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Cfa And Ardl Panel Capability In Predicting The Fluctuation Of Joint Stock Indices Indonesia, China, Australia

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Abstract: *Research aims to predict the fluctuations in the stock prices of Indonesia, China and Australia based on the company's fundamental economic and fundamental. Data analysis using the CFA model and ARDL Panel. The leading indicator of State effectiveness in the effective control of the state of Indonesia, China, and Australia. Australia (inflation, GDP, unemployment). Other countries, such as Indonesia's stock price control is done by increase and the amount of money supply. China is still active in controlling the price of stocks through the stability of inflation. Leading indicator of the effectiveness of variables in the control of security of Indonesia, China and Australia namely increase (Indonesia, China, and Australia) is seen from the stability of short-run and long-run, where the inflation variable significantly controls Share price in the short term only, but unstable controlling the share price in the long time.*

Keywords: *Inflation, money supply, exchange rate, GDP, stocks*

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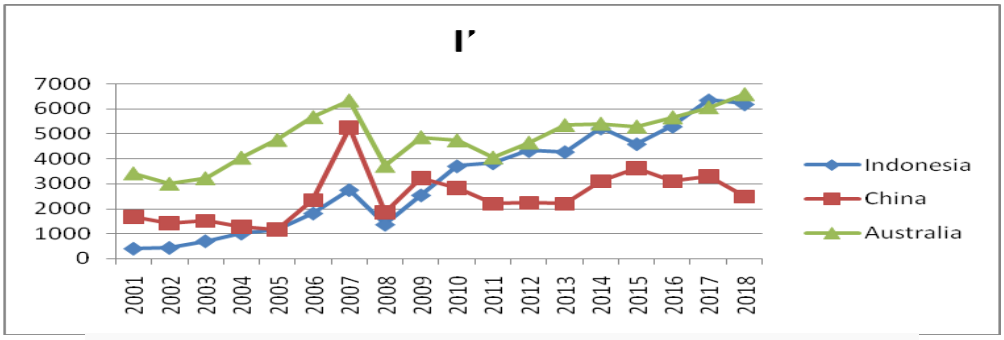
I. Introduction

Some monetary factors that have a significant influence on the price of the stock are interest rates, amount of money supply, and currency exchange rate. While the macroeconomic factors affecting the stock price are inflation, economic growth, unemployment, and oil price. In each country, these factors can have similar or different influences on the stock indices. Based on some studies that have been done before, Ocktavia (2007) states that the value of the stock price is affected by macroeconomic fluctuations. Capital markets that have increased (bullish) or decreased (bearish) are seen from the ups and downs of the stocks recorded through the movement of the Consolidated stock price Index (Maulino, 2009). The IDX movement is influenced by several factors, factors originating from the domestic (internal), and the considerations arising from abroad (external). Factors originating in the country (internally) can come from the fluctuations of monetary and macroeconomic variables. While the factors originating from overseas (foreign) are oil price, gold price, and other countries ' stocks. Also, investor behavior affects the performance of the Joint Stock price index (Yanuar, 2013). A delay effect can occur due to barriers from other macroeconomic variables (Natsir, 2011). Flowers can influence the occurrence of the delay effect (Wróbel,2013). Wimanda (2015) The exchange rate affects the success of monetary policy. Monetary transmission is crucial in maintaining economic stability (Rusiadi; Novalina, 2018). Onyeiwu (2012) concluded exports as a variable capable of affecting final target intercessions. Alfian (2011) The asset line affects economic growth and inflation. Natsir (2015) which demonstrates the workforce and exports of net affect economic growth. Silvia (2013) Exports and investments are capable of affecting economic stability... Indonesia rose to rank fifth because of rising chemical product growth, as well as manufacturing of industrial and financial services (Watson,2018).

About the above, it is necessary that analysis can describe the relationship between the monetary and macroeconomic variables to the stock indices in certain countries and times. The report of the data panel, which is a combined analysis between time series data and cross-section, can describe the relationship. In this case, the data analysis panel is capable of explaining how the exchange rate, interest rate, inflation, economic growth, amount of money supply, oil price, and unemployment affects the stock indices. The countries that have become objects in this research are Indonesia, China, and Australia. These countries were chosen to describe the economic state of the already developed and emerging economies.



Pictures of 1.1 composite stock price index in Indonesia, China, Australia
Source: www.yahoofinance.com

Based on the table, there can be seen changes in the price of shares in Indonesia, China, and Australia from 2001-2018, which are always fluctuating. Indonesia, China, and Australia increased in the year 2007, declining in 2008 due to the global crisis in United States, Indonesia, China and Australia, respectively, the decline in 1.355.41, 1,851.52 and 3,722.30 because while the worldwide disaster struck the world, investors tend to want to avoid the risk of harm that would suffer if investing in a portfolio form. Investors only want to invest in developed countries and developing countries that promise profit from the country that is building its economy. They want a definite advantage, from the confusion of having to speculate if investing that is not necessarily profitable.

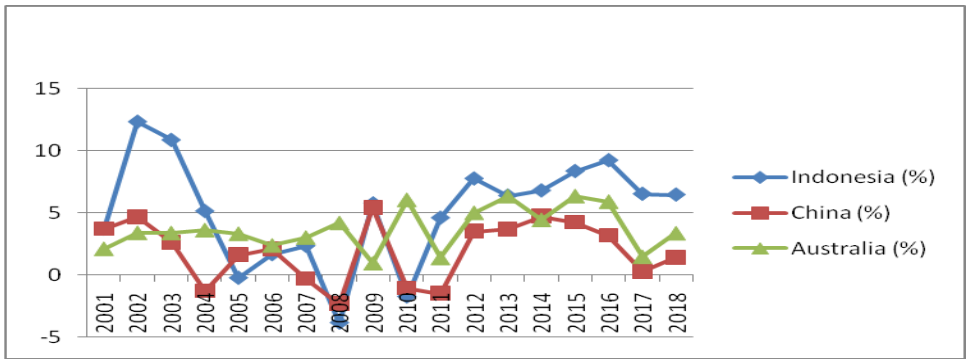


Figure 1.2 Interest rate developments in Indonesia, China, Australia

From the picture above, it can be explained that the movements of interest rate charts in Indonesia, China, and Australia are experiencing varying fluctuations from the years 2001 to 2018. Where there is a decrease in interest rates that are established in Indonesia and China in 2008, the development of Indonesian interest rates dropped to-3.85%, and China amounted to-2.33%. And in Australia, the decline occurred in the year 2009 by 0.96%. But there is also a movement of the highest rise in interest rates in Indonesia, China, and Australia. Indonesia has increased by 7.75% in 2012, China, to 5.45% in 2009. Australia 6.34% in the year 2015. But in 2017, the movement of interest rates on charts in Indonesia, China, and Australia has decreased dramatically. According to Mankiw (2000), Low-interest rates will result in lower borrowing costs. They will stimulate investment and economic activity that will result in increasing the price of shares in each country. At every crisis that occurs, every time there is a weakening in the financial markets of capital market funds, there is also a weakening of the macroeconomic variables in these countries. This indicates the relationship between the stock market and the macroeconomic variables of the ASEAN countries.

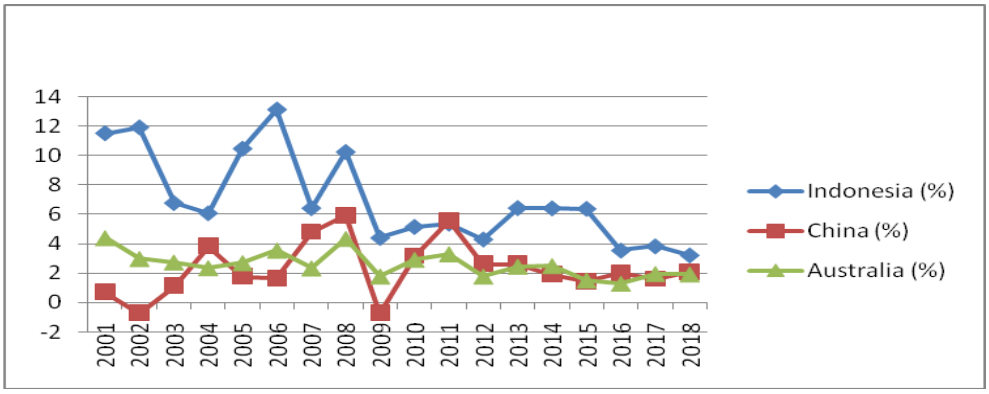


Figure 1.3 Inflation in Indonesia, China, Australia

From the picture above, it can be explained that the movement of inflation charts in Indonesia, China, and Australia, is experiencing varying fluctuations from the years 2001 to 2017. Where the highest inflation rate occurred in 2006 in Indonesia amounted to 13.10%, in China's highest inflation state in 2008 at 5.92%, and in the state of Australia, the highest inflation occurred in 2001 at 4.40%. Among the three countries, Indonesia is the country whose inelastic level is highest each year compared to China and Australia. When the world economic crisis struck, oil prices in the world were high, so governments in each country raised their infested levels to keep control of their economy.

According to Almilia (2003), states that the higher the inflation will result in a decline in the profitability of the company. It means imperfect information for traders on the stock exchange and resulting in a decrease in the share price in the company. As with the interest rate, inflation also plays a significant role in encouraging speculative investment. The owners of capital will divert the capitals to prefer investing in productive efforts. Rise affected the fluctuations in the price of the requested stock when inflation increases that will affect the rising cost of raw materials, which will eventually lead to decreased competitiveness in the production of goods produced Company. This would have impacted the company's prospects to fall and would hurt the company's share price in the capital market. Also, increasing inflation will increase the cost of the company resulting in the decline in the profitability of companies that listed its shares in stock exchanges that will ultimately minimize the dividend received by shareholders. In researching the fluctuations in the combined stock price index, many macroeconomic indicators are often associated with capital markets such as interest rate, inflation, exchange rate, and GDP growth. But in this study, the author took four factors, namely interest rate, inflation, exchange rates (exchange rate), and the amount of money supply

II. Heading

Stocks are the most popular and widely known securities in both developed and developing countries. Damaji and Hendy (2006), the shares can be described as a sign of inclusion or possession of a person or legal entity in a company or limited liability. The stock is tangible, a piece of paper explaining that the paper owner is the owner who issued the securities. The portion of the flat is determined by the broad participation that is implanted in the administration. According to Anoraga and Pakarti (2006).

Stocks are used as a tool to look for additional resources to cause research and analysis on stocks to develop well technically and fundamentally. (Fahmi, 2012). The owner of the stock is commonly called investor, making Rate of Return as one of the bases in support to make the decision of investing that was passed by various reasons for other choices (Fahmi, 2012). When someone has a stock preferred stock (individual stock) If viewed from the perspective of the rate of return, namely "This preferent stock usually gives a fixed dividend annually as well as bonds. In general, this preferent stock does not have a falling day (continuity).

According to Jones (2007), in the calculation of common stock with a formula developed by Myron J, Gorden, where this formula Gordon is commonly known as constant growth of capital, namely:

$$P_0 = \frac{D1}{r-g}$$

Description

P0 = value of the common stock (ordinary shares)

D1 = Revenue dividend in one year

R = Expected rate of return

g = The estimated growth, always Kostan

The fact gained from maintaining the payout percentage of the dividend result is kontan, so with a constant growth model dividend and the stock price, results are all expected to grow steadily (g). (Charles P. Jones, (2007:266).

The party who owns the shares will benefit as a form of obligation that must be accepted; that is, each year-end will receive dividends, acquire voting rights if holding common stock type shares and get profit when the shares are owned Resale at a high price or capital gain.

The formula of capital gains is the following:

$$CG = \frac{P_{it}\ P_{it}\text{-}1}{P_{it-1}}$$

Description:

CG = Capital Gain

Pit = end of period stock price

Pit-1 = stock price Previous Period

III. Indentations And Equations

Research is a systematic process encompassing the collection and analysis of information (data) to improve our understanding of the phenomenon that we are interested in or our concern. (Leedy, 1997). The data to be used in this research is secondary data originating from Bank Indonesia at www.bi.go.id. World Bank, www.worldbank.com. Yahoo finance www.yahoofinace.com.. The data collection techniques used in this study are using documentation studies collecting and processing data from previous information relating to the issues studied. The data used in this research is secondary data that was taken and processed from Bank Indonesia, World Bank, and Yahoo Finance from 2001 to 2018.

CFA (Confirmatory Factor Analysis)

Furthermore, the analysis of the factors aimed at finding a way to summarize the information contained in the original variable (initial) into a set of new dimensions or variate (factor) with the formula:

Xi = Bi1 F1 + Bi2 F2 + Bi3 F3 +..... + Viμi

Where:

Xi = to-I variable that is done

Bij = partial regression coefficient for variable I in common factor to-J

Fj = Common factor to-I

Vi = a regression coefficient that is done for the to-I variable on a unique to-I factor

Mi = unique to-I variable factor

Description:

IDX = B1 SBI + b2 exchange rate + B3 INF + b4 JUB + b5 PDB + b6 OP + B7 PENG

Bij = partial regression coefficient for variable I in common factor to-J

Fj = Common factor to-I

Vi = the regression coefficient that is done for the to-I variable on the unique to-I factor

Mi = unique to-I variable factor

μi =Faktor Unik variable ke-i

ARDL Panel

The ARDL regression panel is used to obtain the estimated individual characteristics individually by assuming the presence of cointegration in the long-term lag of each variable. An autoreactivity Distributed Lag (ARDL) introduced by Pesaran et al. (2001). This technique examines each variable delay located on I (1) or I (0). Conversely, ARDL regression results are test statistics that can compare with two critical values of asymptotic.

Testing regression Panel with formulas:

IHSGit = α + β1 People's Chamait + β2 Inflasiit + β3 PDBit + β4 KURSit + β5 JUBit + β6 Oil Priceit + β7 Pengangguranit + E

Here's the regression panel formula by country:

IHSGINDONESIAt = α + β1 tribe of chamait + β2 Inflasiit + β3 PDBit + β4 KURSit + β5 JUBit + β6 Oil Priceit + β7 Pengangguranit + E

IHSGCHINAt = α + β1 Tribe of the Chamait + β2 Inflasiit + β3 PDBit + β4 KURSit + β5 JUBit + β6 Oil Priceit + β7 Pengangguranit + E

IHSGAUSTRAIAt = α + β1 tribe of chamait + β2 Inflasiit + β3 PDBit + β4 KURSit + β5 JUBit + β6 Oil Priceit + β7 Pengangguranit + E

Where:

SB: Interest rate (%)

RATES: Exchange rate (currency per country/US $)

INF: Indonesian, Chinese and Australian inflation rate (%)

JUB: Total money supply (%)

GDP: Gross domestic product (US $ billion)

OP: Oil Price (USD)

Png: Unemployment (millions of people)
€: Term Error
β: Regression coefficient
α: Constants
I: Number of observations
T: The amount of time

IV. Figures And Tables

Result *Confirmatory Factor Analysis*

Table 1. *Output* CFA KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.534
Bartlett's Test of Sphericity	Approx. Chi-Square	69.952
	df	21
	Sig.	.000

The method used in the analysis of this factor is the primary component method. From the output above, in the can, the value of Kaiser Mayer Olkin (KMO) amounted to 0534. This value indicates the data is already valid for further analysis with factor analysis. The cost of a Bartlett test is 69,952, with a significance value of 0.000 very far below 5%. A correlation matrix formed is an identity matrix, or in other words, the factor method used is excellent.

Next, to see which variables have the value communalities correlation above or below 0.5 in the know the following results.

Table 2. *Output* CFA
Communalities

	Initial	Extraction
SB	1.000	.812
INF	1.000	.768
KURS	1.000	.968
JUB	1.000	.861
PDB	1.000	.935
OL	1.000	.865
PENG	1.000	.935

Extraction Method: Principal Component Analysis.

Hasil analisis diatas berarti semakin besar *communalities* sebuah variabel, berarti semakin erat hubungannya dengan faktor yang terbentuk. Hasil *extraction* menunjukan secara individu seluruh variabel dinyatakan memiliki kontribusi yang melebihi 50% atau 0.5. namun kelayakan selanjutnya harus diuji dengan *Variance Explained*.

Table 3. Total Variance Explained

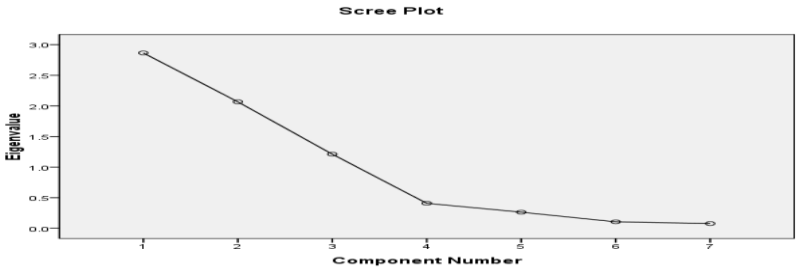
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.866	40.937	40.937	2.866	40.937	40.937	2.830	40.434	40.434
2	2.067	29.529	70.466	2.067	29.529	70.466	2.026	28.936	69.370
3	1.211	17.305	87.770	1.211	17.305	87.770	1.288	18.400	87.770
4	.409	5.839	93.609						
5	.264	3.766	97.375						
6	.106	1.518	98.893						
7	.077	1.107	100.000						

Extraction Method: Principal Component Analysis.

Based on the results of the total variance explained, it is known that there are only three components of the variable that factors affect the combined stock price index in Indonesia. Eigenvalues show the relative

importance of each element in calculating the variant to the seven variables in the analysis. From the table above, it appears that there are only three factors that form because the third factor has the total value of eigenvalue is still above 1, namely 2,866 for elements 1, 2,067 for Factor 2, and 1,211 for third consideration so that the factoring process should stop at 3 (three) factors only or two variables that will participate in the next analysis.

Table 4. *Output* CFA



If the Total Variance table explains the significant number of factors gained with the calculation of numbers, then the scree plot reveals it with a chart. It appears that from one to two factors (the line from the Component Number axis = 1 to 2), the chart direction decreases reasonably sharply. Similarly (from number 2 to number 3) Note that the decline occurs still very sharp, and from the number 3 to the number 4 is below the number 1 of the Y-axis (Eigenvalues). This shows that all three factors are best for summarizing the variables.

Table 5. *Output* CFA Component Matrix

	Component		
	1	2	3
SB	-.822	-.327	-.171
INF	.094	.871	-.001
KURS	.011	.320	.930
JUB	.918	.080	.108
PDB	.856	-.354	-.279
OL	.693	-.586	.205
PENG	.355	.790	-.430

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Once it is known that both factors are the most optimal amount, it can be seen in the Component Matrix table showing the distribution of the seven variables on the three factors formed while the numbers present in the table are the loading factor, which shows a significant correlation between a variable with coefficient 1, Factor 2 and Factor 3. The process Penentukan, which variable will go into which factor, is done by making an extensive comparison of correlation on each line.

Table 6. *Output* CFA Rotated Component Matrix

	Component		
	1	2	3
SB	-.761	-.416	-.245
INF	-.064	.836	.257
KURS	.024	.033	.983
JUB	.894	.222	.109
PDB	.882	-.085	-.389
OL	.800	-.474	.007

PENG	.174	.934	-.182

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 4 iterations.

Component Matrix results in the rotation process (Rotated Component Matrix) shows a brighter and more noticeable distribution of variables. It is seen that the first small Factor Loadings are increasingly minimized, and the significant loadings factor is frequently in the enlarge.

Table 7. *Output* CFA Component Transformation Matrix

Component	1	2	3
1	.981	.194	-.019
2	-.179	.938	.298
3	.076	-.289	.954

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Matrix Component Transformation results, visible figures in the diagonal, between component 1 with 1, element 2 with 2, Component 3 with 3. It looks at both data far above 0.5. This proves that the three factors (Component) that formed is right because it has the highest correlation. Based on the value of the matrix component is known from 7 elements.

ARDL Panel Test Results

Analysis panel with Auto-Regressive Distribution Lag (ARDL) test pooled data that is combined data cross-section (country) with Data time series (yearly), ARDL panel results are better compared with ordinary panels, because it is able to cointegrate the term Long and has the most appropriate distribution of lag with the theory, using the Eviews 10 software, obtained the following results.

Table 8.*Output* Panel ARDL

Dependent Variable: D(LNIHSG)
Method: ARDL
Date: 10/13/19 Time: 00:10
Sample: 2002 2017
Included observations: 48
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (1 lag, automatic): SB INF LNKURS JUB PDB OL PENG
Fixed regressors: C
Number of models evaluated: 1
Selected Model: ARDL(1, 1, 1, 1, 1, 1, 1, 1)
Note: final equation sample is more significant than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Long Run Equation				
INF	0.044104	0.070103	0.629130	0.5376
LNKURS	-4.108311	2.297372	-1.788265	0.0916
JUB	-0.019880	0.017110	-1.161865	0.2613
PDB	-0.012968	0.032931	-0.393806	0.6986
PENG	0.105149	0.113798	0.923995	0.3684

Short Run Equation

COINTEQ01	-0.679529	0.313825	-2.165313	0.0449
D(INF)	-0.061990	0.017508	-3.540582	0.0025
D(LNKURS)	0.619204	0.844750	0.733003	0.4735
D(JUB)	0.043072	0.030327	1.420234	0.1736
D(PDB)	-0.154172	0.149183	-1.033445	0.3159
D(PENG)	-0.310417	0.208741	-1.487088	0.1553
C	3.234530	1.591824	2.031965	0.0581

Mean dependent var	0.022255	S.D. dependent var	0.355078
S.E. of regression	0.220396	Akaike info criterion	-0.016346
Sum squared resid	0.825765	Schwarz criterion	1.271538
Log-likelihood	34.41682	Hannan-Quinn criteria.	0.475792

*Note: p-values and any subsequent tests do not account for model selection.

The ARDL Panel model received a model that has a cointegrated lag, where the primary assumption is that the value of the coefficient has a negative slope with a level of 5%. ARDL Panel Model Requirements: The cost is negative (-0.67) and is significant (0.04 < 0.05) then the model is accepted. Based on the model acceptance, the data analysis is done by the panel per country.

Analisis Panel Negara Indonesia
Table 9. *Output* Panel ARDL

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
COINTEQ01	-1.317416	0.042593	-30.93029	0.0001
D(INF)	-0.044310	0.000491	-90.25752	0.0000
D(KURS)	0.085002	0.055834	1.522419	0.2253
D(JUB)	0.046955	0.000392	119.6645	0.0000
C	2.725964	0.756082	3.605383	0.0366

Analisis Panel ARDL Negara China
Table 10. *Output* Panel ARDL

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
COINTEQ01	-0.866955	0.078822	-10.99887	0.0016
D(INF)	-0.010351	0.000346	-29.87904	0.0001
D(PDB)	0.002416	0.001175	2.056748	0.1319
D(PENG)	0.001339	0.082263	0.016281	0.9880
C	0.653449	0.101370	6.446143	0.0076

Analisis Panel ARDL Negara Australia
Table 11. *Output* Panel ARDL

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
COINTEQ01	-0.649386	0.028232	-23.00177	0.0002
D(INF)	-0.114718	0.001533	-74.81022	0.0000
D(PDB)	-0.098694	0.001618	-60.99155	0.0000
D(PENG)	-0.094629	0.009012	-10.50080	0.0018
C	0.426015	0.035423	12.02665	0.0012

Based on the overall results, it is known that the seven factors affecting the joint Stock price index in Indonesia, China and Australia, have been elected several factors that affect or more significantly affect the stock price index Combined.

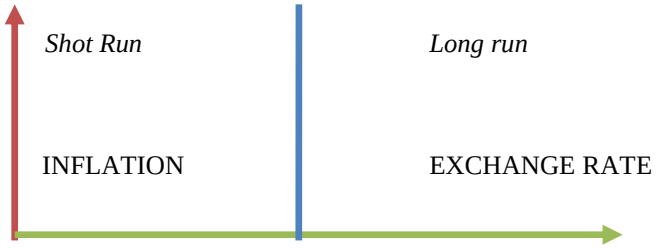
National ARDL Panel Indonesia, China, and Australia

Based on overall results, it is known that a significant long-term affects the stability of the joint-stock price index in the country of Indonesia, China, and Australia, i.e., interest, inflation, amount of money supply, GDP, oil price. Then in the short term, no one affects the stability of the stock price. Here's a summary of ARDL panel results:

Variable	Indonesia	China	Australia	*Short Run*	*Long Run*
Inflation	1	1	1	1	0
Exchange rate	0	0	0	0	1
Amount of money supply	1	0	0	0	0
Gdp	0	0	1	0	0
Unemployment	0	0	1	1	0

Source: Data processed authors, 2019

Here's a summary of the long-term stability of Indonesia, China, and Australia.



In the effective control of the state of Indonesia, China, and Australia. Australia (inflation, GDP, unemployment). Other countries, such as Indonesia's stock price control is done by inflation and the amount of money supply. China is still active in controlling the price of stocks through the stability of inflation. In the price control of the capital, monetary policy framework and macroeconomics are carried out with an approach based on the price of financial magnitude and the macroeconomic policy taken. According to Antoni (2010), unstable global economic growth also encourages inflation pressure for short periods. The uncontrolled rate of increase in price will deteriorate the inflation rate again, and it is not impossible to paralyze the country's economy. If viewed from a macro-angle of the economy, a high standard of inflation will reduce the competitiveness of a nation. Farsio & Fazel (2013) found that the stock market's response to macroeconomics depended on the state of the economy. Some of the stock market's reaction to unemployment news depends on the average unemployment rate in the previous year.

Hooker in Femininals (2012) found that inflation rates significantly affect the stock price. Increased inflation is relatively a negative signal for a financier in the capital market. Inflation increases company revenues and costs. If the increase in production costs is higher than the price increase that can be enjoyed by the company, then the company's profitability will fall. If economic growth improves, the purchasing power of the public will increase as well, and this allows the company to improve its sales. With the increasing journal of currency sales, the opportunity to gain profit will also increase (Prasetiono, 2010).

Indonesia, China, and Australia's national stability Control, inflation (Indonesia, China, and Australia) are seen from a short-run and long-run stability, where the inflation variable significantly controls the share price in the short term, but Not stable controlling the stock price in the long run. The designation of inflation as leading indicators of the country is also supported by the opinion of Almilia (2003), stating that a higher increase will result in the decline in the profitability of the company. It means imperfect information for traders on the stock exchange and resulting in a decrease in the share price in the company. Gan, an, et al. (2006), Hsing (2011), Dasgupta (2012), and Sirucek (2012) If there is a price increase, then the purchasing power of the public will decline, and the interest in investing will also decrease. As a result, the share price will decrease, and the stock price index will also fall. The research results of Pasaribu and Kowanda (2013) also reveal that the development of monetary indicators and macroeconomics has a significant and positive impact on the combined stock price index in both the short and long term.

V. Conclusion

Based on the results of the component value matrix is known that of 7 factors, then the appropriate to affect the joint-stock price index in the country of Indonesia is the three factors that come from. Component 1 most significant amount of money supply, component 2 most considerable inflation, and element three most considerable exchange rate. The leading indicator of State effectiveness in the effective control of the state of

Indonesia, China, and Australia. Australia (inflation, GDP, unemployment). Other countries, such as Indonesia's stock price control is done by increase and the amount of money supply. China is still active in controlling the price of stocks through the stability of inflation. Leading indicator of the effectiveness of variables in the control of security of Indonesia, China and Australia namely increase (Indonesia, China, and Australia) is seen from the stability of short-run and long-run, where the inflation variable significantly controls Share price in the short term only, but unstable controlling the share price in the long time.

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