

ARDL PANEL MODEL IN CONTROL OF EXCHANGE RATE SYSTEMS THROUGH POST-COVID-19 OPEN ECONOMY MODEL

Abdiyanto¹, Ronald Farel Siahaan², Rusiadi³, Ade Novalina⁴, Bhaktiar Efendi⁵, Lia Nazliaan Nasution⁶, Suhendi⁷, Diwayana Putri Nasution⁸

^{1,3-8}Lecturer of the Master of Economics Study Program, Universitas Pembangunan Panca Budi

²Students of the Master of Economics Study Program, Universitas Pembangunan Panca Budi

Email Coresponden : hajiabdiyanto@gmail.com

ABSTRACT

Destination from study this that is for test variable Interest Rates, Inflation , Total Money Supply and GDP how much big in take effect to EXCHANGE variable . And for knowing is panel level _ ethnic group interest , inflation , money supply , unemployment , investment , and GDP have an effect positive and significant to exchange rates in America, Australia, China, Canada , Indonesia, Japan , South Korea, Malaysia, Singapore, Russia and Thailand. Approach study this is study associative / quantitative with the Simultaneous model and the ARDL Panel where aim see linkages Among independent variables and dependent variables that spread panel in Top Major Exchange Rate countries in 11 APEC Countries. Study this conducted against 11 countries with exchange rate strongest in the APEC countries in the world (America, Australia, Malaysia, Singapore, South Korea, Japan , China, Indonesia, Canada , Russia , and Thailand). The ARDL Panel Analysis results show that the Leading Model Control indicators Exchange Rate System Through the Post -Covid-19 Open Economy Model, the Top Major Exchange Rates in Eleven Apec Countries (Varies) are JUB and GDP. this _ due to the results data processing , the ROE variable is variable that gives stable influence , ie _ effect on the inside period long nor period short in give influence significant to score exchange , which is assessed from level short run and long run stability in the table result .

Keywords: Exchange Rates , Covid 19, APEC Countries

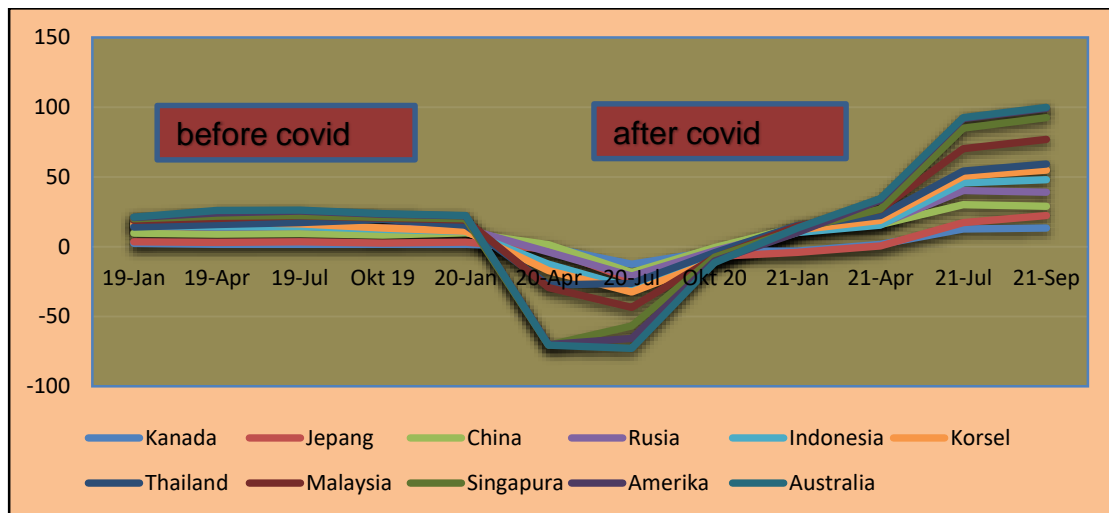
INTRODUCTION

A good economy in a country can look at well-being the people become reject measuring related with growth economy . Growth economy is increase score amount production goods and services counted by a country in _ period time certain to indicator economy like enhancement income national income _ per capita , amount more unemployment _ small than amount power work and decline level poverty . Growth economy too _ interpreted as more conditions _ good from a process of change in a manner continuously to economy a country.

Table 1.1 GDP (%) Jan 2019 to Sep 2021

GDP/Month	Canada	Japan	China	Russia	Indonesia	Carou sel	Thailand	Malaysi a	Singapor e	America	Australi a
Jan-19	2,3	1.18	6,3	5.06	0.34	1.43	-2.56	4,8	1,3	0.9	0.2
Apr-19	1,7	1.36	6	5.05	0.26	3,15	-1.71	4,5	1,6	2,2	1,9
Jul-19	1,7	1.86	5,9	5	0.01	1.89	1.04	4,8	0.2	3,2	0.7
Oct 19	1,8	0.83	5,8	4.95	-0.81	0.74	6,36	0.8	0.6	2,1	0.6
Jan-20	1,7	1.56	6,8	2.97	-2.15	0.2	4.46	3,6	1	1,9	0.4
Apr-20	-0.3	-1.41	3,2	-5.32	-8.64	-4.59	-10.3	-2	-41.2	0.3	-0.3
Jul-20	-12.6	-10.85	4,9	-2.48	-8.52	-3.03	6,28	-17.2	-13.3	-9.0	-7
Oct 20	-3,2	-3.91	6,5	-2.19	-4.48	-2.79	5,8	-3,4	0.2	-2,8	-1,1
Jan-21	-3,1	-0.9	18,3	-1.8	-2.39	1,9	3,33	-0.5	-2,4	-2,3	3,2
Apr-21	1,8	-1,3	15.5	0.17	-0.71	3,4	3,5	4,4	0.2	6,4	1,1
Jul-21	12,7	4,7	12,8	10.03	5,43	4,9	3,73	16,1	14,7	6,7	0.7
Sep-21	13,4	8,9	6,8	10.05	8.95	6,9	4,28	17,8	15,4	6,7	0.7

Source : <https://tradingeconomics.com/country-list/gdp-annual-growth-rate>



Source : Table 1.1

Figure 1.1 : Processed by the Author , (2021). Chart Product Domestic Gross (%) Jan 2019 to Sept 2021

Based on Tables and Graphs on could seen that occur significant decline in GDP in Japan , Canada , Malaysia, Indonesia, Singapore, South Korea and China in Q1 2020. China is the country that experienced the most GDP decline _ drastic . this _ caused by because China is center the world's largest contagion of Covid . China Bureau of Statistics report , Product domestic China's gross (GDP) contracted 6.8% in the period January-March if compared last quarter of 2019 .

The Covid-19 pandemic has influence the economies of world countries. In fact , from magnitude pandemic until make many countries experience recession economy. A number of countries are years this experience recession call just start from South Korea, Germany , Singapore, France, Malaysia, Japan, Italy, Canada , to the United States . Indonesia is also included in the list of countries that experienced it recession.

Growth economy throughout 2020 contracted up to -2.07%. this figure Becomes notes worst since incident crisis monetary 1998.



Figure 1.2 : Inflation (%) Jan 2019 to sept 2021

Based on Chart on could seen that Inflation in each country experienced a simultaneous decrease in March 2020. While Indonesia fell in April where _ previously level the inflation as much as 2.98 % changed to 2.86% in May , South Korea earlier level the inflation by 1% change down to 0.1% in April , Japan previously level the inflation as much as 0.1% fixed study the same number ie 0.1% in April , Iran earlier level the inflation as much as 22% change down to 19.8% in April . Singapore before level the inflation by 0.7% changing up to -0.1% in April . Malaysian before rate of -0.2% rose to -2.9% so did China 's rate earlier 4.3% fell to 3.3%. Decline Inflation in Indonesia is low this affected by the weakening Request consequence impact spread of Covid-19. So that supply goods permanent adequate and smooth chain distribution . this _ reflected in the dynamics component inflation . Core inflation declined influenced central bank consistency in direct expectation inflation on target and slow down Request domestic . Especially affected by the correction prices on some commodity consequence slow down Request as well as adequate supply .

Table 1.2 : Variable Data Inflation in 11 APEC Countries for the 2004-2020 period

No	Year	Canada	Japan	China	Russia	Indonesia	Carou sel	Thailand	Malaysia	Singapore	Americ a	Australia
		INF	INF	INF	INF	INF	INF	INF	INF	INF	INF	INF
1	2010	2.85	-1.9	6,68	14,29	6.96	2.74	7	7,27	1,1	1.17	1.17
2	2011	3,23	-1.67	8.07	24,46	3.79	1.28	8,2	5,41	1.05	2.09	6,25
3	2012	1.21	-0.76	2,33	8,9	4.03	1.25	7,42	1	0.47	1.92	1.86
4	2013	1.74	-0.33	2,16	5,32	8,38	1.02	6,28	0.17	-0.45	1.75	-0.12
5	2014	1.94	1.75	1.03	7,49	8.36	0.91	7,39	2.47	-0.27	1.89	1.48
6	2015	-0.88	2,15	-0.03	7,25	3.35	3,19	7,84	1.22	3.06	1.07	-0.55
7	2016	0.75	0.27	1,4	2.84	3.02	1.99	8,13	1.66	0.65	1.09	-0.53
8	2017	2.56	-0.23	4.23	5.35	3.61	2,22	10.98	3.78	3.01	1,9	3.74
9	2018	1.76	-0.1	3,5	9.99	3,13	0.48	16,48	0.67	3.35	2.36	1.89
10	2019	1.67	0.64	1.28	3.08	2.72	-0.92	13,9	0.06	-0.62	1.74	3,3
11	2020	0.83	0.71	0.67	0.89	1.68	1.25	14.82	-0.78	-2.92	1,2	0.7

Source : <https://databank.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG/1ff4a498/Popular-Indicators>

Based on table above _ is known that Rate inflation show fluctuation yes diverse from 2010 – 2020. In 2010 it happened increase as big caused by the crisis economy problem finance this started happened in japan and spread to part other countries of the world. Is known movement rate most visible inflation happened in Japan which in 2016 also happened increase inflation of 8.10% from 7.54% year before . Mexico rose by 4.44% from 1.53% year before , China experienced decline of -0.03% from 1.03% previously but in 2017 China _ experience increase that is of 4.23%, Indonesia experienced a decrease of 3.35% from 8.36% year previously , Turkey and Russia experience increase in 2018 by 16.48% and 9.99% .

Not only Indonesia, various countries around the world also experience decline inflation , and even many have experienced deflation . Because of the rate inflation this goes along with it with the economy in various countries that are still covered uncertainty . Another thing, ie exists decline sharp price commodity , incl price refined oil _ with escalation tension Among war United States (US) and China trade .

With explanation on so study this aim for analyze Control Exchange Rate System Through the Post -Covid-19 Open Economy Model Top Major Exchange Rate In Eleven Apec Countries (Varies).

MATERIALS & METHODS

ARDL Panel Regression

Panel Regression Testing with the formula:

$$\mathbf{KURS}_{it} = \alpha + \beta_1 \mathbf{INF}_{it} + \beta_2 \mathbf{JUB}_{it} + \beta_3 \mathbf{PDB}_{it} + \beta_4 \mathbf{INV}_{it} + \beta_5 \mathbf{SBI}_{it} + \beta_6 \mathbf{PEN}_{it} + e$$

The following is the panel regression formula based on country:

AMERICAN e	$\mathbf{EXCHANGE} = \alpha + \beta_1 \mathbf{INF}_{it} + \beta_2 \mathbf{JUB}_{it} + \beta_3 \mathbf{PDB}_{it} + \beta_4 \mathbf{INV}_{it} + \beta_5 \mathbf{SBI}_{it} + \beta_6 \mathbf{PEN}_{it} + e$
AUSTRALIAN e	$\mathbf{EXCHANGE RATE} = \alpha + \beta_1 \mathbf{INF}_{it} + \beta_2 \mathbf{JUB}_{it} + \beta_3 \mathbf{PDB}_{it} + \beta_4 \mathbf{INV}_{it} + \beta_5 \mathbf{SBI}_{it} + \beta_6 \mathbf{PEN}_{it} + e$
MALAYSIA	$\mathbf{KURS} = \alpha + \beta_1 \mathbf{INF}_{it} + \beta_2 \mathbf{JUB}_{it} + \beta_3 \mathbf{PDB}_{it} + \beta_4 \mathbf{INV}_{it} + \beta_5 \mathbf{SBI}_{it} + \beta_6 \mathbf{PEN}_{it} + e$
CHINESE	$\mathbf{EXCHANGE} = \alpha + \beta_1 \mathbf{INF}_{it} + \beta_2 \mathbf{JUB}_{it} + \beta_3 \mathbf{PDB}_{it} + \beta_4 \mathbf{INV}_{it} + \beta_5 \mathbf{SBI}_{it} + \beta_6 \mathbf{PEN}_{it} + e$
INDONESIAN e	$\mathbf{EXCHANGE} = \alpha + \beta_1 \mathbf{INF}_{it} + \beta_2 \mathbf{JUB}_{it} + \beta_3 \mathbf{PDB}_{it} + \beta_4 \mathbf{INV}_{it} + \beta_5 \mathbf{SBI}_{it} + \beta_6 \mathbf{PEN}_{it} + e$
$\mathbf{EXCHANGE}_t$	$= \alpha + \beta_1 \mathbf{INF}_{it} + \beta_2 \mathbf{JUB}_{it} + \beta_3 \mathbf{PDB}_{it} + \beta_4 \mathbf{INV}_{it} + \beta_5 \mathbf{SBI}_{it} + \beta_6 \mathbf{PEN}_{it} + e$
KORSEL	$\mathbf{EXCHANGE} = \alpha + \beta_1 \mathbf{INF}_{it} + \beta_2 \mathbf{JUB}_{it} + \beta_3 \mathbf{PDB}_{it} + \beta_4 \mathbf{INV}_{it} + \beta_5 \mathbf{SBI}_{it} + \beta_6 \mathbf{PEN}_{it} + e$
SINGAPORE $\beta_6 \mathbf{PEN}_{it} + e$	$\mathbf{EXCHANGE RATE} = \alpha + \beta_1 \mathbf{INF}_{it} + \beta_2 \mathbf{JUB}_{it} + \beta_3 \mathbf{PDB}_{it} + \beta_4 \mathbf{INV}_{it} + \beta_5 \mathbf{SBI}_{it} + \beta_6 \mathbf{PEN}_{it} + e$
CANADIAN e	$\mathbf{EXCHANGE} = \alpha + \beta_1 \mathbf{INF}_{it} + \beta_2 \mathbf{JUB}_{it} + \beta_3 \mathbf{PDB}_{it} + \beta_4 \mathbf{INV}_{it} + \beta_5 \mathbf{SBI}_{it} + \beta_6 \mathbf{PEN}_{it} + e$
RUSSIAN	$\mathbf{EXCHANGE At} = \alpha + \beta_1 \mathbf{INF}_{it} + \beta_2 \mathbf{JUB}_{it} + \beta_3 \mathbf{PDB}_{it} + \beta_4 \mathbf{INV}_{it} + \beta_5 \mathbf{SBI}_{it} + \beta_6 \mathbf{PEN}_{it} + e$
THAILAND $it + \beta_6 \mathbf{PEN}_{it} + e$	$\mathbf{EXCHANGE exchange rate} = \alpha + \beta_1 \mathbf{INF}_{it} + \beta_2 \mathbf{JUB}_{it} + \beta_3 \mathbf{PDB}_{it} + \beta_4 \mathbf{INV}_{it} + \beta_5 \mathbf{SBI}_{it} + \beta_6 \mathbf{PEN}_{it} + e$

Where:

$\mathbf{EXCHANGE}$ = Dollar exchange rate (US\$)

\mathbf{INF} = Inflation (%)

\mathbf{JUB} = Money supply M2, (%)

\mathbf{GDP} = Gross Domestic Product (%)

\mathbf{INV} = Investment

\mathbf{SBI} = Central bank interest (%)

\mathbf{PEM} = Unemployment

ϵ : error term

β : regression coefficient

α : constant

i : number of observations (11 countries)

t : the amount of time 10 years

RESULTS

ARDL Panel Analysis Results

Table 1.4 : ARDL Panel Test Results

Dependent Variable: D(EXCHANGE)
 Method: ARDL
 Date: 09/08/22 Time: 15:18
 Sample: 2011 2020
 Included observations: 109
 Maximum dependent lag: 1 (Automatic selection)
 Model selection method: Akaike info criterion (AIC)
 Dynamic regressors (1 lag, automatic): INF INV JUB PDB PENG
 Fixed regressors: C
 Number of models evaluated : 1
 Selected Model: ARDL(1, 1, 1, 1, 1, 1)
 Note: final equation sample is larger than selection sample

Variables	coefficient	std. Error	t-Statistics	Prob.*
Long Run Equation				
INF	374.3352	517.6201	0.723185	0.4740
INV	156.7216	212.7453	0.736663	0.4659
JUB	372.6346	505.3602	0.737364	0.4654
GDP	-2370.160	3218.279	-0.736468	0.4660
Peng	-709.1534	925.5924	-0.766162	0.4483
Short Run Equations				
COINTEQ01	-0.042252	0.039302	-1.075053	0.0289
D(INF)	-141.3756	144.2226	-0.980260	0.3332
D(INV)	452.6370	455.2697	0.994217	0.3264
D(JUB)	172.2150	171.1708	1.006100	0.3207
D(GDP)	466.8427	465.2700	1.003380	0.3220
D(PENG)	270.9945	281.4480	0.962858	0.3417
C	1497606	1572,392	0.952438	0.3469
Mean dependent var	384.0385	SD dependent var		4906931
SE of regression	1968.857	Akaike info criterion		5.032574
Sum squared residue	1.47E+08	Schwarz criterion		6.937360
Likelihood logs	-219.9545	Hannan-Quinn criter .		5.806117

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

Source : Eviews 2020 output

ARDL Panel models are accepted if have cointegrated lag , where assumption mainly is coefficient value has a negative slope with level significant 5%. Results above show that requirements for the ARDL Panel model used already fulfilled : with value negative , namely -0.04 and significant with prob value < 0.05, ie worth 0.2891, then could stated that the ARDL panel model used in study this accepted .

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Table 1.5 Ardl Panel Output Results

Variable	ENG	CHIN	KANA	MALAY	JAPAN	LION	COR	US	AUS	THAI	RUS	Short run
INF	+	+	+	-	-	-	+	+	-	-	-	
INV	-	-	-	+	-	-	+	-	-	-	+	
JUB	-	+	+	-	+	-	+	-	+	+	+	
GDP	-	-	+	+	-	+	-	+	+	+	+	
Peng	-	+	-	-	+	+	+	-	-	+	+	
Cointeg	-	+	-	-	+	-	+	-	-	+	-	

data is processed by the researcher Year 2022

From the table above could is known that the Leading Model Control indicators Exchange Rate System Through the Post -Covid-19 Open Economy Model, the Top Major Exchange Rates in Eleven Apec Countries (Varies) are JUB and GDP. this _ due to the results data processing , the variables JUB and PDB are variable that gives stable influence , ie _ effect on the inside period long nor period short in give influence significant to score exchange , which is assessed from level short run and long run stability in the table result .

CONCLUSION

Based on results analysis and discussion that has been conducted with use method simultaneous could concluded : Based on results estimate show that $R^2 = 0.125369$ which means that variable SBI, INF, JUB and PDB able explaining the EXCHANGE of 12.5% and and the rest of 87.5% EXCHANGE influenced by other variables outside estimate in models. Is known that SBI has an effect positive and significant to the EXCHANGE in study this . INF effect positive and significant to the EXCHANGE in study this . JUB is influential negative and no significant to the EXCHANGE in study this . GDP matters negative and no significant to the EXCHANGE in study this . Based on results estimate above _ could show that $R^2 = 0.088783$ which is meaningful that the variables PENG, INV and EXCHANGE capable explaining GDP of 8.8% and the rest 91.2% of GDP is influenced by other variables outside estimate in models. PEM is influential negative and significant to GDP in study this . INV effect negative and no significant to GDP in study this . stated that EXCHANGE effect positive , however no significant to GDP in study this .

In the ARDL panel model can be concluded that the Leading Model Control indicators Exchange Rate System Through the Post -Covid-19 Open Economy Model Top Major Exchange Rates In Eleven Apec Countries (Varies) including India, China, Canada , Malaysia, Japan , Singapore, Korea, America, Australia, Thailand and Russia . With thus , in panel it turns out all variable namely (INFLATION, INVESTMENT, TOTAL MONEY SUPPLY, GDP, and UNEMPLOYMENT) are able become a leading

The 1st Proceeding of The International Conference on Economics and Business

Vol.1, No.1 Januari-Juni 2022

e-ISSN: 2963-3370; p-ISSN: 2963-3656, Hal 49-57

indicator in affect the Exchange Rate Through the Post -Covid-19 Open Economy Model Top Major Exchange Rate In Eleven Apec Countries (Varies) in the short run and long run. But the Leading Model Control indicators Exchange Rate System Through the Post -Covid-19 Open Economy Model, the Top Major Exchange Rates in Eleven Apec Countries (Varies) are JUB and GDP. this _ due to the results data processing , the variables JUB and PDB are variable that gives stable influence , ie _ effect on the inside period long nor period short in give influence significant to score exchange , which is assessed from level short run and long run stability in the table result .

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