roots for residuals, do not include trend components in the test statistics.

3. Discussion

3.1 Descriptive Analysis

Descriptive analysis use to know about the data like mean, median, maximum and minimum, standard deviasion, kurtosis, skewness and Jarque-Bera.

Table 3.1 Descriptive Analysis Result

	^JKSE	^STI	^DJI	^N225	^KOSPI	^HSI
Mean	4567.779	3051.325	16625.89	15057.42	1993.726	23143.24

Median	4720.435	3114.160	16417.01	15305.57	1992.560	22880.53
Maximum	13104.14	22666.59	27359.16	24270.62	10543.52	33154.12
Minimum	1256.109	1456.950	2870.560	1997.050	1018.810	1723.490
Std. Dev.	1291.796	626.2768	5403.022	4993.717	441.7228	3723.643
Skewness	-0.353675	21.43922	0.352352	0.069244	12.23196	-0.252148
Kurtosis	3.955034	682.5048	2.131958	1.545653	237.9290	4.869844
Jarque-Bera	166.2554	54565496	147.1476	250.4251	6566962	441.3240
Probability	0	0	0	0	0	0
Sum	12903975	861992	46968143	42387929	5632275	65356513
Sum Sq. Dev.	4712514930.742	1107636776.804377	82440023898.25	70198252592.215	551016168.240191	39142356194.80
Observations	2825	2825	2825	2825	2825	2825

3.2 Unit Root Analysis

In this research author use Akike Info Criterion with maximum lags 14. On level stages the data is stationary and not stationary (useing trend and no trend). After use first differences the all the data is stationary even use trend or no trend.

Table 3.2 ADF Test First Differences No Trend

Variable	Value of t-statistic ADF	prob	Value of t-critis MacKinnon			Conclusion
			1%	5%	10%	
^DJI	-22.88379	0	-3.432483	-2.862368	-2.567255	Stationary
^HSI	-21.12971	0	-3.432484	-2.862369	-2.567256	Stationary
^JKSE	-21.82650	0	-3.432486	-2.862369	-2.567256	Stationary
^KOSPI	-22.22774	0	-3.432487	-2.862370	-2.567256	Stationary

^N225	-26.03524	0	-3.432527	-2.862387	-2.567266	Stationary
^STI	-23.99095	0	-3.432486	-2.862369	-2.567256	Stationary

Table 3.3 ADF Test First Differencess with Trend

Variable	Value of t-statistic ADF	prob	Value of t-critical MacKinnon			Conclusion
			1%	5%	10%	
^DJI	-22.88427	0	-3.961304	-3.411404	-3.127553	Stationary
^HSI	-21.13835	0	-3.961306	-3.411405	-3.127554	Stationary
^JKSE	-21.84872	0	-3.961308	-3.411406	-3.127554	Stationary
^KOSPI	-22.22759	0	-3.961310	-3.411407	-3.127555	Stationary
^N225	-26.03067	0	-3.961367	-3.411435	-3.127571	Stationary
^STI	-23.99124	0	-3.961308	-3.411406	-3.127554	Stationary

In table 3.2 and table 3.3 all the probability is 0%, the data is stationary if the probability is less then 5% and the ADF t-statistic should bigger than t-critical MacKinnon even at 1%, 5% or 10%. The tables shows the t-statistic ADF value is bigger then t-critical MacKinnon value so the data is stationary.

3.3Engle-Granger Test

Cointegration test used in this research is Engle-Granger test. Engle-Granger methodology follows two step estimations. The first step differenced residuals on lagged residuals. Hence, any possible error from the first step will be carried into second step (Bilgili, 2017). The table below show the result after using Engle-Granger cointegration.

Table 3.4 Cointegration Test using Engle-Granger

Variable	ADF t-statistic Value	T-critical Value MacKinnon			Conclusion
		1%	5%	10%	
JKSE - DJI	-4.071887	-3.432486	-2.862369	-2.567256	Cointegrated
JKSE - HSI	-3.231823	-3.432486	-2.862369	-2.567256	Not Cointegrated
JKSE- KOSPI	-2.94987	-2.432486	-2.862369	-2.567256	Not Cointegrated
JKSE – N225	-3.125532	-3.432570	-2.862407	-2.567276	Not Cointegrated
JKSE - STI	-1.844460	-3.43224	-2.862369	-2.567256	Not Cointegrated

The table shows that Indonesia and the United State has cointegration because the ADF t-statistical value is higher than t-critical value at 5% and 10%. Then rest of the variables are not cointegrated because the t-critical value is higher than ADF t-statistical.

4. Discussion
   1. Indonesia and the United State has cointegration relation because ADF t-statistic is bigger than t-critical value.
   2. Indonesia and Hong Kong are not cointegrated at 1% and 5% t-critical value.
   3. Indonesia and Korea are not cointegrated at 1%, 5% and 10% t-critical value.
   4. Indonesia and Japan are not cointegrated at 1% and 5% at t-critical value.
   5. Indonesia and Singapore are not cointegrated at 1%, 5% and 10% at t-critical value.

5. Suggestion
   Base on the conclusion above, author gives suggestion about:
   1. Investor can choose stock market that does not have cointegration with Indonesia which are Hong Kong, Japan, Korea and Singapore to maximize the profit.
   2. Next reseacher can be use other methodology to do cointegration test, like Johansen with longer time period
   3. Next reseacrher can be adding new variables from Europe country and adding new the United State index like Nationa Association of Securities Dealer Automated Quotation (NASDAQ) and the New York Stock Exchange

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