Equilibrium and Disequilibrium Exchange Rate: Case of Rupiah Exchange Rate

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ABSTRACT

This article would analyze the determination of Rupiah exchange rate by using equilibrium and disequilibrium concepts. This analysis became important for policy maker because disequilibrium reflected distortion towards relative price related to domestic policies. The research results showed that Rupiah exchange rate was in disequilibrium condition. The conclusion was based on Indonesia Bank policies that conducted intervention through some regulations by emerging Indonesia Bank regulations and conducting intervention on foreign exchange market, both in demand and supply. The Indonesia Bank policies aimed to stabilize Rupiah exchange rate that led to equilibrium exchange rate. The research results also showed purchasing power parity did not applied in short term. It indicated market inefficiency and led to price rigidity in commodity market. The price rigidity caused price adjustment did not work. As a result, market was in disequilibrium condition.

Keywords: Equilibrium, Disequilibrium, Intervention, Purchasing Power Parity, Price Rigidity
JEL Classification: F310

1. INTRODUCTION

The changing system of Rupiah exchange rate from managed exchange rate system into free exchange system causes market forces determines the value of rupiah exchange rate towards foreign currencies. It means the interaction of foreign currencies supply and demand determine rupiah exchange rate value freely. Besides, in a floating rate system, it is assumed that Indonesia Bank has no obligation to intervene foreign currency market systematically. Thus, the value of Rupiah exchange rate is able to move freely in responding market forces.

It is more difficult to predict market behavior when the market forces have wider power in determining Rupiah exchange rate. The exchange rate in the money market is not only reflects the strength of foreign exchange demand and supply to meet the underlying transaction, but is also affected by other factors that influence economic agents expectations that are closely related to the element of uncertainty.

This paper would present the analysis of rupiah exchange rate model determination by using equilibrium and disequilibrium

concept approaches. There are controversies between the two concepts that are closely related to the discussion about classic theory and Keynesian theory. Equilibrium analysis refers to the classic theory which strongly believes that the market mechanism will reach equilibrium in the absence of the role of government. While the disequilibrium analysis refers to the Keynesian theory that states the market failures that lead to disequilibrium can only be overcame by government roles in stabilization policy.

Equilibrium real exchange rate (ERER) is the relative prices of tradable and non-tradable price that are the outcome of internal and external equilibrium. Internal equilibrium is defined as a sustainable equilibrium in the non-trade market good, while the external equilibrium means the proper current account balance with the flow of capital in long term. Disequilibrium exchange rate represents an unsustainable condition; it would be costly and generally requires government policy for stabilization in long term. In contrary, equilibrium condition does not require government intervention (Edward, 1987).

Analysis of equilibrium and disequilibrium exchange rates become important for policy makers, because the disequilibrium reflects

distortions in relative prices associated with domestic policy. The signs of distortion can be used as a disequilibrium analysis to determine the causes and consequences that arise so that policy makers can attempt to make the necessary adjustments. Willet (1986) explained that the management of the exchange rate at a wrong level would cause an increase in welfare costs. It means the level of well-being dropped. That stance could be explained by two mechanisms that generate false information to economic actors and generate economic instability.

2. EMPIRICAL GAP

De Grauwe (1996) distinguished exchange rate models based on equilibrium and disequilibrium analysis. According to De Greuwe equilibrium model is a monetary model, while the disequilibrium model is Dornbusch model.

The disequilibrium exchange rate research aimed to focus on overvaluation exchange rate that had a negative impact on the economy. Dollar (1992), Razin and Collin (1999) explained that the RER overvaluation had a negative impact on the economy that would produce bad macroeconomic conditions and was inconsistent in exchange rate policy. The impact was transmitted in two-ways:
1. Import cost increase that led to investment loss in strong currency
2. Competitiveness declining related to overvaluation that obstruct international influence adaptation ability and production reallocation in economy.

Lane and Milesi-Ferreti (2005; 2007; 2008) in research explained disequilibrium exchange rate of US Dollar had increased Net Foreign Assets (NFA) United States through trade and financial effect. The mechanism of trade effect was explained by the weakening of the US Dollar would cause the current account narrowed deficit that eventually became a surplus. On the other hand, financial effect implied that the depreciation of the US Dollar boost NFA United States because United States foreign debt was largely dominated by the US dollar while external assets were more varied in terms of its currency.

Positive relationship between undervalue RER reflected disequilibrium and economic growth in some countries like China, India, South Korea, Taiwan, Uganda and Tazmania (Rodrik, 2008). RER undervaluation conditions have an influence on the reduction of distortions in developing countries such as weak institutional problem, a problem of information and coordination problems that will foster structural change and drive growth.

Research models of exchange rate with the equilibrium analysis refers to the monetary model. Some studies support the equilibrium analysis that showed the monetary model applied (it is able to explain the behavior of the exchange rate), so it could be concluded that the exchange rate was at equilibrium position. Mark (1995) conducted a study by using monetary approach model. The results showed that the research of money supply and relative real output monetary model variables could be used for predicting US Dollar currency in the period 1981-1991.

Diamandis et al. (1996) conducted integration test on the monetary model in determining exchange rate. US Dollar and Dollar Canada were the currency objects in the research. The research results concluded that the monetary model were co-integrated in long term and very useful to be applied in determining the exchange rate. The same conclusion was also obtained from some research conducted by Frankel (1982) and Copeland (2005).

3. DISEQUILIBRIUM THEORY

Disequilibrium exchange rates (misalignment) is defined as a position where the RER and equilibrium exchange rate are in different positions. overvaluation happens when the ERER is above exchange rate value. In contrary, undervaluation happens when it is below the equilibrium exchange rate. Edward (1987) differentiated disequilibrium into two-types:
1. Macroeconomic induced misalignment, the disequilibrium that occurred by the inconsistency between macroeconomic policies, especially monetary policy and exchange rate systems
2. Structural misalignment; disequilibrium that occurred when there was a change in fundamental economic factors that determine the real equilibrium exchange rate, where the fundamental economic change was unable to be transmitted to the changes in the RER.

The explanation of disequilibrium exchange rate occurrence was also described by Aguirre and Calderon (2005) that differentiate into two, the first refers to the measurement of the concept of purchasing power parity (PPP) based on the RER deviation. PPP measurement concept only counted the monetary factors of exchange rate movements. However, it did not consider exchange rate movements associated with the real factor. Second, the disequilibrium based on the difference between the black market and the official exchange rate, named the black market premium.

4. EQUILIBRIUM THEORY

Exchange rate disequilibrium theory drew criticism last few years. Critics of disequilibrium theory was related to previous research and the existence of alternative new theories named equilibrium exchange rates theory. As a new theory, the equilibrium exchange rate has very different implications and perceptions of policy compared with the disequilibrium theory.

In equilibrium theory framework, economic theory predicts the real disruption on supply and demand of goods led to changes in relative prices, including RER. In wide range variations, changes in some parts of the RER can be achieved through changes in nominal exchange rates. Repeated disruption in supply and demand will create a relationship between changes in the RER and the nominal exchange rate. Such relationships are consistent with equilibrium in the economy, in term of market clear through price adjustments. Another important thing that should be emphasized from the definition of the equilibrium exchange rate is:
1. The equilibrium exchange rate is not a fixed value or level, but may change when other variables that affect the internal equilibrium and external equilibrium changed

2. There isn't any ERER but rather on a process towards ERER after some time
3. The value of the ERER (ERER) is not only influenced by economic fundamentals but also influenced by expectations about fundamental variables.

5. RUPIAH EXCHANGE RATE CASE ANALYSIS

Indonesia Bank has used the intervention policy as liquidity management tools to balance government spending since managed exchange rate system was changed into free exchange rate system in August 1997. At the same time intervention was able to stabilize rupiah volatility especially during the depreciation associated with excess liquidity. Thus the intervention through the domestic liquidity tightening from foreign currency selling, could be used as a framework to influence the exchange rate, reduce the exchange rate volatility, reduce the market pressure, and naturally add foreign exchange liquidity into the market that is often characterized by the lack of supply.

Madura (1988) described some of the reasons why the central bank had to intervene foreign exchange markets. First, reducing sharp fluctuations (smoothing exchange rate movement). Second, creating an implicit boundaries like applying a band or a "target zone." Third, using a proactive measure against expectations or excessive market sentiment. Meanwhile, according to Arifin (1998) in a concrete intervention policies were intended to:
a. Maintaining the flexibility of the exchange rate level itself to stimulate the economy
b. Maintaining a rational equilibrium based on economic fundamentals
c. Maintaining medium and long-term stability by strengthening the fiscal and monetary policies.

In simpler context, the purpose of intervention was able to be interpreted as an effort to prevent currency "overshooting" and also provided a good balance in "demand" and "supply."

Indonesia Bank conducted interventions mainly through spot transaction. Some factors underlying the intervention choice through spot transaction are:
1. The volume of spot transactions is relatively larger on foreign currency market transactions. Thus, the intervention is expected to affect the exchange rate stability
2. Spot transactions potentially affects the price level directly
3. Spot transactions pattern may indicate speculators behavior
4. Spot transactions are able to reflect exchange rate volatility, so it can be used as a basis for intervention decisions consideration.

The foreign exchange market intervention conducted by Indonesia Bank in the spot transactions was organized from foreign exchange demand and supply of. The interventions data can be seen in Figure 1 (Warjiyo, 2013).

In conducting the intervention policy, Indonesia Bank was not only affecting foreign currency demand and supply, but also pursuing a policy related to Indonesia Bank regulations, namely: PBI No. 03/03/2001 concerning restrictions on rupiah transactions and credit in foreign currency by banks, PBI No. 6/20/PBI/2004 concerning regulations to fix the net open position, PBI No. 13/20/PBI/2011 concerning export foreign exchange receipts and foreign debt withdrawal.

In addition, Indonesia Bank also conducted direct and indirect supervision policies, as stated bellow:
1. Conducted indirect supervision by monitoring foreign exchange transactions. Commercial banks that conduct foreign exchange transactions have to submit daily reports through the Money Market Information Center
2. Held some on site supervisions on commercial banks that conducting foreign exchange trading activities.

The explanation reinforced the analysis that the rupiah was in disequilibrium state. In this case Indonesia Bank, as the monetary authority, conducted some policies or steps to stabilize rupiah in order to achieved equilibrium exchange rates position. The policies were conducted through transactions monitoring on foreign exchange markets, moral suasion and intervention from demand and supply in the foreign exchange market.

An exchange rate approach testing on PPP theory was conducted to support the rupiah exchange rate based on disequilibrium analysis conclusion. PPP theory states that the exchange rate of a currency is a price level ratio of each country in which the price level is calculated based on the money price of a reference commodity. In this study, PPP model involved short-term variable into the long-term dynamics as follows:

$$D \ln S_t = a_0 + a_1 D(INF_{t-1} - INF_{t-1}^*) + a_2 D(IRT_{t-1} - IRT_{t-1}^*)$$
$$+ a_3 D \ln(GDP_{t-1} - GDP_{t-1}^*) + a_4 D \ln(JUB_{t-1}$$
$$- JUB_{t-1}^*) + a_5 ECT$$

Where: S_t: Spot rate IDR/USD,
INF: Variable inflation,
IRT: Variable interest rate,
GDP: Variable gross domestic product,
JUB: Variable money supply,
ECT: Error correction term,
*: Foreign variable.

This study used 2000.1-2014.4 study period with quarter data. The PPP model test results by using error correction mechanism (ECM) are presented in Table 1.

ECM testing was conducted to acknowledge PPP model in short term. The decision was taken by viewing error correction term (ECT). ECT test result showed probability score of 0.6660. Based on the finding, it was concluded that PPP model in short term was unable to explain the exchange rate behavior in short term.

The underlying assumption of PPP model was an efficient commodity market in terms of the allocation, operations, pricing, and information. There were no restrictions or barriers

Figure 1: The movement of exchange rate and intervention of Indonesia Bank
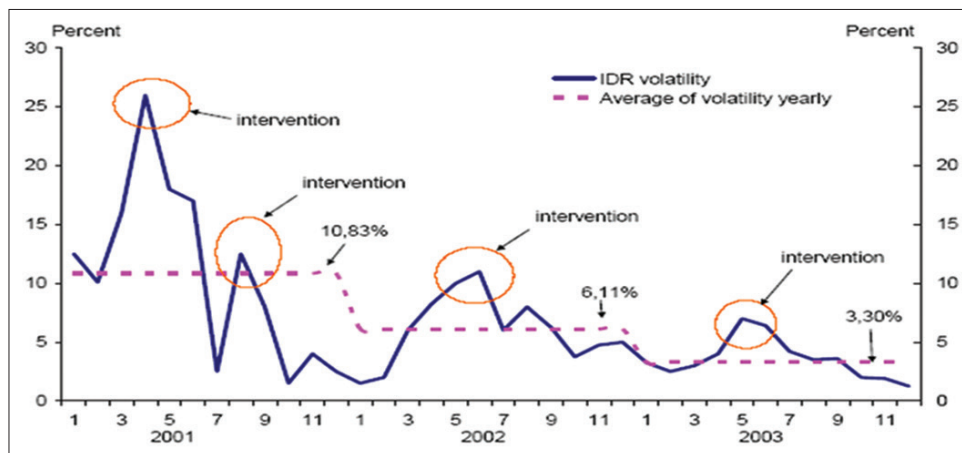
Source: BIS Papers no 73

Table 1: PPP model results

Variable	Coefficient	Standard error	P
C	9.008675	0.237468	0.0000
LGAPGDP	0.046504	0.078867	0.5584
LGAPJUB	−0.010325	0.061656	0.8678
GAPIRT	0.005357	0.006775	0.4333
GAPINF	0.004405	0.004746	0.3583
ECT	0.002026	0.004663	0.6660
R-squared	0.110351		
Adjusted R-squared	0.009255		
F-statistic	1.091543		
P (F-statistic)	0.378511		

ECT: Error correction term

in good trades, so that the price was flexible in terms of changes adjustment. The research results showed that the PPP model in the short term did not apply. It indicated that the market was not efficient so that the commodity market prices became rigid. The price rigidity caused automatic price adjustment did not work that led to market disequilibrium state.

The PPP case study results for Indonesia was consistent with previous research conducted by several researchers. Kravis and Lipsey (1998) examined the relationship between inflation and exchange rate by using a different price index. Variables used in the study include the gross national product deflator, the consumer price index, and the price index producer. The goods were distinguished into the one traded in international trade (tradable good) and the non-traded goods (non tradable good). The results showed that the lower PPP occurred on tradable goods. They also concluded that the PPP exchange rates failed in explaining the exchange rate.

The other research results that explained PPP model failure in explaining exchange rate performance were previously conducted by Acaravci and Acaravci (2007), Ilona (2013), and Hiroki and Chen (1998).

6. CONCLUSION

The Indonesia case results analysis showed that rupiah value showed disequilibrium conditions. The conclusion was based on some proofs:

a. Indonesia Bank conducted intervention on the foreign currency supply side that aimed to reduce rupiah volatility from market pressures
b. Indonesia Bank issued Indonesia Bank regulation that aimed to influence foreign currency demand and supply
c. PPP model test on rupiah showed that the PPP model was not applicable.

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