Interest Rate Pass-Through: The Case of Indonesia

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Abstact

This paper examines the direct and indirect interest rate pass-trough (IRPT) from policy interest rate (BI rate) to banks' retail interest rates in Indonesia during a full-fledged inflation-targeting regime. We use montly data of policy interest rate (BI rate) as well as interest rates for interbank money market (interbank), deposit, and loan during July 2005 to May 2015. We employ Error Correction Mechanism (ECM) and Ordinary Least Square (OLS) to find the significant of IRPT and the speed of adjustment process of IRPT. The study suggests the existence of direct and indirect IRPT in Indonesia. The change of policy rate is transmitted quicker in the direct channel compared to the indirect channel. However, indirect channel is more stable than the direct channel. We conclude that the direct and indirect IRPT are complementary.

Keywords: interest rate pass-through, interes rate, monetary policy.

Abstrak

Penelitian ini membahas transmisi jalur suku bunga (interest rate pass-trough (IRPT)) langsung dan tidak langsung dari suku bunga kebijakan (BI rate) ke suku bunga ritel bank selama penerapan rezim penargetan inflasi secara penuh di Indonesia. Kami menggunakan data bulanan suku bunga kebijakan (BI rate) serta suku bunga dari Pasar Uang Antar Bank (PUAB), simpanan, dan pinjaman. Periode penelitian mencakup Juli 2005 sampai Mei 2015. Studi ini menggunakan Error Correction Mechanism (ECM) dan Ordinary Least Square (OLS) untuk mengestimasi adanya transmisi dan kecepatan proses penyesuaian dari IRPT. Studi ini menemukan bahwa jalur transmisi lansung lebih cepat dibandingkan jalur transmisi tidak langsung sekalipun jalur tidak lansung lebih stabil. Kami menyimpulkan bahwa kedua jalur transmisi saling melengkapi.

Kata kunci: Transmisi jalur suku bunga, suku bunga, kebijakan moneter.

INTRODUCTION

Bank Indonesia (BI), as the central bank of Indonesia, has applied Inflation Targeting Framework (ITF) since July 2005. BI rate, the official interest rate, is used as the major instrument in ITF. Further, the effectiveness and speed of adjustment process of this official interest rate in influencing banks' retail interest rate determine the succes of monetary policy since it influences consumption, investment, and inflation. Utama et al. (2017) shows the interest rate (BI rate and the interbank money market interest rates) are an effective instrument in controlling inflation in Indonesia.

Interest rate transmission mechanism or interest rate pass-trough (IRPT) is one of the most important economic phenomena in pursuing an effective monetary policy. The effectiveness in achieving its goals is dependent on the speed of adjustment in the transmission and the margin between the retail interest rate and short-term interest rate (De Bondt, 2005) and the completeness of IRPT (Tang et al., 2015).

Literature on transmission mechanism of monetary policy assume the short-term market and retail banking rate follow the movement of monetary authority's target rate, that will be immediate and pass through completely. Grigoli and Mota (2015) found evidence of complete pass-through to retail rates in Dominican Republic, confirming the effectiveness of the monetary policy transmission mechanism. In addition, research by Wang and Lee (2009) and Haughton and Iglesias (2012), using US and nine Asian countries data, found complete pass through only in deposit rate in the US. Tai et al. (2012) examined the effectiveness of the transmission mechanism to retail interest rates in several Asian countries, such as Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore and Thailand and found that the degree of IRPT to lending rates are lower than deposit rates. Furthermore, IRPT to credit and deposit rates are slow and small in Indonesia, Phillipines, Korea and Thailand.

Other studies found evidence that IRPT to banking interest rate was incomplete. The studies found that changes in policy and/or money market rates do not affect short-term lending and deposit rates, however they do affect the long term lending rates (BIS, 1994, Cottarelli and Kourelis, 1994, Borio and Fritz 1995, Sander and Kleimeier, 2000, Donnay and Degryse, 2001, and De Bondt, 2005). De Bondt (2005), study European countries in period 1996-2001 and found that there are only less than 50 percent official interest rate transmitted in a month for short run deposit and lending rates, but is nearly 100 percent for long run lending rates. Tang et al.

(2015) study Malaysia in period January 1987 to December 2014 and also found an incomplete pass-through to deposit and lending rates. Horváth et al. (2004) analyzed the IRPT from money market to banks interest rate in Hungary period 1997-2004 for aggregate and 2001-2004 for individual bank. They found that IRPT to loan rate is more significant than to deposit rate. Sander & Kleimeierr (2004) and Égert, et al. (2006) compared direct and indirect IRPT. Sander & Kleimeierr (2004) study ten countries in Europe in January 1993-October 2002 and found that IRPT through overnight money market rate respond rapidly compared to market interest rate. The degree of IRPT to lending rates was higher than deposit rates and pass-through was also not complete.

Stanisławska (2014) make summary based on 17 studies of IRPT. First of all, transmission of interest rate is usually sluggish and sometimes incomplete. The speed of adjustment and scale of pass-through in the long run is heterogeneous across bank products. Typically, lending rates to firms adjust at the greater pace, while rates on consumer credit and on short-term deposits at slower pace.

The study of IRPT is essence to determine the reaction of banks, as financial intermediaries in economy, to official interest rates in Indonesia. This paper analyzes the direct IRPT that exist when official interest rates directly affect retail interest rates of bank. Furthermore, we also study the indirect IRPT that exist when policy rate influence retail interest rates trough money market interest rates[1]. In the current literature, there are a small number of empirical studies that analyze both the direct and indirect IRPT of monetary policies in Indonesia.

METHOD

This study uses monthly time series data of BI rate, interest rates of interbank money market (interbank), the deposit rate (tenor 1, 3, and 6 months) and loan rate for working capital, investment, and consumption in the period July 2005 to May 2015. Data is obtained from Statistik Ekonomi dan Keuangan (SEKI) Bank Indonesia. We employ Ordinary Least Square (OLS) and Error Correction Mechanism (ECM) to measure IRPT. The model estimated in this study can be illustrated in Figure 1. BI rate is the policy interest rate, PUAB is the interbank money market interest rates, while

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[1] Égert et al. (2006) define two types of IRPT, direct IRPT or monetary policy approach and indirect IRPT or cost of funds approach.

DR1, DR3, and DR6 are the deposit interest rates of 1, 3, 6 months consecutively. KRINV, KRINV, and KRKON is lending interest rates for working capital, investment, and consumption respectively. In Figure 1, the arrow shows the direction of the relationship. Arrow 1 to 6 illustrate the direct IRPT while 7 to 13 the indirect IRPT. Every arrow is estimated using a pair of long run and short run equation based on Engle Granger ECM model.

Figure 1. Model of direct and indirect IRPT
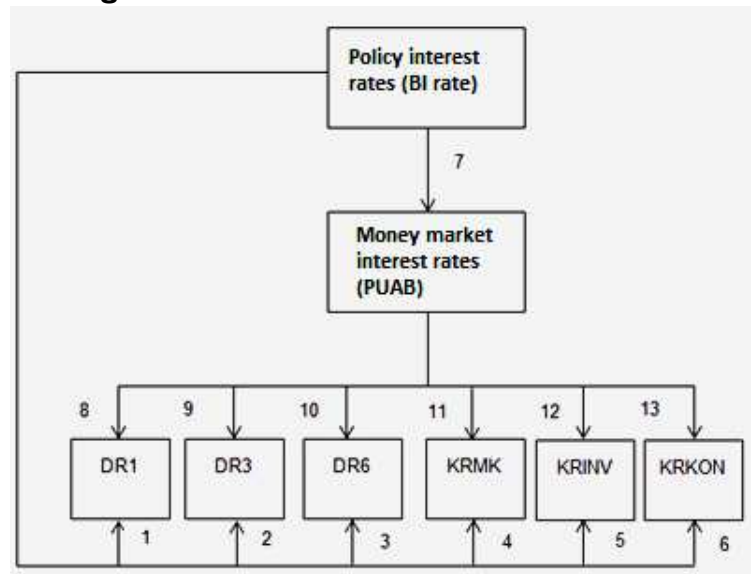
OLS and ECM estimate long run and short run as well as speed of adjustment on direct IRPT. The direct IRPT estimated using 6 pair of equations that are arranged based on model in Figure 1 (arrow 1-6). The equations are as follow:

$$DR1_t = \beta_0 + \beta_1 BIrate_t + e_t$$
$$\Delta DR1_t = \alpha_0 + \alpha_1 \Delta BIrate_t + \alpha_2 e_{t-1} + \varepsilon_t$$
$$e_{t-1} = DR1_{t-1} - \beta_0 - \beta_1 BI\,rate_{t-1} \qquad (1)$$

$$DR3_t = \beta_0 + \beta_1 BIrate_t + e_t$$
$$\Delta DR3_t = \alpha_0 + \alpha_1 \Delta BIrate_t + \alpha_2 e_{t-1} + \varepsilon_t$$
$$e_{t-1} = DR3_{t-1} - \beta_0 - \beta_1 BI\,rate_{t-1} \qquad (2)$$

$$DR6_t = \beta_0 + \beta_1 BIrate_t + e_t$$
$$\Delta DR6_t = \alpha_0 + \alpha_1 \Delta BIrate_t + \alpha_2 e_{t-1} + \varepsilon_t$$
$$e_{t-1} = DR6_{t-1} - \beta_0 - \beta_1 BI\,rate_{t-1} \qquad (3)$$

$$KRMK_t = \beta_0 + \beta_1 BIrate_t + e_t$$
$$\Delta KRMK_t = \alpha_0 + \alpha_1 \Delta BIrate_t + \alpha_2 e_{t-1} + \varepsilon_t$$
$$e_{t-1} = KRMK_{t-1} - \beta_0 - \beta_1 BI\,rate_{t-1} \qquad (4)$$

$$KRINV_t = \beta_0 + \beta_1 BIrate_t + e_t$$
$$\Delta KRINV_t = \alpha_0 + \alpha_1 \Delta BIrate_t + \alpha_2 e_{t-1} + \varepsilon_t$$
$$e_{t-1} = KRINV_{t-1} - \beta_0 - \beta_1 BI\,rate_{t-1} \qquad (5)$$

$$KRKON_t = \beta_0 + \beta_1 BIrate_t + e_t$$
$$\Delta KRKON_t = \alpha_0 + \alpha_1 \Delta BIrate_t + \alpha_2 e_{t-1} + \varepsilon_t.$$
$$e_{t-1} = KRKON_{t-1} - \beta_0 - \beta_1 BI\,rate_{t-1} \qquad (6)$$

OLS and ECM estimate long run and short run as well as speed of adjustment on indirect IRPT. The direct IRPT are estimated using 7 pair of equations that are arranged based on model in Figure 1 (arrow 7-13). The equations are structured as follow:

$$PUAB_t = \beta_0 + \beta_1 BIrate_t + e_t$$
$$\Delta PUAB_t = \alpha_0 + \alpha_1 \Delta BIrate_t + \alpha_2 e_{t-1} + \varepsilon_t$$
$$e_{t-1} = PUAB_{t-1} - \beta_0 - \beta_1 BI\,rate_{t-1} \qquad (7)$$

$$DR1_t = \beta_0 + \beta_1 PUAB_t + e_t$$
$$\Delta DR1_t = \alpha_0 + \alpha_1 \Delta PUAB_t + \alpha_2 e_{t-1} + \varepsilon_t$$
$$e_{t-1} = DR1_{t-1} - \beta_0 - \beta_1 PUAB_{t-1} \qquad (8)$$

$$DR3_t = \beta_0 + \beta_1 PUAB_t + e_t$$
$$\Delta DR3_t = \alpha_0 + \alpha_1 \Delta PUAB_t + \alpha_2 e_{t-1} + \varepsilon_t$$
$$e_{t-1} = DR3_{t-1} - \beta_0 - \beta_1 PUAB_{t-1} \qquad (9)$$

$$DR6_t = \beta_0 + \beta_1 PUAB_t + e_t$$
$$\Delta DR6_t = \alpha_0 + \alpha_1 \Delta PUAB_t + \alpha_2 e_{t-1} + \varepsilon_t$$
$$e_{t-1} = DR6_{t-1} - \beta_0 - \beta_1 PUAB_{t-1} \qquad (10)$$

$$KRMK_t = \beta_0 + \beta_1 PUAB_t + e_t$$
$$\Delta KRMK_t = \alpha_0 + \alpha_1 \Delta PUAB_t + \alpha_2 e_{t-1} + \varepsilon_t$$
$$e_{t-1} = KRMK_{t-1} - \beta_0 - \beta_1 PUAB_{t-1} \qquad (11)$$

$$KRINV_t = \beta_0 + \beta_1 PUAB_t + e_t$$
$$\Delta KRINV_t = \alpha_0 + \alpha_1 \Delta PUAB_t + \alpha_2 e_{t-1} + \varepsilon_t$$
$$e_{t-1} = KRMK_{t-1} - \beta_0 - \beta_1 PUAB_{t-1} \qquad (12)$$

$$KRKON_t = \beta_0 + \beta_1 PUAB_t + e_t$$
$$\Delta KRKON_t = \alpha_0 + \alpha_1 \Delta PUAB_t + \alpha_2 e_{t-1} + \varepsilon_t$$
$$e_{t-1} = PUAB_{t-1} - \beta_0 - \beta_1 BI\ rate_{t-1} \qquad (13)$$

Where e_t and ε_t are the residuals or error term of the first and second equations respectively. The change between period are denoted by Δ.

Gujarati and Porter. (2009) warned that the regression of a nonstationary time series on another nonstationary time series may produce a spurious regression. The regression is not spurious if there are long run relationship or cointegration between variable. Engle-Granger cointegration test examine the stationartity of residual of the regression, e_t, to find cointegration relationship. We also employ Phillip-Perron (PP) test to examine the stationarity of data and residual of the regression. Finally, if both variables are stationary infirst difference, *I*(1), and they have cointegration, we can conduct ECM to find the short run IRPT as well as speed of adjustment of the IRPT. Error Correction Term (ECT) in the ECM measures the speed of adjustment to long-term equilibrium.

RESULT AND DISCUSSION

The stationarity test of the data can be seen in Table 1. The result of PP test in Table 1 show all variables are not stationary in level. Rather, the variables are stationary in first difference, *I* (1).

Table 1. Stationarity test using (PP test)

Variable	Level	1st Difference	Variable	Level	1st Difference
BI Rate	-1,5691	-3,8584 [a]	DR6	-2,0743	-3,4475 [a]
PUAB	-2,1079	-10,4078 [a]	KRMK	-1,5220	-5,0196 [a]
DR1	-2,0698	-4,0935 [a]	KRINV	-1,3133	-5,0943 [a]
DR3	-2,0836	-4,2175 [a]	KRKON	-0,7224	-10,2648 [a]

Significant at: [a]) α=1%; [b]) α=5%; [c]) α=10%

Based on Engle-Granger ECM method, the stationarity of residual, e_t, in level (using PP test) indicates that there are cointegration relationships between the observed variables. Further, β_1 and α_1 measure the long run and short run relationship between variable. Error Correction Term (ECT) in ECM, α_2, measures the speed of adjustment to long-term equilibrium. Table 2 also shows PP-stat of e_t that is used to examine cointegration. Since all variables are integrated in first difference, *I*(1), the long

run equations are not spurious only if cointegration exist. If residual of the equation, e_t, is stasionary, then there are cointegration. The estimation shows that only BI rate and DR1 have a long-term relationship. Further, we can estimate ECM only for BI rate and DR1.

In the short-run there may be disequilibrium. ECM states that ΔDR1 depends on ΔBI rate and, also, on the equilibrium error term. If the latter is non-zero, then the model is out of equilibrium. Since Table 2 shows that the error correction term (ECT) or coefficient of e_{t-1} is statistically significant and has negative sign, then there is adjustment process to equilibrium or long run relationship. As these results show, 0.0324 (or 3.24%) of the discrepancy from long run equilibrium between the two rates in the previous month is eliminated this month. If DR1 is out of its equilibrium value, it will be corrected to the equilibrium condition in approximately 31 months. Furthermore, short-run changes in BI rate are quickly reflected in the short run change of DR1, as the slope coefficient between the two is 0.9636 or nearly 1, nearly complate pass trough.

Tabel 2. Estimation result of direct IRPT

Equation	Dependent variable	β_0	β_1	α_0	α_1	α_2	PP-stat for e_t
1	$DR1_t$	1.3681[a]	0.8163[a]				-2.5856[c]
	$\Delta DR1_t$			0.0134	0.9636 [a]	−0.0324	
2	$DR3_t$	1.8088 [a]	0.8047 [a]				-2.4960
	$\Delta DR3_t$			0.0162	0.8248 [a]		
3	$DR6_t$	2.5291 [a]	0.7321 [a]				-2.5680
	$\Delta DR6_t$			0.0182	0.5467 [a]		
4	$KRMK_t$	8.4689 [a]	0.6239 [a]				-1.8677
	$\Delta KRMK_t$			−0.0012	0.5498 [a]		
5	$KRINV_t$	7.9113 [a]	0.6467 [a]				-2.1193
	$\Delta KRINV_t$			−0.0078	0.4271 [a]		
6	$KRKON_t$	10.7404 [a]	0.5712 [a]				-1.4253
	$\Delta KRKON_t$			−0.0179	0.1452 [a]		

Significant at: [a]) α=1%; [b]) α=5%; [c]) α=10%
First difference of variabels are denoted by Δ

Since there are no cointegration between BI rate and DR3, DR6, KRMK, KRINV, and KRKON then we can only employ OLS for equation 2 to 6 using the first differenced data. Furthermore, short-run changes in BI rate are quickly reflected in

short run change DR3, as the slope coefficient between the two is 0.8248. The short-run change in BI rate is also quickly reflected in the change of DR6, KRMK, and KRINV, since the coefficient between the two variables are 0.5467, 0.5498, and 0,4271. However, short-run change in BI rate is slowly reflected in KRKON since the coefficient between the two is only 0.1452.

Table 2 and Figure 2 show there are short run and long run relationship between BI *rate* and DR1 and only short run relationship between BI rate and others. The pass-through is complete if one unit change in policy rate is reflected in one unit change in retail interest rates (based on Taylor rule). The estimation shows the IRPT from BI rate to deposit rate (DR1 and DR3) is nearly complete. This result is different than previous studies that conclude there is no effect from policy rate to short run deposit interest rate. The change of policy rate transmitted to change in retail interest rate quickly. However, the adjustment mechanism to long run equilibrium takes a long time. If there is a shock that creates disequilibrium between BI rate and DR1, then the dispersion will disappear after 31 moths. On the other hand, there are no long run relation between BI rate and other retail interest rates.
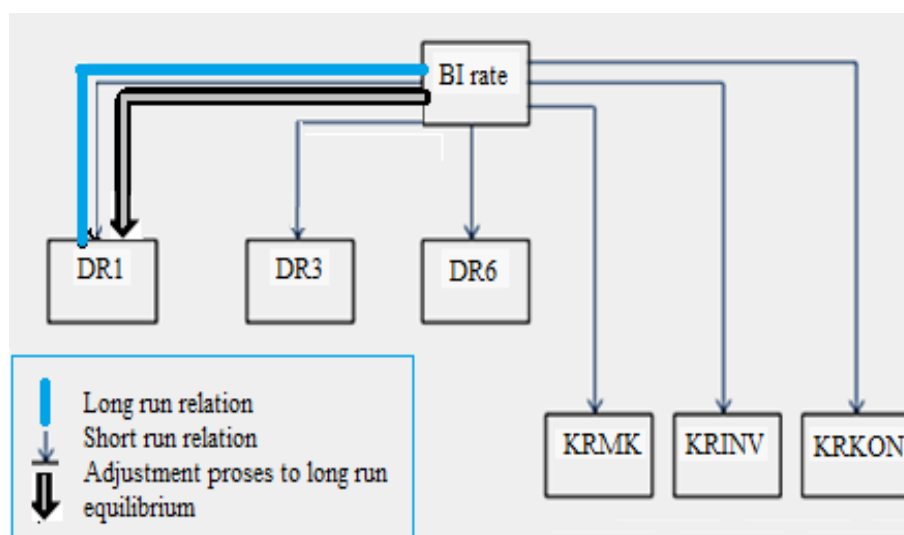
Figure 2. Direct IRPT

Table 3 shows that the residual, e_t, of equation 7, 8, 9, 11, and 12 are stasionary. Based on the result, there are cointegration relationships between BI rate and PUAB as well as between PUAB and DR1, DR3, KRMK, and KRINV. However, there are no long run relationship between PUAB and DR6, as well as between PUAB

and KRKON. We can estimate ECM for equation 7, 8, 9, 11, and 12. Since table 3 shows the error correction term (ECT), α_2, is statistically significant and has a negative sign, then there are adjustment process to equilibrium in these equations.

As these results of equation 7 show, 0.2163 of the discrepancy from long run relation between BI rate and PUAB in the previous month is eliminated this month. If PUAB is out of its equilibrium value, it will be corrected to the equilibrium condition in 4.6 months. Furthermore, short-run changes in BI rate are quickly reflected in short run change DR1 rate, as the slope coefficient between the two is 0.87190. The estimation shows that the IRPT from BI rate to PUAB is nearly complete. The change of policy rate transmitted to change in retail interest rate quickly. However, the adjustment mechanism to long run equilibrium takes a long time.

Table 3. Estimation result of indirect IRPT

Equation	Dependent variable	β_0	β_1	α_0	α_1	α_2	PP-stat for e_t
7	$PUAB_t$	0,0261	0,8451	[a]			-3,7534 [c]
	$\Delta PUAB_t$			0.0059	0.87190 [a]	-0.2163[a]	
8	$DR1_t$	2.5131 [a]	0.7894 [a]				-3,5871 [c]
	$\Delta DR1_t$			0.0096	0.1532 [a]	-0.1631 [a]	
9	$DR3_t$	2.8968 [a]	0.7843 [a]				-3,0611 [c]
	$\Delta DR3_t$			0.0081	0.1260 [a]	-0.1532 [a]	
10	$DR6_t$	3.7330 [a]	0.6813 [a]				-2,5638
	$\Delta DR6_t$			0.0138	0.0870[b]		
11	$KRMK_t$	9.2902 [a]	0.6115 [a]				-3,0621 [c]
	$\Delta KRMK_t$			-0.0056	0.0578[b]	-0.1323[a]	
12	$KRINV_t$	9.0849 [a]	0.5853 [a]				-2,9064 [c]
	$\Delta KRINV_t$			-0.0111	0.0479[b]	-0.1023[a]	
13	$KRKON_t$	11.5011 [a]	0.5595 [a]				-2,0755
	$\Delta KRKON_t$			-0.0191	0.0103		

Significant: [a]) α=1%; [b]) α=5%; [c]) α=10%

The results of equation 8, 9, 11, and 12 shows that 0.1631, 0.1532, 0.1323, and 0.1023 of the discrepancy between PUAB rate and DR1, DR3, KRMK, and KRINV in the previous month is eliminated this month. If DR1, DR3, KRMK, and KRINV is out of its equilibrium value, it will be corrected to equilibrium in 6 to 10 months. Furthermore, short-run changes in PUAB are not quickly reflected in the short run change of DR1, DR3, KRMK, and KRINV rate, as the slope coefficient between the two is 0.1532, 0.1260, 0.0578, and 0.0479 respectively. There are incomplete IRPT in these cases.

We can only estimate short run relation between PUAB to DR6 as well as PUAB to KRKON using OLS technique. The results also show incomplete IRPT from PUAB to DR6 as well as PUAB and KRKON since short run coefficients are 0.087 and 0.0103. Furthermore, there are no long run relation and incomplete IRPT between PUAB and DR6 as well as PUAB and KRKON. Figure 3 show long-term relationship or long run IRPT from BI rate to the interbank money market and from PUAB to DR1, DR3, KRMK and KRINV. Further, there are also adjustment process to equilibrium between PUAB and deposit rate (DR1 and DR3) as well as lending rate (KRMK and KRINV).

Figure 3. Indirect IRPT
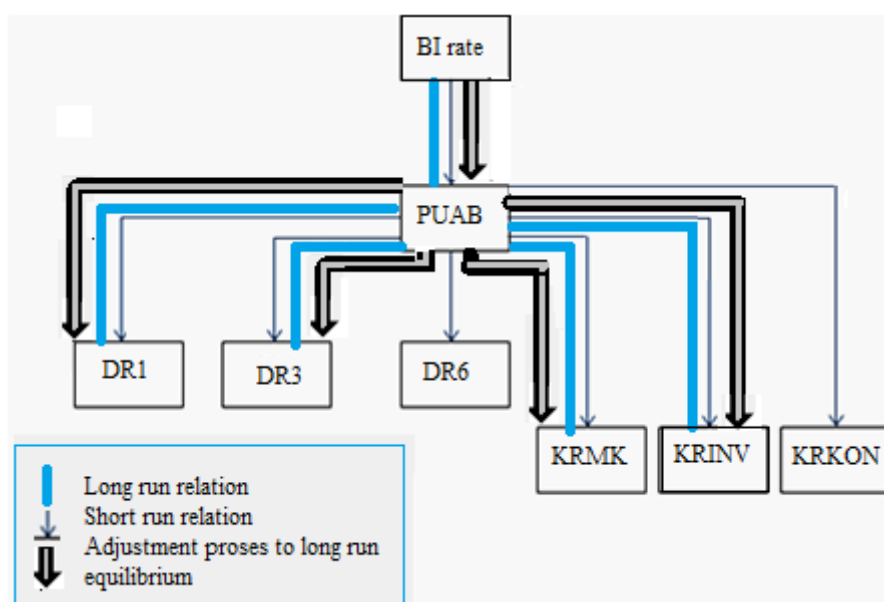
CONCLUSION

Based on the estimation of direct and indirect IRPT, we found that the banks' interest rates respond to policy rates incompletely or nearly complete. If policy rate changes by 1%, banks' interest rates will change by less than 1% or nearly 1% in the month. This sudy also found that the degree of *pass-through* to the short run deposit rate (1-month deposit rate) is significantly quicker than to the loan rates. Furthermore, degree of *pass-trough* in direct IRPT is higher than in the indirect IRPT. Our study also found that long-term relationship is not detected in the direct IRPT (except for 1 month deposit rates) while the short-term relationships are detected in almost all line of pass-through. However, in indirect IRPT, long-term and short-term pass-trough was

detected in almost all banks' interest rates (except 6-months deposits and consumer loans). The study detects more channel of transmission in the indirect IRPT than in direct IRPT. Furthermore, there are more adjustment processess to long run equilibrium in indirect IRPT compared to the direct IRPT. However, the process of transmission of policy rate is quicker in the direct IRPT (athough there is only one channel) than in the indirect one.

Based on the degree of IRPT, we conclude that there are strong responses of the change in deposit and lending rates to the change in the policy rate. It is indicated by the direct transmission channel of monetary policy through the deposit interest rates and indirect transmission channel of policy rates through PUAB as well as deposit and lending interest rates. Although the transmission process in indirect IRPT is slower than in the direct IRPT, we found that there are more transmission mechanisms through this channel. The transmission process in indirect IRPT is also found to be more stable compared to the direct channel. We conclude both channels are complementary.

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