The Analysis of Exchange Rate Fluctuations and Its Implications on Indonesian Economy Empirical Evidence and Islamic Economic Perspective

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Introduction

In globalization context interaction among one state with the other cannot be obviated, hence pattern and direction economic policy will be influenced by other economics performance. Positive impact from interaction international trade can push the economic growth through growing factors productivity and utilize of domestic economic scale beside due to the media transfer technology among country. Indonesia as an developing countries own economic resource and lay in geographical band of international trade cannot secede from changing in that happened in international market as consequence from an economics opened. Table below shows the economic indicator of some country in Asia :

Table 1.
Macroeconomic Indicator of Asia's Countries 1999 – 2000

Country	Indicator				
	Eksport (12month) (billion $US)	Balance of Payments (billion $ US)	Cadangan Devisa (miliar $US)	Economic Growth (%)	GDP Per capita ($ US)
Korea Selatan	144	26.7	66.1	12.3	12445
Singapura	115	17.9	77.2	8.2	27740
Malaysia	76.9	9.2	29.9	8.1	7370
Indonesia	48.2	4.4	26.3	0.5	2940
Thailand	56.1	11.8	339	3.5	6020
Philipina	34.6	3.5	12.6	3.1	3380
Brunei	2.3	0.8	20.0	1.0	20100
Myanmar	1.2	-0.4	0.3	5.0	1200
Kamboja	0.8	-0.2	-0.4	0.0	1350

SOURCE : Asia Week Magazine, 4th Februari 2000, adopted from Tulus Tambunan, 2000, *Perdagangan Internasional dan Neraca Pembayaran Teori dan Temuan Empiris*, p. 15, LP3ES, Jakarta.

Exchange rate fluctuation have impacted to international payment balance performance beside its influence to other macroeconomic variable. Exchange rate fluctuation will influence to the intensity and volume of trading among country. Because changing the value of money will impact to the price automatically and than to the product competitiveness in international market. Exchange rate fluctuation influenced by fundamental economics, sentiment and market risk, and exchange rate policy. Movement of exchange rate is nfluenced by international balance of payment which is determined by the position of balance of capital and current account. This research is to know how far

the exchange rate fluctuations influenced to Indonesian economy performance that expressed in a few of macroeconomic indicator such as consumption, invesment, government expenditure, export, import, money supply, demand of money, inflation rate, interest rate, capital flow and balance of payment.

Literature Review

Exchange rate fluctuation is influenced both monetary policy and also fiscal policy with UU No. 23 1999 about central bank. Various research have been studied about exchange rate equilibrium analysis by economist. *Elbadawi (1994)* and *Baffes et-al (1997)* explain some fundamental factor that influence real exchange rate equilibrium in the long run. *Zhaoyong Zhang (1999)* doing research the impact of exchange rate reform in RRC to balance of payment and domestic inflation. In its research explained that in the long run currency devaluation have an effect on inflation significantly. And also do explained that exchange rate reform have affected to the composition of balance of trade. *Angelos Kanas and Georgios P. Kouretas (2001)* have conducted the study about the exchange rate volatility in official market and black market in control systems at Greek. The result of his research explain that the exchange rate volatility will decrease along with liberalization policy of movement of capital flow.

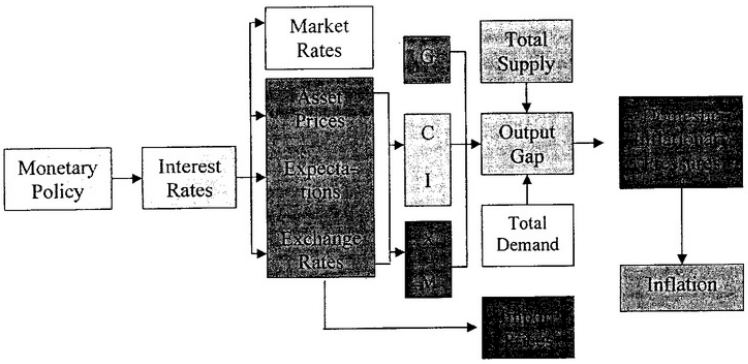


Figure 1.
Transmition Mechanism of Monetary Policy in Indoneisa
With Inflation as a Target
(Haryono, Nugroho dan Pratomo, 2000 : 114)

There are two kinds of exchange rate system *i.e* float exchange rate system and fixed exchange rate system. In the float exchange rate system concerning two kinds of variation *i.e* dirty float that is if government conduct the intervention and clean float if government not conduct the intervention in currency market. Concerning exchange rate *(kurs)* two approach that is traditional approach and monetary approach. According to traditional approach that the equilibrium of exchange rate is if the value of export and

import are equal. Exchange rate equilibrium is also determined by how far the elasticity of import and export goods and service. So that traditional approach is also conceived of elasticity approach. Factors that influence to the exchange rate fluctuation can be depicted at scheme bellows :

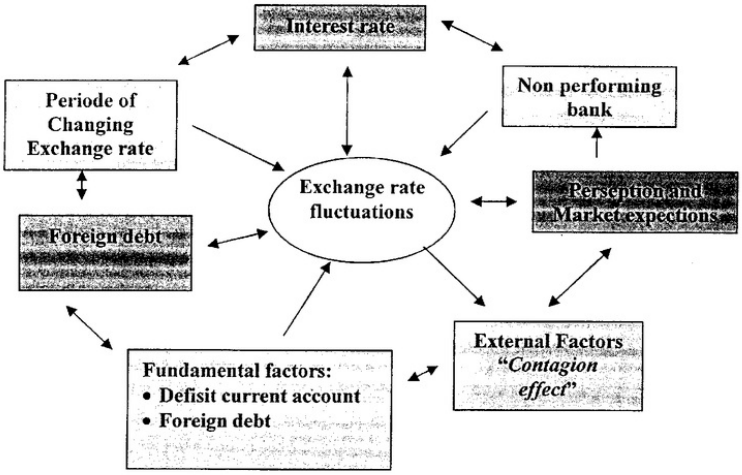


Figure 2.
The Effect of Exchange Rate Fluctuations to Macroeconomics Variable (Rasmo Samiun, 2002 : 23)

In Islamic economic perspective money have specific role to economic activity. Because money is not commodity so it can not be traded and consecuently money can generate riil sector more effective. Motive demand for money in Islamic economic was to transaction and precautionary not to speculation so that economic growth can increase more efficient. In Islamic economic perspective money is not private goods but it was a public goods. Thereby each people have obligations to improve social welfare with money that they have trough *zakat, infak* and *shadaqah (ZIS)*. The role of Islamic financial institutions are very importants to improve real sector with free interest economy principles. Combination between individual behavior to use money demand with financial institution and economic policy can improve economic performance.

Methodology

Definition of Variables and Data Source

This research used quarterly time series data from 1990.I – 2004.IV that collected from International Financial Statistics (IFS), Bank Indonesia Report (BI), Badan Pusat Statistik (BPS), Financial Departement Republik Indonesia, World Bank, Asian

Development Bank (ADB). The data that identified were consumption (C), investment (I), government expenditure (G), export (X), import (M), money demand (M_d), money supply (MS) as measurement the amount of money refers narrow money (M1), international reserve (CD), balance of payment (BoP), consumer price index (CPI) as measurement of inflation rate, world income (GDPDN) as measurement amount GDP of big country i.e USA, England, France, Germany, and Japan that have trade relations with Indonesia significantly, national income (GDP) as measurement of economic product, certificate of bank Indonesia (SBI), deposit interest rate (r), ratio between domestic interest to international interest (RDNLN), terms of trade (ToT), exchange rate (ER), dummy variable of economic crisis (D), dummy variable of economic policy (DER) and capital flow (CF).

Specification Model

The tools of analysis were used is simultaneous equation models with two stage least square (TSLS) to analysis in macroeconomics equilibrium. Tools to examine dynamic analysis in the long run and short run were used error correction model (ECM). Than the tools to examine dynamic analysis in the impact of economic policy especially monetary policy at the long run and short run were used Insukendro error correction model (I-ECM).

The procedure was applied as follow (1) The first step we used unit root test to test stationarity data with ADF test (2) The second we test simultanity and stationarity were used Hausment test, (3) The third we test model with rank model and matrik model, (4) The forth we test classical assumption were used matrik to test multicolinearity, used garnag to test otocorrelation and used lllll to test heteroscedasticity. (5) The fifth we regress with two stage least square to analysis macroeconomic equilibrium, than we regress with ECM to examine dynamic analysis both the long run and short run, and finally we regress with I-ECM to examine dynamic analysis that involve intervention in monetary policy used SBI both at the long run and short run.

The Simultaneous equations that show correlation between exogenous variable to endogenous variable in this research can be formulated follow :

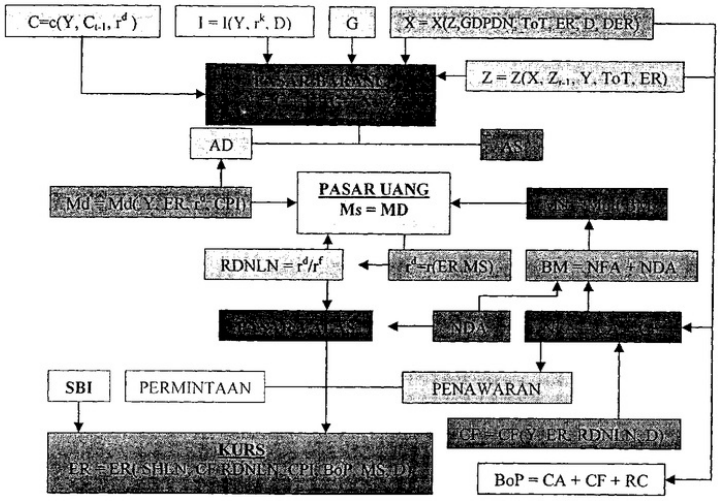
- $C_t = f(Y, C_{t-1}, r^d)$ ..... (1.1)
- $I_t = f(Y, r^k, D)$ ..... (1.2)
- $X_t = f(Z_t, ER_t, ToT, GDPDN, D, DER)$ ..... (1.3)
- $Z_t = f(X_t, Y_t, ER_t, ToT, Z_{t-1})$ ..... (1.4)
- $ER_t = f(RDNLN_t, SHLN_t, BoP, CF, CPI, MS, D)$ ..... (1.5)
- $SHLN^d_t = f(RDNLN, Y_t, ER, G_t, G_{t-1})$ ..... (1.6)
- $Md_t = f(Y, ER, r^d, CPI)$ ..... (1.7)
- $r^d = f(ER, MS)$ ..... (1.8)
- $CF_t = f(RDNLN, Y, ER)$ ..... (1.9)
- $BoP = X - Z + CF$ ..... (1.10)
- $Y_t = C_t + I_t + G_t + (X_t - Z_t)$ ..... (1.11)
- $MS = Md$ ..... (1.12)

Note :

C	= Consumption(billions rupiah)
I	= Investment (billions rupiah)
G	= Government expenditure (billions rupiah)
X	= Export (billions rupiah)

Z = Import (billions rupiah)
Y = National income (billions rupiah)
r^d = Deposit interest rate (%)
r^k = Credit interest rate (%)
D = Dummy Variable 1 = Crisis economic periode
0 = Non-crisis economic periode
DER = Dummy Variabel Deregulation policy
1 = After deregulation policy
0 = Before deregulation polciy
ToT = Terms of trade
ER = Exchange rate (rupiah/$ AS)
SHLN = Total amount of government foreign debt (million $ AS)
GDPDN = Total amount of world income (billion $ AS)
RDNLN = Ratio between domestic interest rate and international interest rate
CPI = Consumer price index
MS = Money supply (billionsr rupiah)
Md = Money demand (billions rupiah)
CF = Capital flow (millions $ AS)
BoP = Balance of payment (millions $ AS)

Inter relations between exogenous variable to endogenous variabel at simultaneous equations can be depicted follow :



Figurer 3.

Indonesian Macroeconomic Scheme

Empirical Result

Identification Problem

The essential problem to develop a structural model of a system is to achieve neccesery condition and sufficient condition. First step in the analysis of simultaneous equation is to investigate whether the structural model in the system fullfil necessary condition or not with used rank order condition. The result rank order condition of simultaneous equations are presented follows :

Table 2.

Identification Test of Simultaneous Equation

Simultaneous equation	K-G	K-E	Order Condition
Consumption function	10	1	Overidentified
Investment function	11	2	Overidentified
Export function	9	2	Overidentified
Import function	11	3	Overidentified
Exchange rate function	9	3	Overidentified
Capital flow function	11	2	Overidentified
The Foreign debt function	10	2	Overidentified
Money demand function	11	2	Overidentified
Domestic interes rat function	11	1	Overidentified

SUMBER : *Data sekunder (diolah)*

The result test shows that all function are achieve overidentification and it means that all function are fulfill necessary condition.

Exogenity Test

The exogenity test is to investigate the characteristic of simultaneous equations whether any variable in a equations can plot as endogenous variable or not. The result test shows that all variable at equations can plot as endogenous variable.

Table 3.

Exogenity Test

Equation	*F-statistics*	*Probability*	*Note*
Consumption	1060,282	0,0000	Endogen
Investment	154,3087	0,0000	Endogen
Export	213,0702	0,0000	Endogen
Import	386,1513	0,0000	Endogen
Exchange rat	82,55377	0,0000	Endogen
Foreign debt	80,66235	0,0000	Endogen
Capital flow	10,24400	0,000001	Endogen
Money demand	1292,365	0,0000	Endogen
Dom. Intes rate	21,44590	0,0000	Endogen

Source : *Secondary data*

Estimation Analysis of Structural Equation

The research about analysis of exchange rate fluctuation and its implication on Indonesian economy period 1990 quarterly I - 2004 quarterly II. Analysis method developed in this research is two stage least square (TSLS) and also provided with error correction model (ECM) and Insukendro error correction model the (I-ECM). The result of estimation from this research is represented at tables follow :

Table 4.
Estimation Analysis of Structural Equation

Regression of Consumption Function Equation						
Variable	*Coefficient*	*t-statistic*	*Prob.*	*t-table α = 5 %*	*R^2 Adj.*	*F-statistic*
Constanta	-4295,829	-2,031233	0,0473	1,684	0,982614	1049,503
Y	0,346041	6,448877	0,0000			
C_{t-1}	0,531858	7,798296	0,0000			
r^s	81,48018	1,282538	0,2052			
Regression of Investment Function Equation						
Variable	*Coefficient*	*t-statistic*	*Prob.*	*t-table α = 5 %*	*R^2 Adj.*	*F-statistic*
Constanta	19274,31	5,376639	0,0000	1,684	0,832936	92,44853
Y	0,171666	8,689634	0,0000			
r^k	-650,5445	-5,324759	0,0000			
Dummy	3622,641	2,807354	0,0070			
Regression of Export Function Equation						
Variable	*Coefficient*	*t-statistic*	*Prob.*	*t-tabel α = 5 %*	*R^2 Adj.*	*F-statistic*
Constanta	2323,918	1,417979	0,1624	1,684	0,954933	193,2928
Z	0,772733	21,25524	0,0000			
GDPDN	0,070722	0,422705	0,6743			
ToT	420,9364	0,338961	0,7361			
ER	0,670959	5,137092	0,0000			
Dummy	-1486,733	-2,034405	0,0472			
DER	-106,4920	-0,529392	0,5989			
Regression of Import Function Equation						
Variable	*Coefficient*	*t-statistic*	*Prob.*	*t-table α = 5 %*	*R^2 Adj.*	*F-statistic*
Constanta	-2855,075	-2,937841	0,0049	1,684	0,966371	398,9716
X	0,840567	8,481835	0,0000			
Z_{t-1}	0,366007	4,824798	0,0000			
ToT	684,6662	0,578106	0,5657			
ER	-0,707720	-5,639158	0,0000			
Regression of Government Foreign Debt Function Equation						
Variable	*Coefficient*	*t-statistic*	*Prob.*	*t-table α = 5 %*	*R^2 Adj.*	*F-statistic*
Constanta	33153,41	18,13140	0,0000	1,684	0,759236	45,33135
Y	0,083478	1,079055	0,2855			
ER	0,593556	2,447882	0,0178			
RDNLN	124,2140	0,450848	0,6540			
G	1,544394	1,625298	0,1101			
Regression of Capital Classification Equation						
Variable	*Coefficient*	*t-statistic*	*Prob.*	*t-table α = 5 %*	*R^2 Adj.*	*F-statistic*

Constanta	1479,626	2,112316	0,0395	1,684	0,425158	11,39446
Y	0,008652	0,976728	0,3332			
ER	-0,487081	-5,811307	0,0000			
RDNLN	178,9613	2,007043	0,0500			
Dummy	159,0584	0,295890	0,7685			
Regression of Domestic Saving Function (Insukendro Approach)						
Variable	*Coefficient*	*t-statistic*	*Prob.*	*t-table α = 5 %*	R^2	*F-statistic*
Constanta	24709,02	1,137288	0,2606	1,684	0,811704	64,98267
Y	0,084201	0,414813	0,6800			
ER	14,95830	9,440793	0,0000			
r^s	-2771,867	-4,336356	0,0001			
CPI	152,2155	1,325365	0,1908			
Regression of Domestic Saving Function (Insukendro Approach)						
Variable	*Coefficient*	*t-statistic*	*Prob.*	*t-table α = 5 %*	R^2	*F-statistic*
Constanta	16,98882	11,64841	0,0000	1,684	0,254159	14,08231
ER	0,002363	4,951041	0,0000			

Source : *Secondary Date*

From table above we can analysis with TSLS approach in macroeconomic equilibrium dan dynamic analysis with ECM approach dan I-ECM approach. The changing of exchange rates is due to interaction between economics factors and non economic factors. The aim of this research is to analysis some factors that affect exchange rate and their implications on Indonesian economy period 1990 quarterly I until 2004 quarterly II. Analytical method used in this research is explanatory method which is to test hypothesis about simultaneous reliationship among variables that research, by developing the characteristics of verificative research by doing some testing at every step of research. We used secondary data taken from Bank Indonesia (BI), Badan Pusat Statistik (BPS), World Bank, International Financial Statistics (IFS), error correction model (ECM) and Insukendro error correction model (I-ECM). The analysis of exchange rate fluctuations that used TSLS and I-ECM can show on table follow :

Table 5.
Estimation Analysis of Exchange Rate

Two Stage Least Square (TSLS)					
Variable	*Coeffisient*	*t-statistics*	*Prob.*	*Diagnostic Test*	
Konstanta	3246,660	2,920582	0,0052	Ramsey Test	2,685018
RDNLN	-260,6239	-1,877282	0,0663	J-B	0,006076
BoP	2,037993	3,704506	0,0005	B-G	0,431157
CF	-1,372394	-4,763788	0,0000	White test	18,74984
CPI	-1,794155	-0,280142	0,7805	F-statistik	39,17444
MS	0,029535	4,460308	0,0000	R^2 Adjusted	0,784188
Dummy	1801,339	3,040319	0,0038	t-tabel $\alpha = 5\ \%$	1,672
Insukendro Error Correction Model (I-ECM)					
Variable	*Coeffisient*	*t-statistics*	*Prob.*	*Diagnostic Test*	
Konstanta	3946,948	2,714350	0,0100	AIC	16,60899
D(RDNLN)	-172,3248	-1,350478	0,1851	SC	17,20379

D(CF)	0,562399	2,639783	0,0121	Ramsey test	6,157172
D(BoP)	-0,539647	-2,211627	0,0332	J-B test	1,278425
D(CPI)	-22,07965	-1,258142	0,2162	B-G test	0,073737
D(MS)	0,069493	2,804071	0,0080	F-statistik	2,819107
D(Dummy)	1211,767	1,695845	0,0983	R^2 Adjusted	0,344152
RDNLN(-1)	29,80141	0,359648	0,7212	t-tabel $\alpha = 5\ \%$	1,672
CF(-1)	0,694682	2,679518	0,0109		
BoP(-1)	-0,868850	-2,777795	0,0085		
CPI(-1)	-43,71169	-2,978376	0,0051		
MS(-1)	0,045690	2,753302	0,0091		
Dummy(-1)	1119,041	2,897289	0,0063		
ECT	0,035438	1,299487	0,2018		
D(SHOCK)	-19,74828	-0,837087	0,4079		
SHOCK(-1)	38,39973	1,049669	0,3007		

Source : Secondary data

Result of the research shows that ratio between domestic interest rate and international interest rate affected exchange rate negative and significantly at amount -260,6236. Capital flow variable affected negative and significantly to exchange rate at amount -1,372394. Meanwhile balance of payments variable affected positive and significantly to exchange rate at amount 2,037993. Than exchange rate variable affected negative and significantly to import at amount -0,707720. On the other hand, exchange rate variable affected positive and significantly to total of government foreign debt variable at amount 0,593556. Meanwhile exchange rate variable affected positive and significantly to export variable at amount 0,670959. Than exchange rate variable affected posit ive and significantly to demand of money variable at amount 14,95830. And economic crisis variable affected to depreciation of exchange rate variabel.

The analysis of government intervention policy trough SBI can see at the value of shock variable. Result of the research indicate that monetary instrument SBI is not effectively to control exchange rate fluctuation because the value of shock variable is not significant.

Table 6.
Estimation Analysis of Exchange Rate
ECM Method

Error Correction Model (ECM)					
Variabel	*Koefisien*	*t-statistik*	*Prob.*	*Uji Diagnostik*	
Konstanta	575,0900	0,814344	04200	AIC	16,74132
D(RDNLN)	-100,0143	-0,846706	0,4020	SC	17,24766
D(BoP)	-0,541937	-2,253419	0,0295	Ramsey Test	2,895749
D(CF)	0,480588	2,238415	0,0306	J-B	3,975161
D(CPI)	0,410951	0,072568	0,9425	B-G	1,090522
D(MI)	0,040934	1,689115	0,0986	White test	31,46473
D(Dummy)	945,6358	1,234966	0,2237	F-statistik	1,985897
RDNLN(-1)	24,72756	0,292030	0,7717	R^2 Adjusted	0,188990
BoP(-1)	-0,700165	-2,502589	0,0163	t-tabel $\alpha = 5\ \%$	1,672

CF(-1)	0,234516	1,352711	0,1834		
CPI(-1)	-6,269850	-1,245395	0,2199		
M1(-1)	0,005039	0,978732	0,3333		
Dummy(-1)	631,0882	1,721655	0,0925		
ECT	0,051906	2,062615	0,0454		

SUMBER : *Data Sekunder (diolah)*

Dynamics analysis with ECM indicate that the ratio of domestic interest rate deposit to international interest rate did not effect to exchange rate significantly. While the analysis with ECM indicate that in dynamic analysis in short-run capital flow affected positive and significan to exchange rate at amount 0,480588. The dynamic analysis with ECM indicate that in short-run and long-run balance of payment affected to exchange rate at amount -0,541937 and -12,4891. The same result is also find with the ECM method which the government policy have succed in controling inflation. While in dynamic analysis with the ECM method indicate that in short-run money supply affected positive and significant to exchange rate at amount 0,040934.

Conclusion and Policy Implication

The changing of exchange rates is due to interaction between economics factors and non economic factors. The aim of this research is to analysis some factors that affect exchange rate and their implications on Indonesian economy period 1990 quarterly I until 2004 quarterly II. Analytical method used in this research is explanatory method which is to test hypothesis about simultaneous reliationship among variables that research, by developing the characteristics of verificative research by doing some testing at every step of research. We used secondary data taken from Bank Indonesia (BI), Badan Pusat Statistik (BPS), World Bank, International Financial Statistics (IFS), error correction model (ECM) and Insukendro error correction model (I-ECM).

Result of the research shows that ratio between domestic interest rate and international interest rate affected exchange rate negative and significantly. Capital flow variable affected negative and significantly to exchange rate. Meanwhile balance of payments variable affected positive and significantly to exchange rate. Than exchange rate variable affected negative and significantly to investment rate. On the other hand, exchange rate variable affected positive and significantly to total of government foreign debt variable. Meanwhile exchange rate variable affected positive and significantly to export variable. Than exchange rate variable affected positive and significantly to demand of money variable. And economic crisis variable affected to depreciation of exchange rate variabel. Than government intervention policy trough SBI monetary instrument is not effectively to control exchange rate fluctuation.

In the Islamic economic perspective money is public good because it have important role to improve economic activity. So that in Islamic shariah money that use to speculation motive is prohibited because it can damage the main function of money as a tools to increasing the level social welfare. Thereby in Islamic shariah financial institutions must be operated with free interest principles.

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