

The Role Of BI Rate And Exchange Rate Affect Inflation And Economic Growth In Indonesia (Before And After The Global Financial Crisis)

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ABSTRACT

This study tried to take a look at the role of BI rate and exchange rate affect inflation and economic growth before and after the global financial crisis, especially during implementation inflation targeting framework (ITF) regime in Indonesia. The purpose of this study was to compared the contribution of BI rate and exchange rate affect inflation and economic growth in period: before the global financial crisis and after the global financial crisis. In addition, this study also analyses the impact of the global financial crisis on each research variables either BI rate, exchange rate, inflation and economic growth in Indonesia by using VECM (Vector Error Correction Model) and add a structural break tests to indicate the period : before the global financial crisis and after the global financial crisis.

KEYWORDS: BI Rate, Exchange Rate, Inflation, Economic Growth, Inflation Targeting Framework (ITF), Global Financial Crisis, VECM, Structural Break

INTRODUCTION

Inflation targeting usually always associated with interest rate [1][2], while the role of exchange rate often overlooked. Involve exchange rate as one of the monetary policy stance will dilute the effectiveness of monetary policy itself, it related with impossible trinity conditions faced by most developing countries. However, there is evidence: countries that implement inflation targeting can still improve their exchange rate condition, especially after crisis 1997-1998 [3]. Based on experience of Chile during the crisis 1997-1998, when exchange rate was far below from their equilibrium. It was not the right time to put aside the importance of exchange rate in the economy [4]. Parrado [5], Cavoli and Rajan [3] find that exchange rate control reasonable to be implemented. Debelle [2] as well as Williamson [6] found that there is a large enough space to managed exchange rate for countries that choose inflation targeting. On the other hand, according to Trevino [7] there was a big debate about the importance of external variables such as exchange rate in monetary policy framework, especially in a small open economy.

Although interest rate is the basis in inflation targeting for most Asian countries, the strength relationship between exchange rate and other macroeconomic variables such as inflation and economic growth, give consideration about the role of the exchange rate in economy. Exchange rate is one of economic indicators that highly responsive to changes in economic condition, especially related with external shock such as economic crisis. In the implementation of inflation targeting framework (ITF) in Indonesia, BI rate is used as a main signal (stance) of monetary policy, when ultimate objective of monetary policy is inflation. However, to control inflation by BI rate was still not enough. BI rate just only affects inflation from internal economy. While inflation from external economy more generally associated with change in exchange rate.

During the implementation of inflation targeting framework (ITF) in Indonesia, one of the crisis that needs attention is the global financial crisis that began with subprime mortgage crisis in United States in 2008. Subprime mortgage crisis in U.S. has turned into a global financial crisis over the perceived negative impact, not only for U.S. economy but also world economy (which is marked by slowing growth of world economy). Adler and Tovar [8] stated that the emerging market economies become more vulnerable to global financial shocks, considering the condition of their macroeconomic fundamentals and increasing of economic integrity of these countries into the world economy. Crisis that began in U.S in the late 2008 perceived negative impact to the entire world and emerging market countries in 2009, including Indonesia. Consider that inflation targeting framework (ITF) is a monetary policy regime prevailing in Indonesia and Indonesia is small open economy that vulnerable to external shocks such as the global financial crisis, so this research also very necessary.

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THEORY AND LITERATURE

The Monetary Transmission Mechanism

Taylor [9] stated that the monetary transmission mechanism is the process through which monetary policy decisions are transmitted into changes in GDP and inflation. According Pohan [10] monetary transmission mechanism start when monetary authorities or the central bank acts used monetary instruments in implementing monetary policy until affect the economic activity. The monetary transmission mechanism is often referred as a black box [11]. The reason is because the monetary transmission is much influenced by three factors:

- 1) Changes in central bank's behavior, banks and economic agent in an economic and financial activity.
- 2) The time lag since actions of monetary authorities to achieve goal.
- 3) Change in the channels of monetary transmission it self according with the economic development of the country concerned.

Monetary policy affects economic activity through various channels of monetary transmission. Two channels are the focus in this study : interest rate channel and exchange rate channel.

a. Interest rate channel

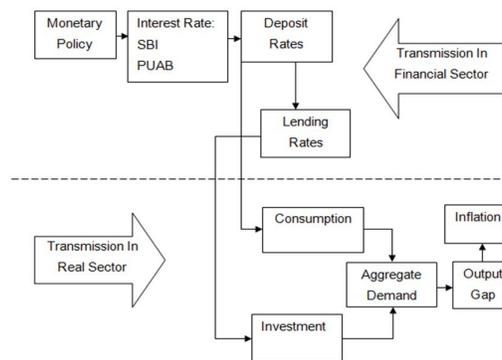


Figure 1. Interest rate channel [12]

b. Exchange rate channel

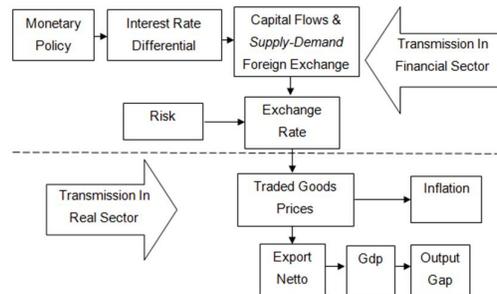


Figure 2. Exchange rate channel [12]

Type of Inflation Targeting Framework (ITF)

- a. Strict inflation targeting : monetary authorities only care about the achievement of the inflation target.
- b. Flexible inflation targeting : monetary authorities also consider other matters such as stability of output growth and exchange rates [13].

Taylor Rule [14]

$$i_t = r^* + \Delta p_{t+1}^e + a_y \cdot (\Delta y_t - \Delta y^*) + a_p \cdot (\Delta p_t - \Delta p^*) \dots \dots \dots (1)$$

Note:

- i_t = nominal Taylor-rate in period t.
- r^* = real equilibrium rate.
- $\Delta p_{t+1}^e + 1$ = expected inflation (prevailing in period t+1).

- Δy_t = change in actual real output.
- Δy^* = change in trend output.
- Δp_t = actual inflation.
- Δp^* = target inflation.
- ay, ap = weightings for the output gap ($\Delta y_t - \Delta y^*$) and the inflation gap ($\Delta p_t - \Delta p^*$) respectively, and have positive weights (ay, ap > 0).
- Δ = annual changes.

If the economy has a trend above-average growth (actual inflation exceeds target inflation) the central bank will have to raise short-term interest rate (other things being equal). However, if the economy is growing below its potential level (actual inflation is smaller than target inflation) the central bank should cut interest rates (other things being equal). If output gap and inflation gap is zero (equilibrium) monetary policy will be neutral in terms of affecting the real output and inflation [15].

Impossible Trinity

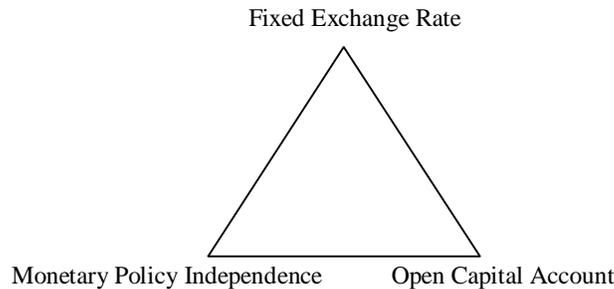


Figure 3. Impossible Trinity [16]

Obstfeld [17] argues that impossible trinity is one of the problems faced in implementation of monetary policy. Exchange rate stability, capital mobility freedom and independence of monetary policy can not be done simultaneously. Policy makers must decide which of the final three targets which will be released / sacrificed.

Purchasing Power Parity (PPP)

Table 1.Type Of Purchasing Power Parity (PPP)

No	Doctrine, Model	Theoretical Description
1	Doctrine PPP by Cassel [18]	Absolute version of PPP : exchange rate of two countries is positively related to the relative prices of two countries.
2	Doctrine PPP by Cassel [18]	Relative version of PPP: depreciation / appreciation of the domestic currency is positively related to the difference between domestic and foreign inflation rates.

Source : Kharie [19]

Exchange Rate Pass-through

The percentage changes of the prices of imported goods because one percent changes of exchange rate of two countries that conduct trade [20].

- a. Direct Pass-through : exchange rate movements can affect inflation through import prices directly.
- b. Indirect Pass-through : exchange rate movements through indirect pass-through will have an impact on changes in the purchasing power / public demand and changes in domestic supply of goods as a result of export-import activities [21].

International Fisher Effect (IFE) [22]

$$e_t = (1 + i_h) / (1 + i_f) - 1 \dots \dots \dots (2)$$

Note: e_t = change in exchange rate.
 i_h = rupiah interest rate.
 i_f = USD interest rate.

Theory of International Fisher Effect (IFE) states that the difference in interest rates between the two countries will be closely linked to expectations of changes in currency exchange rates of the two countries. If interest rate of rupiah higher than U.S dollar interest rate, investors will tend to exchange USD to rupiah because it provides a higher return, it will make the exchange rate strengthened / appreciated.

Inflation

Based on Neo - Keynesian economic theory in Gordon [23] Indonesian inflation determinants approach can be described as follows :

a. Demand Pull Inflation :

This Inflation happen because the demand is greater than supply (increase in aggregate demand is greater than the amount of goods and services offered). The increase in demand for goods (aggregate demand) can be caused by several things (increase of government spending, increase in foreign demand for exports goods, increase expenditure of private investment, etc).

b. Cost Push Inflation :

Commonly, it is called supply - shock inflation when the level of supply goods and services low because the rising costs of activities producing goods and services in economy. When the cost of production goods and services increase, it will increase the price of output in economy. The increase in production costs can be caused by several things, such as rising prices of raw materials or due to rising fuel prices [24].

Economic Growth Theory

a. Neoclassical Growth Theory

Solow [25] stated that economic growth is supported by capital accumulation with diminishing rate in the long run. Countries will reach steady-state level in the long run : stagnation of economic growth. Todaro and Smith [26] : the implications of this growth model is that the underdeveloped countries with open economies can finally catch up with developed countries because capital will flows from developed to underdeveloped countries (that offer higher profits on investment).

b. New Growth Theory

Countries not always get steady-state in the long run. Bhagwati [27] show that trade policy plays an important role of distributing positive externalities in a country. In this case, a country with export orientation will have a higher growth rate. Meanwhile, the new growth theory stated that trade is also important for creating sustainable economic growth in the long run.

Literature Studies

Previous research related to the role of interest rate and exchange rate affect inflation and economic growth, especially if it associated with inflation targeting :

- a. Amato and Gerlach [28] found that Inflation targeting has been successfully introduced in emerging markets and transition economies (EMEs). The exchange rate has played a relatively larger role, especially related to financial structure of emerging markets and transition economies (EMEs). Inflation targeting has been running side by side with exchange rate management though sometimes conflicts between the achievement of inflation target and exchange rate management.
- b. Cavoli [29] found a strong association related interest rate on inflation and output in case of Korea and Thailand compared to case of Indonesia and Philippines. On the other hand, exchange rate does not reflect the monetary policy response, both in terms of inflation and output (because of the parity conditions associated with exchange rate).
- c. Civcir and Akcaglayan [30] examined the monetary policy of Central Bank of Republic of Turkey (CBRT) during period 1987:01 - 2001:12 and 2002:01 - 2009:05 to investigate how monetary policy to response shock of exchange rate before and after the implementation inflation targeting regime. Results: there has been strong exchange rate pass-through during the entire study period. In post-crisis period, exchange rate has been the main variables of concern CBRT.
- d. Garcia, Restrepo, and Roger [31] found that smoothing exchange rate help the economy to be strong as financial, especially in developing countries that vulnerable with the global economy shock. The financial sector is likely to derive benefit from smoothing exchange rate movements, especially when the economy hit by demand shock and become more vulnerable.
- e. Golinelli and Rovelli [32] found that Czech Republic, Hungary and Poland experienced a significant decline in inflation after the adoption of ITF. Although, effect of interest rate and exchange rate on aggregate demand is significant, but for Republic of Ceko influence interest rates on aggregate demand tends to take a long time when compared to other countries.
- f. Lim [33] : (i) monetary policy in Korea under IT is always associated with fluctuations in exchange rate and output, (ii) an increase exchange rate flexibility under the IT regime has contributed to instability output, (iii) consider the stability of exchange rate as one of intermediate goals in implementation of monetary policy.

- g. Mishra and Mishra [34]: the results of this study indicate that the effect of interest rate tends to be much stronger than effect of exchange rate. In addition conflict between exchange rate and interest rate is one of the main dilemmas of monetary policy in inflation targeting regime, especially for open economies.
- h. Mollick, Rene and Carneiro [35] found that adoption of full IT regime will push higher output per capita income for industrial and developing economies. However, it is lower in emerging markets than industrial countries. This might be problems of the lag and credibility (the emerging market economies adopted IT regime slower than industrial economies).
- i. Parrado [5] focuses on the Chile's economy found that the impact / effect of inflation targeting depend on exchange rate regime and targeted inflation index. Flexible exchange rates will be more dominant than managed exchange rates. On the other hand, a more flexible inflation targeting is superior to strict inflation targeting.
- j. Pavasuthipaisit [36] discusses whether optimal for central banks that implement inflation targeting to respond exchange rate movements. This study found that exchange rate movements can provide a signal related to economic development. When the degree of exchange rate pass-through and international financial integration tends to be high, it is optimal time for the central bank to give more attention to exchange rate movement.
- k. Pourroy [37] investigated the role of exchange rate in inflation targeting in developing countries and find strong evidence that exchange rate strategy plays a major role during inflation shock in 2007-2008. Management of nominal exchange rate give stronger anchor (better resistance to inflation shock in 2007-2008).
- l. Tesfaselassie, Schaling and Eijffinger [38] found that under flexible inflation targeting regime and the uncertainty in economy, optimal interest rate rule which is run by the central bank becomes very important. But on the other side, monetary policy also faces a tradeoff : stability of short- term inflation and interest rate (as a policy instrument).
- m. Wing [39] found that exchange rate rule gives lower deviations for GDP and inflation when compared with interest rate rule, especially when an economy has a high degree of openness. This study also shows that exchange rate rule can be a better rule of monetary policy when compared with interest rate rule, especially for countries that face competitive export market.

Previous research regarding impact of the global financial crisis in Indonesian economy:

- a. Kurniati and Permata [40] highlight the importance of external factors influencing the performance of Indonesian economy. The consequences of the global financial crisis: (i) the high level of uncertainty in financial markets that triggered global investor risk aversion behavior and negatively impact capital flows in Indonesia : the capital outflows in significant quantities and causes rupiah depreciated sharply in a short time, (ii) decline in global economic growth, represented by the growth of US have a significant effect on Indonesian economy growth.
- b. Nezky [41] found that: (i) crisis in United States significantly influence Indonesian capital market. IHSG decline tends to make investors withdraw their money from stock market, to provide downward pressure on rupiah, (ii) decrease in U.S purchasing power since the financial crisis affecting trade between U.S. and other countries that make U.S. as a export destination country. Countries directly affected by crisis are countries that make U.S as the biggest export market such as: China, Japan, Germany, and Indonesia.
- c. Raz *et al* [42] investigated the impact of 1997 financial crisis and 2008 global financial crisis on the economies of East Asia (China, Japan, South Korea and the ASEAN-5: Indonesia, Malaysia, Philippines, Singapore, and Thailand). In particular, the impact of financial crisis on economic growth in East Asian economies. The existence of second financial crisis in East Asia is significantly caused the East Asian economies experienced negative economic growth.
- d. Silalahi and Chawwa [43] found that : (i) Indonesia has been affected by the impact of retention capital flows in emerging economies and a decline of economic growth due to the global financial crisis, (ii) cooperation and coordination among policy makers very important in overcoming the crisis.

DATA, METHOD AND EMPIRICAL MODEL

The data used in this study is a secondary data and monthly, beginning in 2005:10 to 2012:12. Data of variables such as BI (BIRATE), exchange rate (EXC), inflation (INF) and economic growth (GROWTH) collected from various sources. Data used in the study was obtained from Economical Statistic and Monetary of Indonesia (Statistik Ekonomi dan Keuangan Indonesia - SEKI) published by Bank Indonesia, IFS (International Financial Statistics) published by IMF (International Monetary Fund), World Economic Outlook published by IMF (International Monetary Fund). Estimation technique in this study using VECM (Vector Error Correction Model) with adds structural break tests (Zivot-Andrews test and Chow test). The empirical model used in this study refers to the model of research conducted by Kharie [19].

$$\Delta INF_t = \alpha_1 + \alpha_{INF} \hat{e}_{t-1} + \sum_{j=1}^n \alpha_{11} \Delta INF_{t-j} + \sum_{j=1}^n \alpha_{12} \Delta GROWTH_{t-j} + \sum_{j=1}^n \alpha_{13} \Delta BIRATE_{t-j} + \sum_{j=1}^n \alpha_{14} \Delta EXC_{t-j} + \beta_1 DUMMY_t + \epsilon_{INF_t} \dots \dots \dots (3)$$

$$\Delta GROWTH_t = \alpha_2 + \alpha_{GROWTH} \hat{e}_{t-1} + \sum_{j=1}^n \alpha_{21} \Delta GROWTH_{t-j} + \sum_{j=1}^n \alpha_{22} \Delta INF_{t-j} + \sum_{j=1}^n \alpha_{23} \Delta BIRATE_{t-j} + \sum_{j=1}^n \alpha_{24} \Delta EXC_{t-j} + \beta_2 DUMMY_t + \epsilon_{GROWTH_t} \dots \dots \dots (4)$$

$$\Delta BIRATE_t = \alpha_3 + \alpha_{BIRATE} \hat{e}_{t-1} + \sum_{j=1}^n \alpha_{31} \Delta BIRATE_{t-j} + \sum_{j=1}^n \alpha_{32} \Delta INF_{t-j} + \sum_{j=1}^n \alpha_{33} \Delta GROWTH_{t-j} + \sum_{j=1}^n \alpha_{34} \Delta EXC_{t-j} + \beta_3 DUMMY_t + \epsilon_{BIRATE_t} \dots \dots \dots (5)$$

$$\Delta EXC_t = \alpha_4 + \alpha_{EXC} \hat{e}_{t-1} + \sum_{j=1}^n \alpha_{41} \Delta EXC_{t-j} + \sum_{j=1}^n \alpha_{42} \Delta INF_{t-j} + \sum_{j=1}^n \alpha_{43} \Delta GROWTH_{t-j} + \sum_{j=1}^n \alpha_{44} \Delta BIRATE_{t-j} + \beta_4 DUMMY_t + \epsilon_{EXC_t} \dots \dots \dots (6)$$

Note:

- INF_t = inflation rate in Indonesia (%).
- GROWTH_t = economic growth in Indonesia (%).
- BIRATE_t = BI rate is the short-term interest rate announced by Bank Indonesia as a periodic signal (stance) monetary policy.
- EXC_t = exchange rate (rupiah against the U.S. dollar).
- DUMMY_t = dummy variable (period : before and after the global financial crisis)
- Δ = first different notation.
- α = constant
- α_{mn,l} = parameter of variable in the equation are given.
- β = parameter of dummy variables in the equation is given.
- ê = error correction term of long-term equilibrium regression.
- ε = error term of each equation.

EMPIRICAL RESULTS

Structural Break Test

The structural break tests on this study is using Zivot-Andrews test and also conducted Chow test to reinforce the findings of Zivot-Andrews test .

a. Zivot-Andrews test

Table 2. Zivot-Andrews test

Variable	Chosen Break Point	Zivot Andrews t-statistic	Critical Value and stationary
BI RATE	2009M04	-3.568339	1%, 5% dan 10% (nonstationary)
EXC	2009M04	-11.38338	1%, 5% dan 10% (stationary)
INF	2009M05	-2.891753	1%, 5% dan 10% (nonstationary)
GROWTH	2008M08	-12.02531	1%, 5% dan 10% (stationary)

Source: E-views 7.1 Estimation (edit)

Table 2 show that only two variables are stationary at α = 1%, 5% and 10% (variable GROWTH and EXC) with each structural break in period 2009M04 and 2008M08. Zivot-Andrews test above shows that in fact the global financial crisis that occurred in the period 2008-2009 and has a significant impact on Indonesian macroeconomic variables, although with different periods of structural breaks. Structural break period in variable GROWTH is relatively more quickly : 2008M08, because GROWTH is directly affected by the subprime mortgage crisis (first round effect). On the other hand structural break in variable EXC is in period 2009M04. In this case EXC affected by second round effect of subprime mortgage crisis that has expanded into a global financial crisis. Therefore, this research is more focused on impact of the global financial crisis so structural break period is in 2009M04.

b. Chow test

Table 3. Chow test

Chow Breakpoint Test: 2009M04			
Null Hypothesis: No breaks at specified breakpoints			
Varying regressors: All equation variables			
Equation Sample: 2005M10 2012M12			
F-statistic	6.220830	Prob. F(4,79)	0.0002
Log likelihood ratio	23.82238	Prob. Chi-Square(4)	0.0001
Wald Statistic	24.88332	Prob. Chi-Square(4)	0.0001

Source : E-views 7.1 Estimation (edit)

This study also conducted Chow test to reinforce the findings of Zivot - Andrews test. Chow test results in table 3 indicate that breakpoint period was significant in period 2009M04, it can be seen from F-statistic probability value: 0.0002. Based on the results of structural break test either using Zivot-Andrews test and the Chow test dummy variables can be used in this study (where period 2005:10 to 2009:03 is period before the global financial crisis and period 2009:03 to 2012:12 is period after the global financial crisis).

Contribution Of BI Rate And Exchange Rate To Influence Inflation And Economic Growth In Indonesia (Before And After Crisis)

a. Contribution Of BI Rate To Affect Inflation In Indonesia (Before And After The Global Financial Crisis).

Table 4. Average Contribution Of BI Rate To Affect inflation In Indonesia (Before And After The Global Financial Crisis)

Before The Global Financial Crisis	After The Global Financial Crisis
23.26 %.	13.57 %.

Source: E-views 7.1 Estimation (edit)

In period before the global financial crisis : contribution of BI rate to affect inflation rate in Indonesia is quite dominant, especially since the implementation of full-fledged inflation targeting framework in 2005 where BI rate used as the only policy reference, replaces monetary aggregates. Some advantages of BI rate as policy reference : the transmission mechanism through interest rates had higher information content than monetary aggregates, interest rate signals are very easy to understand public, easier expectations formation. In period after the global financial crisis: contribution BI rate to affect inflation rate decline significantly. One reason is that the characteristics of Indonesian inflation tend to be supply-side bias : high level of sensitivity of inflation from supply side developments. As it is known that monetary policy (by BI rate) only affects the inflation that comes from demand side and has limitations in addressing inflationary problems on supply side. In addition, ITF has indeed been applied in Indonesia for a long time with BI rate as the only policy reference, but in reality the expectations of economic agents was still to be backward looking (still sticking to the inflation that occurred in previous period).

The limitations of monetary policy to affect inflation rate in Indonesia : monetary policy through BI rate is generally only affect inflation from the demand side especially related to core inflation, while the impact on inflation from the supply side such as administered prices (inflation associated with the development of prices of goods and services are generally regulated by the government) and volatile goods price (inflation associated with the development of prices goods and services that highly volatile, and is generally influenced by a temporary shock such as harvesting, natural disasters, disease disorders, and disorders of the distribution) less visible. Bank Indonesia has had a major instrument of independency, but the goal independency has not been fully achieved. The central bank should coordinate policy with the government (coordination between BI as the central bank and government needed to control inflation, so the inflation target can be achieved). Contribution of BI rate affect the inflation rate in Indonesia has declined significantly since period before the global financial crisis to period after the global financial crisis. These results are consistent with research conducted by Cavoli [29]. On the other hand, contrast to some studies : Golinelli and Rovelli [32], Mishra and Mishra [34], Tesfaselassie, Schaling and Eijffinger [38]. The difference between the other results and this study may be caused by differences study period between this study with previous study, differences country case between this study with previous studies and inclusion of the effect global financial crisis (which represents the condition of structural break) in this study compared with previous studies.

b. Contribution Of BI Rate To Affect Economic Growth In Indonesia (Before and After The Global Financial Crisis).

Nominal contribution BI rate to economic growth in period before the global financial crisis still relatively small : the high interest rate spread between deposit rates and lending rates set by banks is one of the reasons. According to Nasution [44] high NIM (net interest margins) in the banking sector was not matched by cost of banking operations (BOPO). In ASEAN region, Indonesia's banking industry has higher cost of banking operations (BOPO). This is a contradiction with the net interest margin (NIM) of banks which also highest position. In period after the global financial crisis, role of BI to drive portfolio investment in Indonesia need to be consider. This is in line with economic growth theory by Solow. Solow [25] stated that accumulation of capital acts as an engine of economic growth in short term. Effect of BI rate to investment and consumption through deposit rates and lending rates will affect the magnitude of aggregate demand, which will affect the economic growth. BI rate also plays a role to drive portfolio investment in Indonesia. As it is known that economic growth in Indonesia, more driven by financial sector which tends to be dominated by portfolio investment (in the form of stocks, bonds and other equity) that come from foreign investors (usually short term). Overall, contribution of BI rate to economic growth since period before the global financial crisis to period after the global financial crisis show drastic improvement trend (BI rate not only play a role in controlling inflation but also affect economic growth). This indicates that inflation targeting in Indonesia is flexible (flexible inflation targeting) where the monetary authority also pay attention to other things (stability of output growth). Inflation has become a primary goal of monetary policy but it does not mean that achievement of economic growth in ITF (inflation targeting framework) become neglected. Several studies related are : Cavoli [29], Golinelli and Rovelli [32], Mollick, Rene and Carneiro [35].

Table 5. Average Contribution Of BI Rate To Affect Economic Growth In Indonesia (Before And After The Global Financial Crisis)

Before The Global Financial Crisis	After The Global Financial Crisis
0,82 %.	26 %.

Source: E-views 7.1 Estimation (edit)

c. Contribution Of Exchange Rate To Affect Inflation In Indonesia (Before And After The Global Financial Crisis).

Table 6. Average Ccontribution Of Exchange Rate To Affect Inflation In Indonesia (Before And After The Global Financial Crisis)

Before The Global Financial Crisis	After The Global Financial Crisis
0.49 %.	1.95 %.

Source: E-views 7.1 Estimation (edit)

In period before the global financial crisis (especially at the beginning of implementation ITF in Indonesia) exchange rate is allowed to follow demand and supply in foreign exchange market. This is in line with exchange rate regime in Indonesia: free floating exchange rate regime. One of the consequences of implementation ITF in Indonesia : the external side of economy related to exchange rate tends to be sacrificed. On other hand, inflation in Indonesia was more influenced by internal than external side. In period after the global financial crisis, as long as increasing of economic integrity between indonesia's economy and world economy. Exchange rate will ultimately play an important role for monetary policy especially related to external shock in the economy such as economic crisis. These findings are also supported by several studies : Amato and Gerlach [28], Covicir and Akcaglayan [30], Parrado [5], Pavasuthipaisit [36], Pourroy [37], Wing [39]. Nevertheless this study is contrary to research Cavoli [29].

Contribution of exchange rate to affect Inflation in Indonesia in line with exchange rate pass-through theory : direct exchange rate pass-through and indirect exchange rate pass-through. The effect of exchange rate on inflation is indirectly reflected cost push inflation theory. The development of exchange rate affects pattern formation prices by producer and inflation expectations in public (especially related goods and services imported from abroad : as goods and raw materials). When there is a depreciation of the domestic currency, imported goods will become more expensive so it will affect the formation of prices of domestic goods. On the other hand, as it is known that most of domestic industrial sector in Indonesia need imported raw materials. When the domestic currency depreciates it increase the price of imported raw materials, then it will directly affect cost production of domestic industry that will ultimately affect prices of goods in society. Despite this, evidence for theory of PPP (purchasing power parity), which changes in exchange rate in some period will be proportional to changes in the price level prevailing in two countries during the same period [21] needs to be reassessed .

d. Contribution Of Exchange Rate To Affect Economic Growth In Indonesia (Before And After The Global Financial Crisis).

Table 7. Average Contribution Of Exchange Rate To Affect Economic Growth In Indonesia (Before and After The Global Financial Crisis)

Before The Global Financial Crisis	After The Global Financial Crisis
0,43 %.	18,89 %.

Source: E-views 7.1 Estimation (edit)

Contribution of exchange rate affect economic growth show drastic improvement trend since before the global financial crisis until after the global financial crisis. This is consistent with several studies : Golinelli and Rovelli [32], Lim [33], Wing [39]. In this case, exchange rate can affect economic growth through two sides : production and export side. Depreciation will benefit the domestic production sector (increased levels of production due to lower raw material costs of production), especially for the industrial sector which highly dependent on imported raw materials (having a high dependence on imported raw materials). The fall in prices of raw materials will increase the level of production that will ultimately increase domestic aggregate demand and economic growth consider Indonesia has a large share of domestic market, higher domestic demand and consumption levels. On the other hand, despite the appreciation of the exchange rate is in good condition but on the other hand actually have a negative impact on export demand (a decline in export demand because domestic goods prices tend to be more expensive than foreign goods prices). Different conditions seen when domestic exchange rate depreciate, export demand is likely to increase as domestic goods cheaper than foreign goods. Increased demand for exports led to increased export revenue and will ultimately affect the aggregate demand and contribute to economic growth.

Impact Of The Global Financial Crisis On Each Research Variables

This chapter analyzes the impact of the global financial crisis on each research variables either BI rate, exchange rate, inflation and economic growth in Indonesia. Indicate by the probability of each research variable, by compared with $\alpha = 1\%$, 5% and 10% .

Table 8. Impact Of The Global Financial Crisis On BIRATE, EXC, INF And GROWTH In Indonesia

Variable	T-statistic	Probability
BI RATE	-2.205664	0.0282
EXC	-8.200468	0.0000
INF	-0.206408	0.8366
GROWTH	-4.195804	0.0000

Source: E-views 7.1 Estimation (edit).

a. Impact Of The Global Financial Crisis On Exchange Rate In Indonesia.

According to table 8, the global financial crisis had significant impact on economic growth. As we knew that the financial sector in Indonesia tend to be dominated by portfolio investment (in the form of stocks, bonds or other equity) are largely derived from capital flows of foreign investors. Kurniati and Permata [40] also found that the initial consequences of the global financial crisis : high uncertainty in the financial markets that triggered the global investor risk aversion behavior that negatively impact capital flows in Indonesia. Behavioral risk aversion causes the deleveraging activities (foreign investors are experiencing liquidity problems forced to withdraw their funds from Indonesia), as well as the flight to quality (the action of the asset portfolio adjustment is deemed risky to safer assets).

Basri [45] stated that the impact of the global financial crisis of 2008-2009 clearly visible on one of the portfolio investment instruments: stocks. Indonesian stock market experienced a remarkable fall of great (as indicated by the sharp drop IHSG). BEI even had experienced closures (temporary cessation of the transaction) on October 8, 2008 due to concern IHSG destruction because the increased of massively capital outflow by foreign investors. Increased capital outflows related to the tightening of global liquidity post-crisis, when most of developed countries that affected by crisis are need supply of funds, especially from developing countries such as Indonesia (transfer of dollars assets by foreign investors in significant numbers). The higher demand of foreign exchange rate at the time eventually led to rupiah under heavy pressure, so the depreciation can not be avoided.

b. Impact Of The Global Financial Crisis On Economic Growth In Indonesia.

Based on table 8, the global financial crisis had significant impact on economic growth. For Indonesia case, Silalahi and Chawwa [43] explains that a negative shock from decrease of U.S. growth causes contemporary decrease on Indonesian exports which in decrease real domestic growth (slowdown of world economic growth leads to weakening global demand and the slump in world commodity prices exacerbate the Indonesian export earnings). Nezky [41] adds that : the countries directly affected by the crisis is countries that

make the U.S. as the largest export market such as China, Japan, Germany, and Indonesia. Meanwhile, according to Basri [45] Indonesian economic growth decrease was primarily due to reduced demand for exports to developed countries after the crisis which is also followed by a decline in primary commodity prices in international market. As it is known that primary commodity is a main commodity of Indonesian exports. Silalahi and Chawwa [43] explains that the primary sector, especially oil, natural gas, mining and agricultural commodities have a large proportion of the exports of Indonesia. Dependence on the primary sector exports make Indonesia more easily affected by external shocks, especially fluctuations in international commodity prices.

Despite a significant decline in economic growth in post-crisis but Indonesia's condition are still far better than other countries : developed countries and other Asian countries are mostly experienced negative economic growth. This is not apart from the relatively small contribution of exports to economic growth Indonesia, which was only 25 %. In addition, developed countries no longer become the main destination countries of Indonesian exports, as long as diversified Indonesia's export destinations. So the contagion effect of crisis through trade can be minimized. This result seems a bit different from the concept of new growth theory. Especially that related the importance of the role of trade (exports) in creating sustainable economic growth in long term. Higher dependence on exports, although in order to drive economic growth, only make the economy more vulnerable to external shocks such as crisis .

c. Impact Of The Global Financial Crisis On BI Rate In indonesia.

BI rate is also significantly affected by the global financial crisis. According Silalahi and Chawwa [43]: global liquidity pressures have led to an short term portfolio capital outflow and followed by a massive drop in Indonesian financial market. As a result, the central bank should raise interest rates policy. Besides aiming to anticipate inflationary pressures as second round effects of the global financial crisis, the increase in the policy rate is also intended to improve the condition of the exchange rate depreciated sharply during the crisis. The condition in line with the theory of the International Fisher Effect (IFE) : at that time, BI's policy to raise interest rates is contrary to other central banks in other countries that had lower interest rates. Although the BI's policy is unconventional at the time, but this policy is proved effective to minimize impact of the global financial crisis. Higher BI rate level makes foreign capital flows back into Indonesia. Developed countries like U.S. and Euro Area that previously received the title as the save heaven countries for investors becomes unattractive as long as the decline interest rates in these countries (even reaching the level of 0 %), in other side the higher level of interest in regional Asia especially Indonesia would be a magnet for the investors to move their funds to Asia countries including Indonesia. The increase of capital inflow into Indonesia after the global financial crisis give positive effect when Indonesia get investment grade predicate in 2012 after sustainable crisis that happen : supprime mortgage crisis, the global financial crisis and European debt crisis in 2011. This is in line with neoclassical growth theory. Solow [25] stated that economic growth is supported by capital accumulation with diminishing rate in the long run. Countries will reach steady-state level in the long run : stagnation of economic growth. Todaro and Smith [26] : the implications of this growth model is that the underdeveloped countries with open economies can finally catch up with developed countries because capital will flows from developed to underdeveloped countries (that offer higher profits on investment).

d. Impact of the Global Financial Crisis on Inflation in Indonesia.

Based on table 8, the global financial crisis had no significant impact on inflation. It is because anticipant policy that conducted by BI as the central bank which increase the policy interest rate (BI rate) during the global financial crisis. According Silalahi and Chawwa [38]: at that time, the BI policy to raise interest rates is contrary to other central banks in other countries that had lower interest rates. The increase of policy interest rate because massively capital outflow in early global financial crisis, but it also aims to prevent inflationary pressures as second round effects of the global financial crisis. The increase of policy interest rate in accordance with Taylor rule : the conduct of monetary policy should be used short-term interest rates as the main instrument for achieve economic stability in short term and low inflation in long term. If the actual inflation exceeds target inflation, central bank should raise short-term interest rate, other things being equal [15].

CONCLUSION

- a. There a shifting role of Bi rate in Indonesia's economy (as long as the decreasing of BI rate's contribution to influence inflation and the increasing of BI rate's contribution to influence economic growth in period : after the global financial crisis). BI rate not only play a role in influencing inflation but also play a role to drive economic growth in Indonesia. This indicates that inflation targeting in Indonesia is flexible (flexible inflation targeting), inflation has become a primary goal of monetary policy but it does not mean that achievement of economic growth in ITF (inflation targeting framework) become neglected.
- b. The role of exchange rate in Indonesia's economy becoming more crucial (as long as the increasing of exchange rate's contribution to influence inflation and economic growth, in the period : after the global financial crisis). The strong relationship between exchange rate and other macroeconomic variables such as

- inflation and economic growth, give consideration about the role of exchange rate in a small open economy like Indonesia.
- c. The global financial crisis had a significant impact on macroeconomic variables in Indonesia. The global financial crisis significantly impacted exchange rate, economic growth and BI rate. On the other hand, the global financial crisis has no impact on inflation because the anticipation policy that conducted by BI as central bank of Indonesia to minimize sustainable impact of the global financial crisis on inflation.

RECOMMENDATION

- a. Better coordination between Bank Indonesia and government needed to control inflation as long as the declining contribution of BI rate to influence inflation in Indonesia. On the other hand, Bank Indonesia need to give more attention on BI rate's contribution to influence economic growth (BI rate not only play a role in influencing inflation but also play a role to drive economic growth in Indonesia).
- b. Bank Indonesia needs to review the role of exchange rate in Indonesia's economy (the increasing contribution of the exchange rate to influence inflation and economic growth in Indonesia). Indonesia is small open economy that susceptible to global economic shocks (global economic shocks can be directly transmitted to domestic economy as long as increasing of economic integrity between Indonesia's economy and world economy).
- c. The importance of cooperation and coordination among policy makers for responding and determine appropriate policies to overcome the negative impact of crisis (the anticipation policy is needed, so the negative impact of crisis can be minimized). On the other hand, the strengthening of domestic fundamentals macro economic also very necessary (domestic fundamentals macroeconomic indirectly reflect a country's economic endurance to external shocks such as crisis).

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