RELATIONSHIP BETWEEN EXCHANGE RATE (CHINA, JAPAN, SINGAPORE, USA, AND EUROPEAN UNION) AND RUPIAH EXCHANGE RATE USING VECTOR AUTOREGRESSIVE METHOD

Sarton Sinambela

Lecturer, Post Graduate Prog. Master of Management Tantular University, Jakarta, Indonesia

sartonsinambela@yahoo.com

Abstract

The exchange rate is an agreement of current or future payments between currencies of two country or region. International trade relations can affect a country's currency against another otherwise known as a contagious effect. Vector Autoregressive (VAR) Method is a method that can be used to detect such infectious effects. In this study, the VAR method is used to determine the infectious effects of exchange rates between countries which often trades with Indonesia, for example China, Japan, Singapore, the United States and the European Union. The data used is daily data from January 2016 to October 2016. After collected, then the data is analyzed to find out whether the data is stationary or not. In this study the data is not stationary at the level, done first data differentiation process, cointegrated data which means has a long-term relationship, in the Vector Error Correction test Model (VECM) rate data can be used for 38 days. In Impulse Response Testing exchange rates data of each country experienced a shock at the end of the period except for the Japan exchange rate and for the variance decomposition of the exchange rate to see the percentage of the exchange rate relation.

Keywords: Exchange rate, Rupiah exchange rate, International trade, Impulse Response shock

INTRODUCTION

The advanced technology development led to a more open economic system between countries. This economy brings an impact to international trade between countries in the world. International trade is an important element of the globalization process. Opening trade with various countries in the world will provide advantages and bring domestic economic growth,

both directly affect the resources allocation and efficiency in form of increasing the investment level.

Exchange rate is one of the important element in an open economy, because it is determined by the balance between demand and supply that occurs in the market, considering the great impact on the current account and other macroeconomic variables. Exchange rate can be used as a tool to measure the economic condition of a country. A stable growth in currency values indicates that the country has relatively good or stable economic conditions

In the development of research methods there are many uses of Vector Auto Regression (VAR) method to see the interrelationship between exchange rate variables. This method was introduced by Sims in the early 1980s as a critique of complex simultaneous econometric models (Darwanto, 2007). Some research related to using Vector Autoregressive (VAR) method has been done

The data will be analyzed by using multiple regression analysis. Analysis of residual testing (from multiple regression model) with Granger Residual Test approach is used to ensure no spurious regression occurs. Furthermore, data analysis by Johannsen Cointegration Test is used to test the existence of long-term equilibrium relationship between macroeconomic variables and JCI. The final stage of data analysis is done by testing the vector error correction model (VECM) and Granger Causality Test which aims to test the possibility of biderectional (two-way direction) relationship between macroeconomic variables and IHSG.

Researcher wants to see and analyze the relationship between exchange rate which have strong relation with trade in Indonesia.

To know the existence of exchange rate relationship in international trade, this research analyzes five countries currency that related to trade in Indonesia

Research Issues

The research issues that will be discussed in this research are as follows:

1. How are the exchange rates of China, Japan, Singapore, United States, and the European Union in descriptive?

2. How is the relationship between China, Japan, Singapore, United States and the European Union during the research period from January 2016 to December 2016 using Vector Autoregressive (VAR)?

3. Is there any cointegration relationship between exchange rates of China, Japan, Singapore, United States and the European Union during the period of January 2016 to December 2016?

4. How Impulse Response shock relationship between China, Japan, Singapore, United States, and the European Union during the research period January 2016 to December 2016?

THEORETICAL BASIS

Understanding Exchange Rates

The exchange rate between two countries is the price of the currency used by the people of a countries to mutually trade each other (Mankiw, 2012). Meanwhile, according to Sukirno (2013) the foreign exchange rate indicates the price or the value of a country's currency that is expressed in the currency of another country, can also be defined as the amount of domestic money needed, the amount of rupiah needed to obtain a unit of foreign currency.

Then according to Krugman (2005) the exchange rate or exchange rate is the price of a currency against other currencies. Exchange rates play a very important role in spending decisions, because exchange rates allow us to translate prices from different countries into the same language. The exchange rate can appreciate and can also depreciate. Appreciation is an increase in the value of foreign currency that can be purchased. While depreciation is a decrease in the value of the currency that is measured by the amount of foreign currency that can be earned (Mankiw, 2012).

Based on the exchange rate policy that applied in a country, exchange rate system in general can be classified into four categories(Frandiko, 2011), namely:

1. Fixed Exchange Rate System
2. Free Floating Exchange Rate System
3. Managed Flat Exchange Rate System
4. Pegged Exchange Rate System

RESEARCH METHOD

Research method is a step and procedure taken in collecting data or information to be process and analyze in order to get explanation, answer or a solving to principal problems to achieve the purpose of this study that is explanative. According Gujarati (2006) this study used econometrics techniques, which is a combination of economic theory, mathematics and statistical measurement. The data used is daily data from January 2016 to October 2016. Then continued by determine an identification of variables as the determination and limitation of data to be processed in the model. To analyze model, the introduction to the Vector Autoregressive model approach is adopted. According to Agus Widarjono (2016: 4) most econometric models that are built whether single or double equations, more than one equation is called a structural or theoretical equation. Econometric experts have developed a model that can help solve the problem above. That equation model is called Vector Autoregressive in short to VAR. All the data processing and testing in this study using EViews 9 software program.

ANALYSIS AND DISCUSSION

Table 1. Test Results Unit Root (Augmented Dickney-Fuller Test) at Level
Value of t-statistic and critical values Variable

Value of t-statistic and critical values	Variable				
	China	Japan	Singapore	United States	European Union
t-Statistic	-1.989369	-1.668615	-1.132452	-2.655009	-1.538904
Critical values 1%	-3.45673	-3.45673	-3.45673	-3.45673	-3.45695
Critical values 5%	-2.873045	-2.873045	-2.873045	-2.873045	-2.873142
Critical values 10%	-2.572976	-2.572976	-2.572976	-2.572976	-2.573028
Probability	0.2915	0.446	0.7033	0.0835	0.5123

Source: E-views data 9

Based on the unit root test results as shown in Table 1 above, it is found that the variables of China Exchange Rate, Japan, Singapore, the United States and the Erope Union have a root unit at the ADF value at the data level, because the t-statistic value is less than the critical value so there is no reason to reject Ho, which means the time series data is not stationary. To get the data stationary, then in the next stage is testing unit root on the first difference data.

Table 2. The Augmented Dickney-Fuller Test at the first differentiation level

Value of t-statistic and critical values	Variable				
	China	Japan	Singapore	United States	European Union
t-Statistic	-17.00259	-17.39479	-17.30285	-16.33392	-10.35903
Critical values 1%	-3.45684	-3.45684	-3.45684	-3.45684	-3.45695
Critical values 5%	-2.873093	-2.873093	-2.873093	-2.873093	-2.873142
Critical values 10%	-2.573002	-2.573002	-2.573002	-2.573002	-2.573028
Probability	0.000	0.000	0.000	0.000	0.000

Source: Data processed with E-views 9

Table 3. Cointegration Test Results With Johansen's Cointegration Test Method

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.380015	427.5334	69.81889	0.0001
At most 1 *	0.313027	310.8867	47.85613	0.0001
At most 2 *	0.284051	219.2745	29.79707	0.0001
At most 3 *	0.26706	137.7426	15.49471	0.0001
At most 4 *	0.224174	61.93387	3.841466	0
Trace test indicates 5 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.380015	116.6466	33.87687	0
At most 1 *	0.313027	91.61226	27.58434	0
At most 2 *	0.284051	81.53186	21.13162	0
At most 3 *	0.26706	75.80875	14.2646	0
At most 4 *	0.224174	61.93387	3.841466	0
Max-eigenvalue test indicates 5 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

China Exchange Rate (CNY), the Japanese Exchange Rate (JPY), the Singapore Exchange (SGD), the United States (USD) Exchange Rate, and the EU Exchange Rate (EURO) as we discussed previously are not stationary at the level, but stationary at the first cointegrated variables. The existence of cointegration in the variable of the exchange rate means a long-term relationship or balance between the exchange rate variables. In the short term there may be an imbalance (disequilibrium). This imbalance that we often encounter in economic behavior (desired) is not necessarily the same as what actually happened. The difference between what is desired economic behavior and what happened required an adjustment (adjustment). This

model adjusting and make corrections for imbalances it is called an error correction model (ECM).

Vector Error Correction Model

Engle and Granger show even the *time series* data is often not stationary at some level and called nonstasionerity data, but a linear combination between two or more nonstationer data becomes stationary. Acccording to them this time series data that not stationary is called cointegrated. The VECM model is used in a non structural VAR model when the time series data is not stationary at the level, but stationary in the difference data and cointegrated, that indicating a theoretical relation between the variables. Realize the existence of this cointegration so VECM model which is a non structural VAR model is called a restricted VAR model. VACM spesification restricts long-term behavioral relationships between existing variables

The VECM specification restricts long-term behavioral relationships between existing variables in order to be to converge into cointegration relationships while still allowing dynamic changes in the short run. This cointegration terminology is known as error correction because when there is a deviation on long term balance will be gradually corrected through short-term, short-term adjustments (Agus Widarjono,2016,334-335).

Table 4. Vector Error Correction Model

Vector Error Correction Estimates	
Date: 08/07/17 Time: 15:40	
Sample (adjusted): 41 248	
Included observations: 208 after adjustments	
Standard errors in ( ) & t-statistics in [ ]	
Cointegrating Eq:	CointEq1
D(CNY(-1))	1.000000
D(JPY(-1))	1.058940
	(0.31844)
	[3.32544]
D(SGD(-1))	0.002306
	(0.00645)
	[0.35772]

D(USD(-1))	-0.059111			
	(0.00236)			
	[-25.0624]			
D(EUR(-1))	-0.072964			
	(0.00340)			
	[-21.4500]			
C	0.352567			

Error Correction:	D(CNY,2)	D(JPY,2)	D(SGD,2)	D(USD,2)	D(EUR,2)
CointEq1	8.373603	1.623024	124.8108	65.73151	174.8805
D(CNY(-1),2)	-8.437664	-1.404665	-116.6525	-60.59578	-151.2942
D(CNY(-2),2)	-7.062989	-1.214919	-108.3200	-50.61496	-131.5121
D(CNY(-3),2)	-7.680518	-1.230525	-107.0908	-56.32930	-131.6740
D(CNY(-4),2)	-8.761589	-1.246118	-108.5092	-65.20424	-135.6640
D(CNY(-5),2)	-8.724639	-1.241259	-104.5547	-69.71941	-124.3392
D(CNY(-6),2)	-7.407378	-1.093779	-98.50083	-59.29308	-120.5736
D(CNY(-7),2)	-7.169796	-1.159529	-89.97655	-54.81084	-121.1662
D(CNY(-8),2)	-5.974022	-1.007032	-81.88958	-48.61194	-108.0864
D(CNY(-9),2)	-4.762573	-0.934398	-73.73685	-39.63282	-95.04243
D(CNY(-10),2)	-4.482329	-0.902932	-73.22071	-36.31769	-94.90992
D(CNY(-11),2)	-3.948932	-0.831751	-69.24418	-33.43616	-92.49392
D(CNY(-12),2)	-4.339294	-0.885326	-68.40609	-35.73950	-92.11414
D(CNY(-13),2)	-3.853145	-0.778643	-62.85296	-32.31878	-84.83131
D(CNY(-14),2)	-3.532816	-0.790184	-61.09621	-26.73849	-84.21194
D(CNY(-15),2)	-3.026336	-0.693103	-57.79015	-24.08532	-76.85309
D(CNY(-16),2)	-3.969649	-0.740788	-60.64923	-31.11540	-78.62769
D(CNY(-17),2)	-3.993426	-0.722449	-60.61671	-30.84771	-77.08811
D(CNY(-18),2)	-3.798317	-0.750559	-58.89703	-29.25071	-71.81331
D(CNY(-19),2)	-3.466141	-0.688494	-58.98046	-27.18024	-68.82912
D(CNY(-20),2)	-3.757172	-0.706107	-57.52216	-28.05653	-67.70646
D(CNY(-21),2)	-2.872246	-0.571490	-49.80468	-23.86903	-53.93881
D(CNY(-22),2)	-1.591086	-0.452061	-42.41429	-13.72331	-40.88835
D(CNY(-23),2)	-2.186355	-0.461796	-46.05027	-18.74539	-49.42909
D(CNY(-24),2)	-3.399922	-0.450699	-45.85169	-29.07818	-53.93117
D(CNY(-25),2)	-3.862824	-0.422043	-44.89329	-34.01005	-48.95296
D(CNY(-26),2)	-3.010444	-0.272675	-38.30982	-26.64923	-37.08223

D(CNY(-27),2)	-2.732105	-0.239721	-33.13875	-24.04718	-31.65759
D(CNY(-28),2)	-1.617953	-0.208458	-25.74394	-16.00919	-22.70268
D(CNY(-29),2)	-2.087876	-0.266990	-25.89028	-17.03822	-24.09476
D(CNY(-30),2)	-1.748765	-0.195804	-21.12254	-16.19878	-16.16808
D(CNY(-31),2)	-1.541569	-0.192843	-19.41385	-11.16810	-17.83359
D(CNY(-32),2)	-1.169522	-0.149672	-15.59477	-9.297126	-15.65398
D(CNY(-33),2)	-1.253331	-0.100819	-12.48412	-10.12790	-9.734434
D(CNY(-34),2)	-0.865706	-0.041674	-9.227348	-8.241847	-4.038592
D(CNY(-35),2)	-0.323667	-0.004227	-5.111909	-3.031572	-1.984914
D(CNY(-36),2)	-0.203071	-0.024955	-4.381048	-3.302822	-0.432097
D(CNY(-37),2)	-0.978368	-0.071271	-8.248086	-8.680887	-2.527101
D(CNY(-38),2)	-1.011207	0.006025	-7.082702	-10.77510	-4.420119
D(JPY(-1),2)	-9.387892	-2.342549	-145.6136	-61.48472	-211.2462
D(JPY(-2),2)	-11.32907	-2.862925	-147.4469	-67.13232	-221.5008
D(JPY(-3),2)	-6.410306	-2.049028	-134.5679	-40.46862	-158.3131
D(JPY(-4),2)	-6.169509	-2.280546	-132.4113	-28.63558	-165.7012
D(JPY(-5),2)	-8.822521	-2.379619	-137.4653	-37.35646	-193.5480
D(JPY(-6),2)	-9.285491	-2.161307	-138.4102	-45.73311	-170.6109
D(JPY(-7),2)	-8.428489	-1.730971	-143.1674	-47.56220	-159.8246
D(JPY(-8),2)	-12.23918	-2.371857	-147.2742	-72.63479	-187.3205
D(JPY(-9),2)	-12.51351	-2.005576	-144.0954	-83.81373	-173.2198
D(JPY(-10),2)	-8.266617	-1.737353	-111.4984	-59.19137	-127.5802
D(JPY(-11),2)	-4.150633	-1.651265	-99.18244	-25.48091	-107.3622
D(JPY(-12),2)	-3.742245	-1.375797	-92.77922	-11.90191	-113.7347
D(JPY(-13),2)	-3.429970	-1.403632	-76.24348	-18.73031	-91.29010
D(JPY(-14),2)	-0.509165	-0.866885	-65.93237	8.946813	-60.68612
D(JPY(-15),2)	-1.790474	-0.817909	-63.98157	0.745887	-77.09003
D(JPY(-16),2)	-0.808622	-0.776171	-49.83652	5.348095	-66.80533
D(JPY(-17),2)	-3.070635	-0.779133	-57.55143	-7.072801	-51.52236
D(JPY(-18),2)	-2.891865	-0.373578	-45.44654	-15.38466	-35.96570
D(JPY(-19),2)	1.918121	-0.322773	-10.67706	30.59392	-10.15109
D(JPY(-20),2)	3.228037	-0.387546	-11.09646	42.93215	12.82404
D(JPY(-21),2)	3.061847	-0.153360	-9.028038	26.62723	4.476586
D(JPY(-22),2)	1.308224	-0.382637	-10.97949	28.74965	-15.40062
D(JPY(-23),2)	5.281787	-0.014483	6.089226	45.77705	20.11758
D(JPY(-24),2)	7.208804	0.097926	18.93415	58.81541	27.06643
D(JPY(-25),2)	5.461026	-0.070133	9.789939	55.09967	-6.723709
D(JPY(-26),2)	0.830866	-0.049369	-0.276320	16.08347	-32.14641

D(JPY(-27),2)	5.408671	0.420567	21.69402	33.51714	26.95843
D(JPY(-28),2)	3.071882	0.289235	9.045107	29.76551	16.76437
D(JPY(-29),2)	1.603250	0.195965	17.10803	4.268326	16.60671
D(JPY(-30),2)	7.520790	0.798768	40.78756	53.22069	61.84142
D(JPY(-31),2)	8.456419	0.359621	37.40852	55.20399	55.16141
D(JPY(-32),2)	5.323415	0.552379	24.36957	33.11907	27.39791
D(JPY(-33),2)	4.008940	0.069260	20.96257	20.43978	-4.885154
D(JPY(-34),2)	5.677406	0.288752	30.92686	38.43862	14.02169
D(JPY(-35),2)	4.180169	0.251013	20.88507	20.48897	17.07909
D(JPY(-36),2)	3.218621	0.384294	19.74456	27.78220	8.533785
D(JPY(-37),2)	3.981349	0.256654	26.68326	25.31285	41.82623
D(JPY(-38),2)	5.676280	0.620550	19.79445	35.18389	58.29588
D(SGD(-1),2)	-0.115445	-0.008156	-1.685590	-1.274621	-1.294155
D(SGD(-2),2)	-0.155244	-0.016621	-1.679576	-1.106421	-2.451145
D(SGD(-3),2)	-0.135971	-0.017292	-1.378039	-0.456538	-1.541982
D(SGD(-4),2)	-0.027798	-0.002657	-0.980006	-0.305579	0.273688
D(SGD(-5),2)	0.051866	0.006183	-1.068108	0.590834	-0.067423
D(SGD(-6),2)	-0.248435	-0.031567	-2.151947	-1.541665	-2.134587
D(SGD(-7),2)	-0.205025	-0.005605	-1.705033	-1.823334	-0.827484
D(SGD(-8),2)	-0.122880	-0.010349	-1.385331	-0.697744	-0.848176
D(SGD(-9),2)	-0.131073	-0.012443	-1.295672	-0.831039	-0.906518
D(SGD(-10),2)	-0.159699	-0.004527	-1.215296	-1.240859	-0.707921
D(SGD(-11),2)	-0.141416	-0.010357	-1.133836	-1.082969	-0.495370
D(SGD(-12),2)	-0.200339	-0.004281	-0.979555	-1.416970	-0.195140
D(SGD(-13),2)	-0.081772	-0.001545	-0.795287	-0.760712	0.063419
D(SGD(-14),2)	-0.195515	-0.011391	-1.070992	-1.331226	-1.204467
D(SGD(-15),2)	-0.312453	-0.015657	-1.141987	-2.564374	-0.737366
D(SGD(-16),2)	-0.086432	0.014344	0.072106	-0.792185	1.604815
D(SGD(-17),2)	0.058214	0.012023	0.922781	0.254006	2.150168
D(SGD(-18),2)	0.191163	0.016849	1.252591	1.268895	2.190261
D(SGD(-19),2)	-0.054130	-0.011549	0.173994	-0.554450	0.168815
D(SGD(-20),2)	-0.050539	-0.007656	-0.078843	-0.938687	-0.354455
D(SGD(-21),2)	-0.110550	-0.021259	-0.508084	-0.788244	-1.456027
D(SGD(-22),2)	-0.071353	-0.022060	-0.529388	-0.379522	-1.608084
D(SGD(-23),2)	-0.030618	-0.014241	-0.075863	-0.067476	-0.698904
D(SGD(-24),2)	-0.001082	-0.014728	-0.071131	0.292425	-0.060541
D(SGD(-25),2)	0.028167	-0.011502	-0.082844	0.703427	0.154810
D(SGD(-26),2)	0.040766	-0.019902	-0.782862	0.642008	-0.661303

D(SGD(-27),2)	-0.209579	-0.034923	-1.916811	-0.961409	-2.351275
D(SGD(-28),2)	-0.307914	-0.031240	-1.993713	-2.105144	-2.591135
D(SGD(-29),2)	-0.028512	-0.011908	-0.967417	0.314902	-1.003599
D(SGD(-30),2)	-0.030831	-0.017858	-1.071097	0.097918	-1.160604
D(SGD(-31),2)	-0.057908	-0.010228	-1.288195	-0.298928	-1.142462
D(SGD(-32),2)	-0.188245	-0.028563	-1.813198	-1.136215	-1.963544
D(SGD(-33),2)	-0.166854	-0.011756	-1.318616	-1.063993	-1.050813
D(SGD(-34),2)	-0.071256	-0.006183	-0.959297	-0.193703	-0.107158
D(SGD(-35),2)	-0.012230	0.001468	-0.706567	0.204256	0.080882
D(SGD(-36),2)	-0.090463	-0.000504	-0.618158	-0.813091	0.145373
D(SGD(-37),2)	-0.039382	0.001368	-0.408415	-0.575673	0.521873
D(SGD(-38),2)	-0.036590	-0.013897	-0.378024	0.108784	-0.757756
D(USD(-1),2)	0.466273	0.080049	6.825311	2.939849	8.538593
D(USD(-2),2)	0.332543	0.058778	6.124197	2.072626	6.957279
D(USD(-3),2)	0.414627	0.069523	6.185510	2.374105	7.399466
D(USD(-4),2)	0.521391	0.063531	6.342393	3.627831	7.271747
D(USD(-5),2)	0.444337	0.050339	5.842448	3.435703	5.781598
D(USD(-6),2)	0.419814	0.057177	5.682393	3.136100	6.241470
D(USD(-7),2)	0.385058	0.046433	4.687084	2.904540	6.088805
D(USD(-8),2)	0.318842	0.049746	4.332634	2.545548	5.510966
D(USD(-9),2)	0.217265	0.033259	3.673775	1.937881	4.359677
D(USD(-10),2)	0.209597	0.032994	3.570014	1.830245	4.447964
D(USD(-11),2)	0.098755	0.026364	3.057134	1.083064	3.990103
D(USD(-12),2)	0.167800	0.039313	2.982222	1.340732	4.289521
D(USD(-13),2)	0.059126	0.020588	2.345216	0.577352	3.396116
D(USD(-14),2)	0.103633	0.031061	2.521246	0.499438	3.872836
D(USD(-15),2)	0.060708	0.017541	2.308777	0.659140	2.829649
D(USD(-16),2)	0.153678	0.023124	2.506345	1.053194	3.119134
D(USD(-17),2)	0.154105	0.029420	2.644454	1.272967	3.060261
D(USD(-18),2)	0.098675	0.022482	2.445338	0.786330	2.802935
D(USD(-19),2)	0.177265	0.039138	2.990069	1.313502	3.589298
D(USD(-20),2)	0.198083	0.033615	3.109296	1.570876	3.201277
D(USD(-21),2)	0.134794	0.027926	2.620626	1.232759	2.394061
D(USD(-22),2)	-0.021985	0.016412	1.789605	-0.155328	1.412557
D(USD(-23),2)	0.066135	0.025695	2.406795	0.508221	2.324980
D(USD(-24),2)	0.147421	0.021116	2.539555	1.413004	2.380274
D(USD(-25),2)	0.298265	0.031080	2.853207	2.295662	2.985051
D(USD(-26),2)	0.221021	0.016649	2.506707	1.680345	1.855172

D(USD(-27),2)	0.174432	0.008832	1.953544	1.488511	0.972528
D(USD(-28),2)	0.124674	0.015964	1.525825	1.056645	0.733235
D(USD(-29),2)	0.196762	0.022213	1.840740	1.231997	1.230869
D(USD(-30),2)	0.126240	0.014410	1.249887	1.119065	0.236460
D(USD(-31),2)	0.043708	0.013705	1.060538	-0.004676	0.257717
D(USD(-32),2)	0.100976	0.018017	1.290541	0.471629	1.164417
D(USD(-33),2)	0.098991	0.011108	0.822486	0.579393	0.709906
D(USD(-34),2)	0.028271	0.005855	0.502459	0.138521	-0.248910
D(USD(-35),2)	-0.022210	0.000546	0.220981	-0.344161	-0.389031
D(USD(-36),2)	-0.057345	-0.001796	-0.100980	-0.329209	-0.813606
D(USD(-37),2)	-0.001591	0.007255	0.340753	-0.026193	-0.580643
D(USD(-38),2)	0.048393	-0.002678	0.588715	0.525240	0.206135
D(EUR(-1),2)	0.587438	0.109361	9.017643	4.620638	11.32637
D(EUR(-2),2)	0.591624	0.112267	8.720600	4.312474	11.56910
D(EUR(-3),2)	0.558803	0.101929	8.350374	4.186242	10.73669
D(EUR(-4),2)	0.580813	0.103811	8.373327	4.469749	10.26548
D(EUR(-5),2)	0.623213	0.103044	8.495702	4.857972	10.43750
D(EUR(-6),2)	0.649960	0.103052	8.359710	4.947446	10.64440
D(EUR(-7),2)	0.590834	0.094753	7.709994	4.679037	9.623079
D(EUR(-8),2)	0.498268	0.088463	7.115748	3.951803	8.750730
D(EUR(-9),2)	0.486356	0.089414	6.829170	3.822205	8.439499
D(EUR(-10),2)	0.444617	0.082014	6.507466	3.584459	8.024241
D(EUR(-11),2)	0.392562	0.077990	6.184371	3.219639	7.688356
D(EUR(-12),2)	0.430937	0.072680	6.032926	3.528740	7.592430
D(EUR(-13),2)	0.390523	0.074202	5.633423	3.306449	7.264470
D(EUR(-14),2)	0.385447	0.070317	5.516609	3.001795	7.268838
D(EUR(-15),2)	0.379585	0.063725	5.226400	3.106706	6.566459
D(EUR(-16),2)	0.323290	0.055046	4.788072	2.676252	5.592322
D(EUR(-17),2)	0.279780	0.052400	4.362350	2.253386	5.116789
D(EUR(-18),2)	0.255354	0.053353	4.155146	2.084319	4.749305
D(EUR(-19),2)	0.269112	0.053439	4.198902	2.215234	4.826434
D(EUR(-20),2)	0.272890	0.049693	4.056097	2.204696	4.847057
D(EUR(-21),2)	0.244879	0.050280	3.701644	2.018419	4.412195
D(EUR(-22),2)	0.213401	0.046728	3.532406	1.569107	3.968464
D(EUR(-23),2)	0.190263	0.037671	3.213856	1.469597	3.807322
D(EUR(-24),2)	0.186792	0.035477	2.844539	1.261673	3.361157
D(EUR(-25),2)	0.145215	0.027898	2.628224	1.130065	2.499716
D(EUR(-26),2)	0.122820	0.022341	2.453891	0.961821	2.428253

D(EUR(-27),2)	0.194779	0.030253	2.597621	1.393224	2.869222
D(EUR(-28),2)	0.153494	0.020589	2.230913	1.297644	2.279533
D(EUR(-29),2)	0.083290	0.016933	1.695644	0.689641	1.915082
D(EUR(-30),2)	0.063463	0.013840	1.435707	0.517216	1.575369
D(EUR(-31),2)	0.049543	0.008151	1.312044	0.584667	1.439064
D(EUR(-32),2)	0.024495	0.006755	1.051196	0.499244	1.071686
D(EUR(-33),2)	0.049743	0.004861	1.027156	0.596182	1.129649
D(EUR(-34),2)	0.040753	0.000808	0.768634	0.480474	0.731952
D(EUR(-35),2)	-0.012552	-0.005164	0.405591	0.148155	0.410995
D(EUR(-36),2)	0.013525	-0.001398	0.391268	0.126189	0.448914
D(EUR(-37),2)	0.042309	-0.003801	0.443735	0.564862	0.001798
D(EUR(-38),2)	0.004542	-0.004500	0.145067	0.301406	-0.145476
C	0.319686	0.024749	1.760832	3.485971	4.254898
R-squared	0.976703	0.974385	0.975716	0.966686	0.970895
Adj. R-squared	0.698596	0.668603	0.685830	0.569001	0.623460
Sum sq. resids	566.9124	13.07005	13205.40	43489.72	80208.00
S.E. equation	5.952480	0.903813	28.72869	52.13547	70.80254
F-statistic	3.511970	3.186541	3.365858	2.430782	2.794465
Log likelihood	-399.4166	-7.348844	-726.8269	-850.7844	-914.4426
Akaike AIC	5.686698	1.916816	8.834874	10.02677	10.63887
Schwarz SC	8.767502	4.997620	11.91568	13.10758	13.71968
Mean dependent	0.020962	0.002644	0.371106	0.024038	0.777356
S.D. dependent	10.84235	1.570018	51.25467	79.41364	115.3834

Determinant resid covariance (dof adj.)	7.85E+09
Determinant resid covariance	21143.99
Log likelihood	-2511.444
Akaike information criterion	33.42734
Schwarz criterion	48.91159

Based on Vector Error Correction Estimates table above, the first equation where the dependent variable is the exchange rate of China, variables that significantly influence the exchange rate of Singapore on the day 1 until the day 33 then day 37 until day 38. On the exchange rate of China only influenced on day 38. On the exchange rate of US only influenced on day 38.

For the second equation where the dependent variable is the exchange rate of Japan, variables that significantly influence the exchange rate of Singapore is start from the day 1 until day 12 then day 30, day 31, day 37, and day 38. For exchange rate of China influenced on day

30, 31 dan 38. For exchange rate of US influenced on day 31 and day 38. For exchange rate of EU influenced on day 38.

For the third equation where the dependent variable is the exchange rate of Singapore, variables that significantly influence the exchange rate of Singapore on the day 1 until day 3 then day 6 untul day 12 then day 14, 15, 26, 27, 32, and day 33. For exchange rate of China influenced on day 6, 15, and day 28. For exchange rate of US influenced on day 1 and day 12. . For exchange rate of EU influenced only on day 2.

For the forth equation where the dependent variable is the exchange rate of US, variables that significantly influence the exchange rate of Singapore on the day 1 until day 12 then the day 16 until day 21 and then day 23 until day 27 and day 29 and day 32.

For the fifth equation where the dependent variable is the exchange rate of EU, variables that significantly influence the exchange rate of Singapore is on the day 12 until day 22.

Decomposition of Error Variance Decomposition

The dynamic structure of the variables in the VAR model can be seen through a predictor error analysis or Decomposition of Forecasting Error Variance (DFEV), where the pattern of DFEV indicates the nature of multi-variable causality among variables in the VAR model. Variance Decomposition (VD) will provide information about the magnitude and to how long the proportion of a shock to the variable itself and then see the amount of shock proportion of other variables to the variable itself.

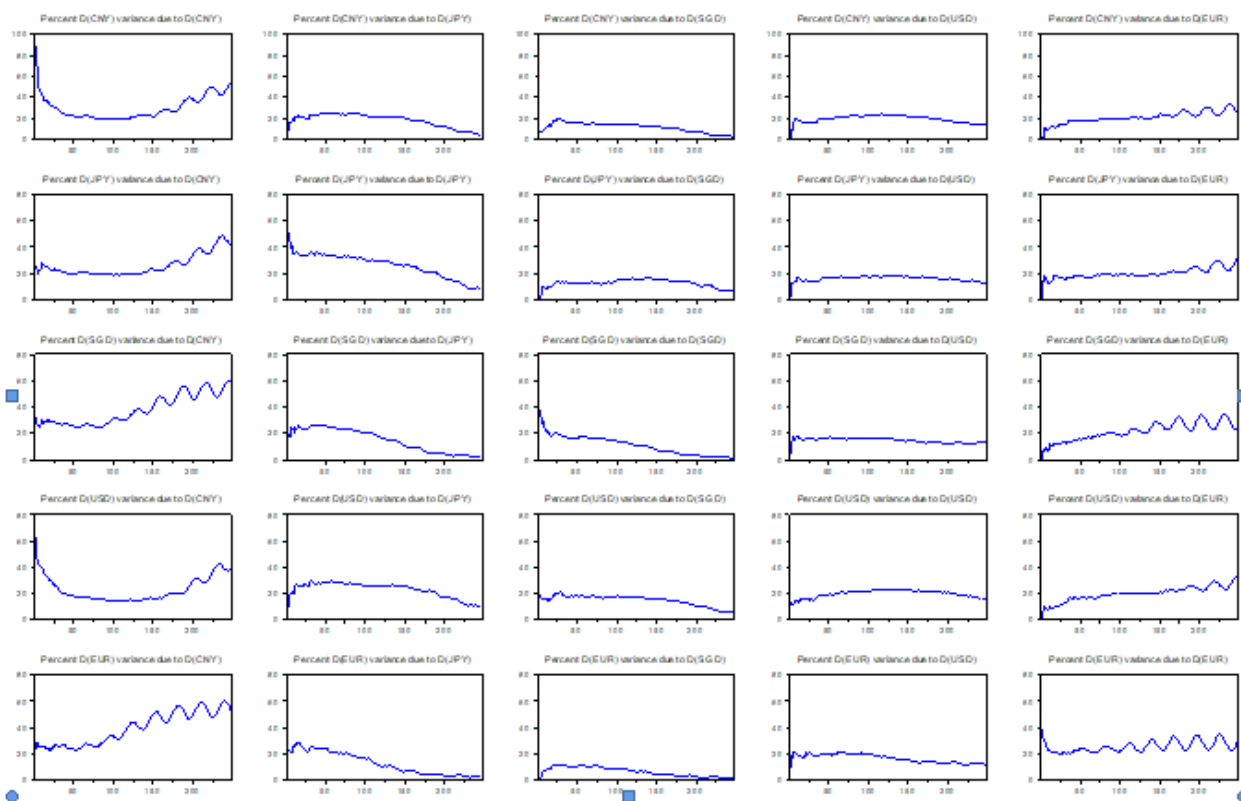Figure 1. Graphic Output for *Variance Decomposition*, with Eviews 9

Figure 1 above is described as follows:

Impact of shock on the Exchange reference rate of China to the Rupiah

The first line from left to right is a summary of the variance of decomposition that indicating that on the first day the exchange reference rate is strongly influenced by the shock of the exchange reference rate of China itself at 100 percent while on that day other country's exchange rate still not give effect. Start from 2nd day effect of that shock is 88.65 percent while the exchange reference rate of Japan is 5.3 percent, Singapore 2.7 percent, the United States 1.39 percent while the EU 1.94 percent. Thus until the 248th day that the average percentage of the change in exchange reference rate in the whole country due to shocks in China is China 31.97 percent, Japan 9.62 percent, Singapore 17.36 percent, the United States 27.73 percent and the EU 13.29 percent.

Impact of shock on exchange reference rate of Japan to the rupiah

The second line from left to right is a summary of variance decomposition indicating that on the first day the exchange reference rate is strongly influenced by the shock on exchange reference rate of Japan 70.04 percent while that period shock on exchange rate is not yet give effect unless China is 29.95 percent. So on, start from the second day of the shock effect was 55.8 percent while the exchange reference rate of China became 27.86 percent, Singapore 0.76 percent, the United States 0.49 percent while the EU 15.07 percent. Thus until the 248th day that the average percentage of the change in exchange reference rate in the whole country due to shock in Japan is China 26.87 percent, Japan 21.23 percent, Singapore 15.63 percent, the United States 20.15 percent and the European Union 16.10 percent.

Impact of shock on exchange reference rate of Singapore to the rupiah

The third row from left to right is a summary of the variance of decomposition showing that in the first period the exchange reference rate was greatly influenced by the shock on exchange reference rate of China by 54.67 percent, Singapore 38.94 percent and Japan at 4.38 percent, whilst in that period shock on exchange reference rate of United States and the European Union have not yet given effect. On the other hand, start from the 2nd period, result from the shock that effect on China is 49.72 percent while the Singapore exchange reference rate is 35.36 percent, Japan 7.1 percent, the United States 1.68 percent while the EU is 6.11 percent. Thus until the 248th day that the average percentage of the change in exchange reference rate in the whole country due to shock in Japan is China 28.08 percent, Japan 8.01 percent, Singapore 17.18 percent, the United States 31.93 percent and the European Union 14.79 percent.

Impact of shock on exchange reference rate of United States to the rupiah

The fourth row from left to right is a summary of variance decomposition indicating that in the first period the exchange reference rate was strongly influenced by the shocks on exchange reference rate of China of 83.2 percent, the United States of 11.98 percent, Japan 4.59 percent, Singapore 0.22 percent whilst in that day the shock of European union still had not affected. On the other hand, start from the 2nd period the result from shock that affect China to be 76.52 percent while the exchange reference rate of United States is 11.38 percent, Japan 4.89 percent, Singapore 6.64 percent while the EU countries 0.55 percent. Thus until the 248th day that the average percentage of the change in exchange reference rate in the whole country due to shock in Japan is China 32.48 percent, Japan 10.42 percent, Singapore 20.57 percent, the United States 25.57 percent and the European Union 10.94 percent.

The impact of EU shocks on the Rupiah

The last fifth line from left to right is a summary of variance decomposition indicating that in the first period the exchange reference rate was strongly influenced by the shock on the exchange reference rate of China by 44.62 percent, the EU itself 31.09 percent, Japan 21.08 percent, Singapore 0.29 percent and the United States 2.90 percent. Start from the second day, the impact of shocks on the EU itself became 30.23 percent while the exchange reference rate of China became 33.33 percent, Japan 25.24 percent, Singapore 0.29 percent and the United States 9.89 percent. Thus until the 248th day that the average percentage of the change in exchange reference rate in the whole country due to shock in Japan is China 22.98 percent, Japan 8.24 percent, Singapore 8.08 percent, the United States 39.24 percent and the European Union 21.43 percent

CONCLUSIONS AND RECOMMENDATIONS

1. Based on the analysis of Relationship of Exchange Rate in Descriptive following conclusions are drawn:

Based on the VECM (Vector Error Correction Model) in Chapter IV, for the first equation in which the dependent variable is the exchange rate of China, the variables that significantly influence the Singapore exchange rate from day 1 to day 33 and day 37 to day 38. At the exchange rate of China only affects the day 38. In the United States exchange rate affects only on the day 38. For the second equation, where the dependent variable is the Japanese exchange rate, the variables that significantly influence the Singapore exchange rate from day 1 to the day 12 and on the day 30 and the day 31 then on the day 37 until the day 38. At the exchange rate of China effect on the day 30, 31 and 38. In the United States exchange rate

affects the day 31 and the day 38. At the EU exchange rate only affects the day 38. For the third equation, where the dependent variable is the Singapore exchange rate, the variables that significally influence the Singapore exchange rate on the 1st day until the 3rd day on the 6th day up to the 12th day on the 14th, 15th, 26th, 27th, 32th, and 33rd day. At the exchange rate of China effect on the 6th, 15th, and 28th days. At the United States exchange rate on day 1 and day 12. At the European Union exchange rate only affects the 2nd day. For equation four, where the dependent variable is the United States exchange rate, the variables that significantly influence the Singapore exchange rate on the 1st day until the 12th day then on the 16th day to the 21st day continued on the 23rd day to the 27th day and the 29th day and the 32nd day. For the fifth equation, where the EU exchange rate is dependent variable , the variables that significantly influence the Singapore exchange rate on the 12th day up to the 22nd day.

2. Based on Vector Error Correction Model (VECM) analysis following conclusions are drawn:
Based on the empirical results that obtained that the exchange reference rate of China, Japan, Singapore, the United States and the EU are interrelated. The exchange reference rate of the Singapore has the greatest relationship followed by China, the United States of America, the European Union and Japan with the least relation to the exchange reference rates of China, Japan, Singapore, the United States and the European Union.

3. Based on Impulse Response Function based analysis following conclusions are drawn:
The average shock of a variable against other variables occurs at the end of a period with a high shock rate among variables particularly in US exchange rates, China, EU, and Singapore but for Japan is only a small shock.

4. Based on Var-Dec based analysis (decomposition of forecasting error variance) following conclusions are drawn:
Based on the empirical results it is found that the contribution of the exchange reference rate variable is positive in China, Japan, Singapore, the United States and the European Union with varying strengths. From the research results it can be seen that there is linkage of exchange reference rates between China, Japan, Singapore, the United States and the European Union (cointegration happened). Therefore, it takes a quick time in the process of adjustment between the countries involved to bring about the convergence of the exchange rate for the creation of financial integration.

SUGGESTIONS

From the results of this study which shows that there is a relationship exchange rate between China, Japan, Singapore, the United States and the European Union, it can be recommended some suggestions and inputs for some relevant agencies and institutions concerned with the problems in this study.

1. For the Government, with the current economic and globalization openness, which is also followed by the increasing trend of foreign exchange transactions, the government must provide support in spurring the transaction so that it can have a positive effect on the growth of the banking industry in particular and the economy generally.

2. For the Community, to improve the performance and competitiveness of the industry to compete and speak in the international market as well as to hold and surpass the entry of overseas industry into the country, thus expected to compete in international and domestic markets.

3. For the Banking Industry, in providing services and developing a more proactive and intensive relationship as a form of cooperation more closely. Good relationships, both institutional and personal, can have a significant effect on gaining and retaining customers to continue to transact and increase profits for the banking industry.

4. For further research, to examine other indicators of financial integration or other characteristics. Financial integration regionally and globally will also intensify financial markets and increase the flexibility of countries that transact large in the trade in face of shock from the outside. This linkages of exchange rates will also make a small picture of the economic interconnection between countries.

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