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Asymmetric Transmission of the Monetary Policy: Empirical Evidence from the Consumer Credit Rates in Indonesia

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Abstract
This paper empirically examines asymmetric transmissions from money market rates to various consumer rates throughout a sample period that comprises monetary policy shifting in Indonesia from 2011 to 2017. We adopt modification of Asymmetric Error Correction Models (AECM), which incorporate three-error correction term. This allows us to inspect the different adjustment when the disequilibria are: large-positive, large-negative, and small. Our findings shows that there are varying asymmetric adjustment in response to different shocks across products in lending market. Thus, the monetary authorities should notice that both easing and tightening monetary policy appear to have varying impact to different credit market.

JEL Classification: C22; E43; G21

Keywords
monetary policy — asymmetric adjustment — Indonesia

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1. Introduction

In the past few years, Bank Indonesia has aggressively cut its benchmark interest rates in order to boost economic growth. After cutting the 7-day repo rate six times in 2016 by total 150 bps, they hit the brakes on easing from October 2016 to July 2017 in anticipating the external risk of the US contractionary monetary policy. However, as the inflation and exchange rates remaining stable in August and September 2017, Bank Indonesia decided to lower the key interest rate again by total 50 bps. Policymaker expected the lower interest rate environment to fire up the sluggish credit growth; hence stimulate the Indonesian economy that was ”trapped” at around 5.0 percent (y/y) growth.

Under inflation-targeting framework, which was adopted since 2005, the interest rate channels has become important part in the monetary policy transmissions in Indonesia. The monetary authorities examine the effectiveness of the monetary transmission by observing the change of money market and commercial rates. Any change in official rate need to be passed through to the money market and commercial interest rate completely and symmetrically over a reasonably short time for the efficacy of monetary operation.

An expected complete or one to one pass through will strengthen the ability of monetary policy to control inflation. However, as many empirical studies suggests that the interest rates pass through from official to commercial rates may not be complete and sluggish, a predictable and large enough incomplete (less than one) pass-through will still be influential to aggregate demand and the real economy (Hofmann & Mizen, 2004; Lim, 2001). Contrariwise, in the case of over (more than one) pass-through, the banks and financial institutions is exceptionally reactive to whichever alteration of the official rates. In this occasion, the monetary policy should be undertake with awareness since it will modify the market forcefully. Furthermore, the monetary authorities be also required to investigate whether the response of retail rate to the positive and negative change in official rate is asymmetric in term of magnitude and speed of adjustment. Recognizing the asymmetric adjustment of the interest rate is essential for policy makers because the impact of monetary policy to the economy may differ between easing and tightening policy (Chong et al., 2006; Zulkhibri, 2012).

Previous literatures present empirical evidence of incomplete or over, sluggish and asymmetric adjustment of commercial rates in US, UK, Europe, Australia, and Asia which include Indonesia (Lim, 2001; Hofmann & Mizen, 2004; De Bondt, 2005; Chong et al., 2006; Zulkhibri, 2012; Listiyanto & Falianty, 2013; Wibowo & Lazuardi, 2016; Yu et al., 2013; Valadkhani & Anwar, 2012).

Most recent studies in Indonesia, which assumed symmetric adjustment process, validated that the transmission from monetary policy to the commercial interest rates is incomplete and sluggish (Listiyanto & Falianty, 2013; Wibowo & Lazuardi, 2016). Nonetheless, there is also confirmation of asymmetric respond of lending rates to change of official rates in Indonesia (Yu et al., 2013).

Listiyanto and Falianty (2013) analyzed the adjustment speed of retail deposit, saving and loan rate for different groups of banks to change of BI rate over the period July 2005–March 2010, and concluded that there different degree of interest rate sluggishness among various financial product

and banks, where average loan rate response is relatively slower than average deposit rate.

Correspondingly, Wibowo and Lazuardi (2016) examined the interaction between weighted average of retail rates and BI rate over the period October 2005–Januari 2013, and found evidence of incomplete pass-through for most of the retail rates, except for 24 month Deposit rate that exhibit complete pass-through, and different adjustment speed for each products.

Yu et al. (2013) inspected the potential asymmetric pass through in long run and short run for Asian area includes Indonesia. They found that, even though in the short run the speed of adjustment is symmetric, there is evidence of long run asymmetric transmission (magnitude) from interbank call money rates to the investment credit rates in Indonesia.

The extant literature in the field of asymmetric pass-through in the credit market can generally be classified into two clusters. The first cluster recognized that lenders is advantageous as they respond the increase of official rates stronger than the cuts. For example in the US (Hannan & Berger, 1991; Payne, 2006), Netherlands (Toolsema & Jacobs, 2007), UK (Becker et al., 2012), Switzerland (Cecchin, 2011), Sweden (Sjölander, 2013), Australia (Valadkhani & Anwar, 2012; Valadkhani & Worthington, 2014), and Scandinavian (Sjölander et al., 2015). The second cluster of these studies suggests the opposite that the asymmetric adjustment favor costumer as the lending rates respond more strongly to rates cuts than the rates hike. See, for instance, in New Zealand (Frost & Bowden, 1999; Liu et al., 2008), US (Payne, 2007), Singapore (Chong et al., 2006), and Netherlands (De Haan & Sterken, 2011).

In order to capture asymmetric adjustments in the interest rate, the most common procedure are the Threshold Autoregressive (TAR) and Momentum Threshold Autoregressive (MTAR) model. Enders and Siklos (2001), Payne (2007), Liu et al. (2008), and Chong (2010) have used similar methodologies to study the asymmetric adjustment of retail rates to changes in benchmark rate (official rate or money market rate). Both TAR and MTAR model were sufficiently address the following issues: (1) the delay of retail rate response to changes in official rate; (2) the asymmetric adjustment to two types of deviations from the long-run equilibrium path, whether positive and negative or above and below some unique endogenous threshold.

However, as predicted by the theoretical model proposed by Hofman and Mizen (2004), the responses of banks to small and large deviations, in the case of positive and negative disequilibria, can vary significantly. In order to unravel this matter, we implement the advanced modification of the previous asymmetric ECM model from Valadkhani and Worthington (2014). The model incorporating three error correction terms (3-ECT) which allows us to examine the varying speeds of adjustments when the disequilibria are assumed to be relatively: positive and large, negative and large, and small respectively.

More specifically, this study would like to address the following questions: (1) How quickly and completely interest rate pass-through to various consumer credit rates in Indonesia?; (2) Do the consumer rates respond asymmetrically to change in official rate, between the case of the positive and negative shock?; and (3) Are there different pass-through, in term of speed (i.e., how fast the policy change is passed on) as well as amount (i.e., how much of the policy change in the official rate is passed on) under different scale of disequilibria (i.e., large or small).

Therefore, our study makes two specific contributions as follow. *First*, we investigate interest rate pass-through from **the money market rates to different lending rates in Indonesia**. *Second*, we adopt the 3-ECT specification proposed by Valadkhani and Worthington (2014) which take into account **possible different adjustment between large and small deviations** from the long run equilibrium to meet the empirical goals of this study.

In contrast with the previous studies, we employ the Jakarta Interbank Offer Rate (JIBOR) as a proxy of money market rate. We also investigate the various consumer credit rates, which consist of mortgage (i.e. non-residential mortgage (MNR); residential mortgage for apartment (MRA) and residential mortgage for housing), vehicle loans (VHC) and others consumer credit (OTH) which include credit card, multi purposes personal loans, furniture loans, electronic loan. Such products shares some portion of household's income, so the change in the interest rates, will affect upon their financial well-being (Valadkhani & Worthington, 2014). As lenders may frequently adjust the interest rates with respect to a change of official rate, it will also influence the consumer's purchasing power (Becker et al., 2012).

Moreover, this study is also intended to deepen the discussion of the asymmetric pass-through in Indonesia lending market as previously investigated by Yu et al. (2013) which only considered two type deviations (positive and negative). Thus, the 3-ECT models is used to explore the possibility that lenders may also weigh up, not only the directions of the disequilibria (positive or negative), but also the scale of the deviations (large or small) in adjusting the interest rates.

The empirical results shows that the lenders adjusts their credit rates incompletely and sluggishly to changes of interest rates. Furthermore, there are also evidence of varying asymmetric adjustment in response to positive and negative shocks across different product. The housing mortgage and vehicle loan rates are more responsive to the monetary tightening than under monetary easing. As the actual lending rates were distinctly higher than the market equilibrium, these lenders briefly lowering their rates. This type of asymmetry that leads to upward rigidity that support two hypothesis: the costumer-reaction hypothesis or the asymmetric information hypothesis. By contrast, for the case of non-residential mortgage rates, more significant adjustment taking place under contractionary monetary policy than expansionary monetary policy. The pass through of official rates to nonresidential mortgage rates is faster when they are below their equilibrium values rather than above. This variety of upward adjustment asymmetry suitable with the collusive-pricing hypothesis.

2. Literature Review

Meyer and Von Cramon-Taubadel (2004) categorized asymmetric transmission according to 3 criteria, i.e. (1) speed and/or magnitude; (2) directions; and (3) spatial. However, the latest is not observed in this study.

In line with the first criterion, there are three types of asymmetric pass through, which are asymmetry in term of magnitude, asymmetry in term of adjustment speed and combination of both magnitude and adjustment speed. As Peltzman (2000) pointed out, the asymmetric pass through signals different welfare distribution between players in the market. The amount asymmetry pass through may leads to a permanent transfer of welfare from one group of player in the market to another, whilst the adjustment speed asymmetry possibly will induce a temporary welfare transfer.

Based on the direction criteria, we classify the interest rate pass-through into two types of asymmetry relate to which respond is larger and/or faster between the situations under easing and tightening monetary policy. In **first type of** asymmetric adjustment, the interest rates are **more sensitive to the increase of official rates** under the tightening policy than to the official rates cuts under the easing monetary policy. Peltzman (2000) defined this type as the positive or upward asymmetry, which in turn leads to downward price or, in this case, interest rate rigidity. If such circumstances take place in the credit market, the lending rates adjust upward faster and/or larger than downward, so that lenders are in a position to generate large profits at the expense of their customers (Apergis & Cooray, 2015). In the **second type**, the opposite conditions occur. Accordingly, the interest rates **respond to falling interest rates more strongly** than to rising interest rates, which leads to upward rigidity of price, or interest rates.

The first possible explanation of the interest rate rigidity is the imperfect competition in the mortgage market. Many authors predict that when the loan demand is inelastic, for example in the case that there are no or limited substitution, and banks possess some degree of market power, their incentive to lower lending rates will be weak (Sjölander et al., 2015). On the other hand, when the loan demand is more elastic and banks have less market power, the greater bank's incentive to adjust price downward faster (Cecchin, 2011). Additional factors that will also induce the competitiveness in mortgage market is the high searching/switching cost that makes it more difficult for customers to find the best deal or to switch to other lenders.

Consistent with the above argument, Gambacorta and Iannotti (2007) proposes two contrast interpretations of asymmetric adjustment. *First*, **the customer-reaction hypothesis** states that, in a very competitive market, there is potential positive asymmetry of lending rates. In such an environment, lenders are less responsive to the increase of official rate since customers react negatively when interest rates rise. *Second*, **the collusive-pricing hypothesis** states that the lending rates might have negative asymmetry in less a competitive market since customers are not quickly switching to other service. In this case, lenders are more responsive to an increase of official rate than to a decrease.

The second explanation is the existence of fixed menu cost or adjustment cost (the cost to banks of adjusting retail rates) as explained in theoretical model by Hofmann and Mizen (2004). In this situation, as a "rate smoother", a bank will try to avoid the menu cost by postponing the transmission of change in official rate to their retail rate, particularly in the case of small change or when they expect the change is only temporary (Frost & Bowden, 1999; Becker et al., 2012).

The third possible reason for the asymmetry is the adverse selection and moral hazard problems based on an asymmetric information hypothesis (Stiglitz & Weiss, 1981). In order to avoid riskier borrower (adverse selection) and/or riskier project (moral hazard), lenders are commonly unwilling to increase their lending rates over a short period. Thus, they might anticipate the rise of funding cost, or in our case the increase of official rates, by rationing the amount of credit supply. De Bondt (2005) provided theoretical model explaining these problem, which proposes that lending rates are expected to be more rigid upward.

3. Methodology

3.1 Econometric Approach

The long-run relationship of the money market rates (r_{Mt}) and the lending rates (r_{Lt}) is examined using the following specification, subsequent to previous studies by De Bondt (2005), Chong et al. (2006), and Valadkhani and Anwar (2012):

$$r_{Lt} = \alpha_0 + \alpha_1 r_{Mt} + \sum_{j=0}^{q} \alpha_{2j} \Delta r_{Mt-j} + \varepsilon_t \quad (1)$$

where α_0 as constant loan intermediation margin, which consist of mark-up and marginal cost, and α_1 is the size of pass-through. As the loan spread and the relationship of lending rate and money market rate are typically positive, hence we expect that $\alpha_0 > 0$ and $\alpha_1 > 0$. Complete pass-through takes place when $\alpha_1 = 1$.

Afterward, we analyze the short-run dynamic of interest rate pass-through that will capture the short-run pass-through and the speed of adjustment. Comparable to the common ECM model, the estimated residual term obtained from long-run equation is used as a proxy for measuring the magnitude of the disequilibrium. Enders and Siklos (2001), Chong et al. (2006), Payne (2007), Liu et al. (2008) have used Threshold Autoregressive (TAR) model to study the asymmetric adjustment of retail rates to changes in benchmark rate (official rate or money market rate). They estimated the following specification to capture the asymmetric magnitude and/or speed adjustment:

$$\Delta r_{Lt} = \varphi_1^+ \Delta r_{Mt}^+ + \varphi_1^- \Delta r_{Mt}^- + \varphi_2^+ \varepsilon_{t-1}^+ + \varphi_2^- \varepsilon_{t-1}^- + v_t \quad (2)$$

Where Δ is the first difference operator and v_t is the error terms, ε_{t-1} are the residuals of the long term model from equation 1 represent the deviation of mortgage rate from long-run equilibrium at time $t-1$. Coefficient φ_1^+ and φ_1^- capture the degree of short-term pass-through of positive and negative change of official rate, which allow us to examine the presence of amount (magnitude) asymmetric pass-through. It means that the sort run (immediate) pass-through are allowed to disparate in the case of official rate rise or cuts.

Next, in order to capture the adjustment asymmetry, coefficient φ_2^+ and φ_2^-, depends on whether the mortgage rates are above or below their long run equilibrium levels. In this model, the threshold parameter is assumed to be zero which allows us to distinguish the adjustment speed

between positive and negative disequilibria conditions. The variables Δr_{Mt}^{+}, Δr_{Mt}^{-}, ε_{t-1}^{+}, and ε_{t-1}^{-}, are defined as:
$\Delta r_{Mt}^{+} = \Delta r_{Mt}$ if $\Delta r_{Mt} > 0$ and $\Delta r_{Mt}^{+} = 0$ otherwise;
$\Delta r_{Mt}^{-} = \Delta r_{Mt}$ if $\Delta r_{Mt} < 0$ and $\Delta r_{Mt}^{-} = 0$ otherwise;
$\varepsilon_{t-1}^{+} = \hat{\varepsilon}_{t-1}$ if $\hat{\varepsilon}_{t-1} > 0$ and $\varepsilon_{t-1}^{+} = 0$ otherwise;
$\varepsilon_{t-1}^{-} = \hat{\varepsilon}_{t-1}$ if $\hat{\varepsilon}_{t-1} < 0$ and $\varepsilon_{t-1}^{-} = 0$ otherwise.

Afterward, we were not only inspected the speed and directions of adjustment, but also the different responses of the banks to small and large deviations, in the case of positive and negative disequilibria. In order to unravel this matter, Valadkhani and Worthington (2014) developed an advanced modification of the previous asymmetric ECM model by incorporating three error correction terms. Comparable to the common ECM model, the estimated residual term obtained from long-run equation is used as a proxy for measuring the magnitude of the disequilibrium. Conversely, in this model, this residual term is decomposed into three sub-series of almost equal length by adopting the standardized z scores in a normal distribution as follows:

$$\Delta r_{Lt} = \varphi_{3j}^{+}\Delta r_{Mt}^{+} + \varphi_{3j}^{-}\Delta r_{Mt}^{-} + \varphi_{4}^{L+}\varepsilon_{t-1}^{L+} + \varphi_{4}^{L-}\varepsilon_{t-1}^{L-} + \varphi_{4}^{S}\varepsilon_{t-1}^{S} + u_t \quad (3)$$

Specifically, the variables ε_{it-1}^{L+}, ε_{it-1}^{L-}, and ε_{it-1}^{S} are defined as:
$\varepsilon_{t-1}^{L+} = \hat{\varepsilon}_{t-1}$ if $\hat{\varepsilon}_{t-1} \geq 0.44\hat{\sigma}$ and $\hat{\varepsilon}_{t-1}^{L+} = 0$ otherwise;
$\varepsilon_{t-1}^{L-} = \hat{\varepsilon}_{t-1}$ if $\hat{\varepsilon}_{t-1} \leq -0.44\hat{\sigma}$ and $\hat{\varepsilon}_{t-1}^{L-} = 0$ otherwise;
$\varepsilon_{t-1}^{S} = \hat{\varepsilon}_{t-1}$ if $-0.44\hat{\sigma} < \hat{\varepsilon}_{t-1} < 0.44\hat{\sigma}$ and $\hat{\varepsilon}_{t-1}^{S} = 0$ otherwise, $i = a, b$.
where $\hat{\sigma}$ is the estimated standard deviation of $\hat{\varepsilon}_{it}$, whereby $\hat{\varepsilon}_t \sim NID(0, \hat{\sigma})$.

Comparable to equation 2, coefficient φ_3^{+} and φ_3^{-} captures the degree of short-term pass-through of positive and negative change of official rate. Subsequently, there are three dissimilar coefficients allowing us to capture the varying speeds of adjustments. The coefficient φ_4^{L+}, φ_4^{L-}, and φ_4^{S} are the speeds of adjustment when the disequilibria are assumed to be relatively: positive and large, negative and large, and small respectively. All coefficients for the speed of adjustments are expected to be negative as a correcting mechanism into the long-run equilibrium. Afterward, we test the applicability of the above two types of amount and adjustment speed asymmetry using a Wald test. First, if the null hypothesis $H_0 : \varphi_1^{+} = \varphi_1^{-}$ and $H_0 : \varphi_3^{+} = \varphi_3^{-}$ is rejected, we may argue that in the short run positive and negative shock in the official rate have asymmetric effects on mortgage rates, and also bank is more likely to transmit the official rate rises to their mortgage rate than they do for rate cuts. Second, if the null hypothesis $H_0 : \varphi_2^{+} = \varphi_2^{-}$, $H_0 : \varphi_4^{L+} = \varphi_4^{L-}$, and $H_0 : \varphi_4^{L+} = \varphi_4^{L-} = \varphi_4^{S}$ are rejected, we may conclude that the speed of adjustment is also asymmetric. In addition, the significance of the above feedback coefficient, which is examined using the critical values, might also directly verified the existence of cointegration between official rate and mortgage rates (Kremers et al., 1992 and Boswijk, 1994 in De Bondt, 2005).

3.2 Data

We obtain the monthly Data of money market rates from BI database of Indonesian Financial Statistics and the lending rates from Indonesia Financial Service Authority (OJK) database of Indonesia Banking Statistics. Not like the preceding studies in Indonesia (Listiyanto & Falianty, 2013; Wibowo & Lazuardi, 2016) that use BI rate as the benchmark official rate, this study observe the Deposit Facility rates as a representation of the policy rates.

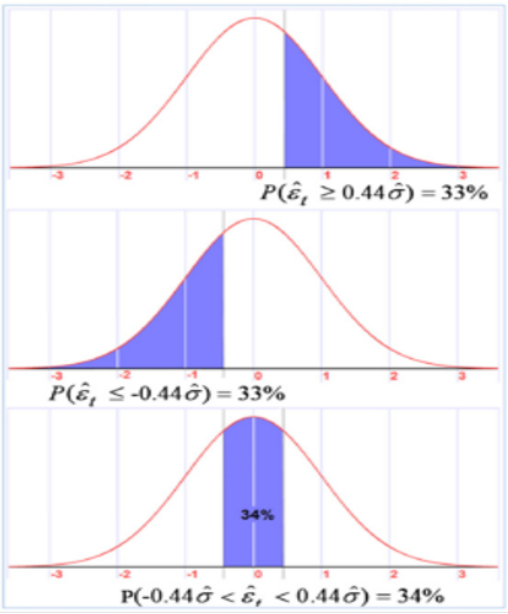

Figure 1. Classification of 3 Error Correction Term
Source: Valadkhani and Worthington (2014)

Our observation period comprise the change of official rate from BI rate to 7 Day Repo Rate, thus the deposit facility rates is more relevant to characterize the dynamic of both official rate. Bank Indonesia replacing the existed BI Rate with a new official rate known as the BI 7-Day (reverse) repo rate in August 2016. The BI Rate, which has been used as official rate since 2005, equals to the 12 month reverse repo rate, hence is not directly tied to money markets causing the shorter term money instruments less affected by the movement of official Rate. Therefore, by using the short term monetary instrument, the new BI 7-Day Repo Rate that has stronger correlation with money market rates, the transmission of the official rate to the money market, banking industry and real sector will be accelerated.

The Jakarta Interbank Offer Rate (JIBOR) is used as a proxy of money market rate, instead of the interbank call money rates used by Yu et al. (2013). Among some range of maturities of the JIBOR, from overnight to 12 months, we follow De Bondt (2005), Chong et al. (2006), and Becker et al. (2012) using correlation analysis to select the JIBOR overnight rate (J1N) and JIBOR 1 month rate (J1M) in this study due to the highest correlation with the observed lending rates.

Our observation period comprises some monetary policy shifting as can be seen in Figure 2. From 2011 to 2017, there are three identifiable periods of monetary easing: (i) October 2011 to February 2012 (cuts by totally 200 bps), (ii) December 2015 to October 2016 (cuts by totally 150 bps) and (iii) July to September 2017 (cuts by totally 50 bps). Meanwhile, the monetary tightening is noticeable at the period of June 2013 to November 2013 with an increase of totally 175 bps.

Figure 2 also show the development of JIBOR rates.

At first impression, it appear JIBOR overnight is always lower than the JIBOR 1 month. Even though both rates are tracking the DF rates throughout most of this period, the JIBOR overnight is likely more sensitive and is adjusted more narrowly to the rise and cuts of official rates.

There are three category of consumer interest rate in this study, which consist of mortgage (i.e. non-residential mortgage (MNR); residential mortgage for apartment (MRA) and residential mortgage for housing), vehicle loans (VHC) and others consumer credit (OTH) which include credit card, multi purposes personal loans, furniture loans, electronic loan. The dynamics of these rates are plotted in figure 3. The other consumer rates (OTH) leads on top as the highest throughout the observation period. The runner up is the vehicle loans but only from 2011 to 2015. Amongst three category or mortgage rates, we identify that the housing rates (MRH) is comparably the most stable and turn out to be the lowest rates in 2016. On the other hand, the apartment rates (MRA) that is the lowest rates during 2011 to 2015 has largely increased since 2016.

The result of the correlation analysis of the DF, JIBOR and consumer rates is presented in Table 1. Based on this result, we use JIBOR 1 month as the reference rates for Non Residential Mortgage rates and Apartment Mortgage Rates. On the other hand, the overnight JIBOR will be the reference rate for the Housing Mortgage Rates and Vehicle Loans rate. We will leave out the other loan rates for its weak correlation to both of the JIBOR (less than 0,1).

The dynamics of the consumer rates, the reference JIBOR rates and the DF rates are plotted in Figure 4 and Figure 5. As can be seen in Figure 4, although the non residential and apartment mortgage rates are trailing the JIBOR and official Rate all over, we may also observe some indication of incomplete and asymmetric pass-through.

As the official rate is on a climbing path during the contractionary monetary policy, the increase of the nonresidential and apartment mortgage rate is not of the same magnitude. As Deposit Facility rate increase by total 175 bps from May to November 2013 (over 5 months), the 1 month JIBOR is also rising for more than 200 bps. However, during that time, the increase of nonresidential mortgage rate are only around 40 bps and the apartment mortgage rates are only around 75 bps, narrowing the gap between these rates.

Furthermore, we notice that after the monetary policy take place, the 1 month JIBOR keeps rising for around 100 bps. This imply that the money market is very sensitive to official rates change as they over passed through the rise of the official rates to the JIBOR rates. Conversely, we remark that the mortgage rates appear to be adjusted incompletely and sluggishly. The effect of the tightening policy keeps the mortgage rates rising until the end of 2015. The total elevation of the apartment mortgage rates is higher (around 250 bps) than the non-residential mortgage rates (around 100 bps).

In reverse, when the official rate is on a downward trajectory as BI launch easing monetary policy and, it appears that the mortgage rate is also decline in relatively less magnitude. As these rates are all decreasing, the gaps are widening. When BI cuts official rates by totally 150 bps during December 2015 to October 2016, the money market and the mortgage rates are not quickly responding. For example, even though the 1 month JIBOR respond the first 75 bps cuts of DF rates in January to March 2016 by dropping for around 200 bps, they started to climbing up as BI holds the official rates stable for several months. In the second transmission from money market rates to the mortgage rates, we notice that the pass through is rather smaller and slower.

Afterward, figure 5 demonstrate the dynamic of Housing Mortgage rates, vehicle loan rates and other loan rates in responding the change of official and money market rates. It is easily detected that almost throughout the observation period; the housing mortgage rates are the most rigid as they altered slightly and slowly.

4. Empirical Results

4.1 Long Run Pass Through

First, we estimate the long run relationship between the official rate and consumer rate using equation 1 as presented in Table 2. All of the estimated constant loan intermediation margin and long run pass through parameters are statistically significant at 1%, except for the others loan rates.

The constant loan intermediation margin from JIBOR to the consumer rates range from 8.22 (apartment mortgage rates) to 14.47 (other loans rates). The corresponding long run pass-through range from 0.06 for other loans rate (not significant) to 0.37 (apartment mortgage rates), means the pass-through are incomplete. Thus, the apartment mortgage lenders is appear to be more responsive since they exhibit lower margin and higher pass through than the other lenders in the long run. On the other hand, not as expected by the result of correlation test, the other loans rate is not surprisingly not respond the JIBOR rates. All of Wald Test result statistically rejected the null hypothesis of $H_0 : \alpha_1 = 1$ vs $H_1 : \alpha_1 \neq 1$ at the 1% level, which verified the incomplete long run pass through from JIBOR to consumer rate except for the others loan rates.

Afterward we proceed to investigate the short run dynamics under asymmetric assumption using equation 2 and 3. We found that the immediate pass through of both official rates cuts (i.e. φ_1^- and φ_3^-) and official rates rise (i.e. φ_1^+ and φ_3^+) in the short run were statistically insignificant from both TAR and 3-ECT estimation . This imply that there are no direct effect in the short run from the monetary policy to the consumer lending rates. Additionally, we may also conclude that there are no evidence of asymmetry in term of magnitude.

Next, we examine the estimated coefficients for each of the error-correction terms to analyze the adjustment asymmetries. For the case of housing mortgage rates, vehicle loan rates, and other loan rates, we found that the estimated coefficient of positive disequilibria (i.e. φ_2^+) in Table 3 and also large positive disequilibria (i.e. φ_4^{L+}) in table 4 are statistically significant. However, the estimated coefficient capturing negative disequilibria, (i.e. φ_2^-) large negative disequilibria (i.e. φ_4^{L-}) and relatively small positive/negative deviations from the long-run path (i.e φ_4^S) were not statistically significant. Thus, we may conclude that when actual lending rates were distinctly higher than the market equilib-

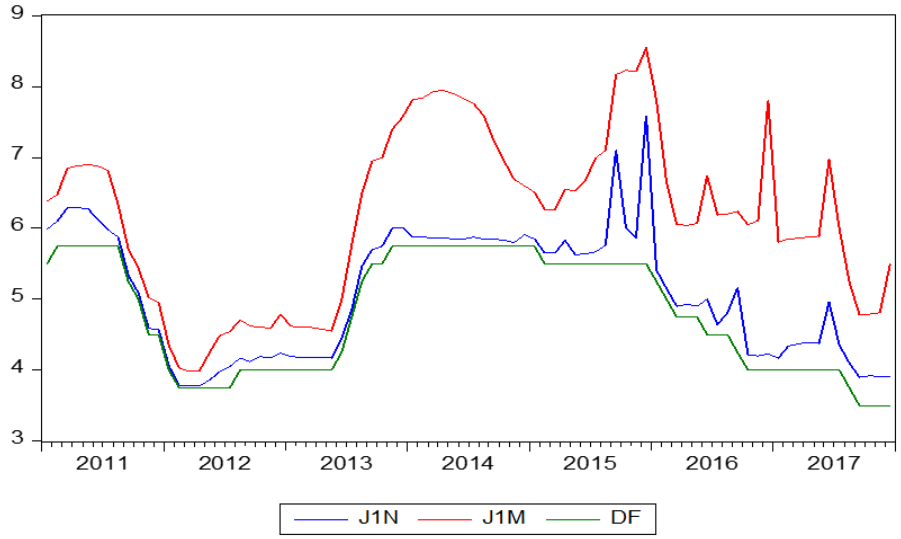

Figure 2. Deposit Facility and JIBOR Rates

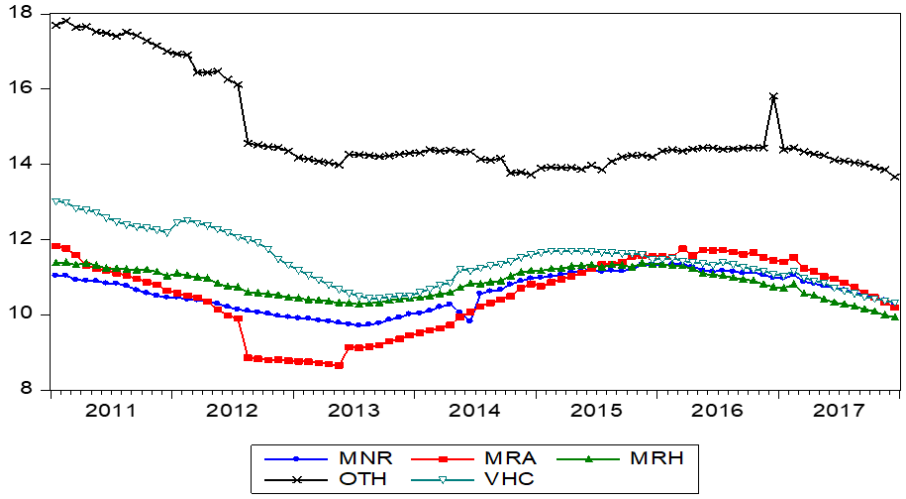

Figure 3. Consumer Rates

Table 1. Correlation Analysis

	Mortgage Non Residential	Mortgage Residential Apartment	Mortgage Residential House	Vehicles	Others	Deposit Facility	Jibor Overnight	Jibor 1 Month
	MNR	MRA	MRH	VHC	OTH	DF	J1N	J1M
Mortgage Non Residential	1.000	0.938	0.733	0.354	0.056	0.242	0.328	**0.377**
Mortgage Residential Apartment		1.000	0.682	0.376	0.235	0.198	0.286	**0.357**
Mortgage Residential House			1.000	0.766	0.420	0.531	**0.528**	0.333
Vehicles				1.000	0.800	0.203	**0.179**	-0.134
Others					1.000	0.066	**0.043**	-0.194
Deposit Facility						1.000	0.941	0.797
Jibor Overnight							1.000	0.847
Jibor 1 Month								1.000

rium, the lenders quickly amend for the prevailing gap by lowering their rates.

The housing mortgage rates is adjusted faster with the speed 0.14 per month, followed by vehicle loan rates (0.11 per month) and the other loan rates is the slowest (0.06 per month). Conversely, the correction of the gap, which occurs, as the actual interest rates were substantially below their equilibrium path were somewhat insignificant, which means that they temporarily continue charging below the equilibrium rates. Moreover, lenders were also did not react to a variety of reasonably small disequilibrium.

Accordingly, we conclude that the housing mortgage rates, vehicle loan rates and other loan rates is more sensitive to the official rates cuts than the official rates hike which suggest downward asymmetry. This type of asymmetry that leads to upward rigidity might be interpreted as an indicative of competition among mortgage lenders, which support the costumer-reaction hypothesis. Thus, we may argue that these lenders are more aware to their customers and demonstrate more rigidity in passing on the positive shocks in the official rates into their mortgage rates. However, there is also another promising explanation related to

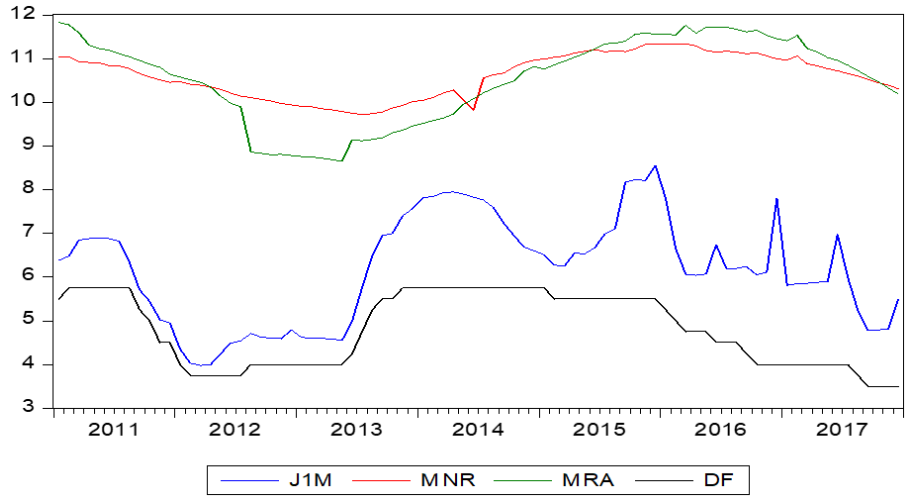

Figure 4. Non Residential and Apartment Mortgage Rates, 1 Month JIBOR, and Deposit Facility Rates

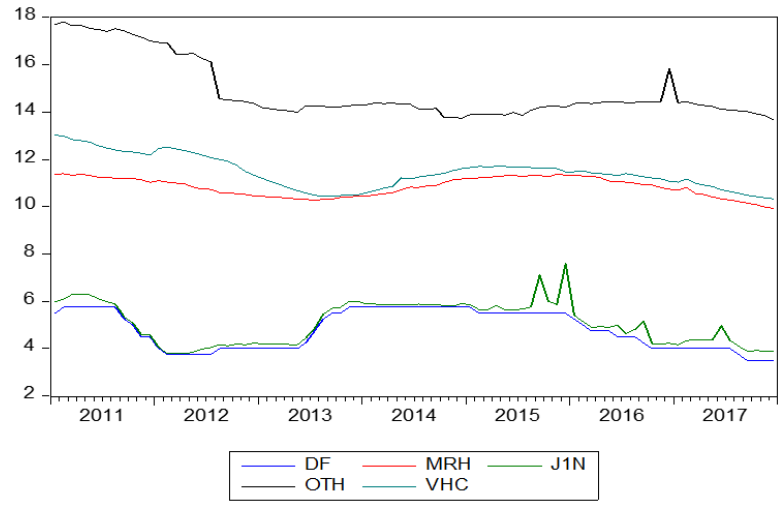

Figure 5. Housing Mortgage Rates, Vehicle Loan Rates, Overnight JIBOR, and Deposit Facility Rates

the asymmetric information hypothesis. According to this theory, the lenders are reluctant to rise their lending rates upward in order to avoid risky borrower.

However, we found indication of the opposite asymmetry for the case of nonresidential mortgage rates. The estimated coefficient of large negative disequilibria (i.e. φ_2^{L-}) are statistically significant which imply that whenever the actual lending rate is distinctly below its equilibrium path at time $t-1$ (i.e. ε_{t-1}^{L-}), it quickly adjusts en route for its equilibrium at the speed 0.11 per month. However, such an adjustment does not occur when rate is distinctly above the equilibrium value (i.e. ε_{t-1}^{L+}) or when the deviations from the long-run path is relatively small (i.e ε_{t-1}^{S}) as the corresponding feedback coefficient (i.e. φ_4^{L+} and φ_4^{s} respectively) are insignificant. For that reason, these results indicate that the pass through of official rates to nonresidential mortgage rates is faster when they are below their equilibrium values rather than above. This variety of upward adjustment asymmetry suitable with the collusive-pricing hypothesis.

For the case of apartment mortgage rates, the estimated coefficient disclose a rather mixed up result. The coefficient of large negative disequilibria (i.e. φ_4^{L-}) and small disequilibria (i.e. φ_4^{s}) are significant and have the expected sign. Nevertheless, it appears that the apartment mortgage rate adjusts faster to small disequilibria (at 0.29 per month) than to large disequilibria (at 0.06 per month). The estimated coefficient of large positive disequilibria is insignificant.

Finally, we tested the absence the adjustment asymmetry (i.e. the long-run asymmetry) using Wald test. As shown in table 3 and 4, there are confirmation of adjustment asymmetry of nonresidential mortgage rates, housing mortgage rates and vehicle loan rates as both of null hypotheses of $H_0 : \varphi_2^{+} = \varphi_2^{-}$, $H_0 : \varphi_4^{L+} = \varphi_4^{L-}$ and $H_0 : \varphi_4^{L+} = \varphi_4^{L-} = \varphi_4^{S}$ are rejected. However, the Wald tests were failed to reject the null hypothesis of adjustment symmetry for apartment mortgage rates and other loan rates. Additionally, we not take into account the Wald test result of amount asymmetry regarding the insignificance of the feedback coefficient estimated.

5. Conclusion

Our findings suggests that there were compelling statistical confirmations of varying asymmetric adjustment amongst different lending rates in consumer credit market. From the analysis of the long run model, we confirm that there are incomplete long run pass-through of all lending rates. Moreover, the short run analysis reveals that three out of five lending rates examined in this study adjusts asymmetrically

Table 2. Long Run Pass Through

$r_{Lt} = \alpha_0 + \alpha_1 r_{Mt} + \sum_{j=0}^{q} \alpha_{2j} \Delta r_{Mt-j} + \varepsilon_t$

	Mortgage Non Residential	Mortgage Residential Apartment	Mortgage Residential Housing	Vehicle	Others
α_0	9.35***	8.22***	9.35***	10.17***	14.47***
α_1	0.20***	0.37***	0.20***	0.22***	0.06
α_{20}	-0.28***	-0.50**	-0.28***	-0.38**	-0.52
α_{21}	-0.28***	-0.52**	-0.28***	-0.43***	-0.47
α_{22}				-0.44***	
α_{23}				-0.52***	
α_{24}				-0.50***	
α_{25}				-0.37**	
R^2	0.28	0.25	0.28	0.29	0.04
$\overline{R^2}$	0.25	0.22	0.25	0.22	0.00
DW	0.13	0.11	0.13	0.13	0.13
Wald Test $H_0 : \alpha_1 = 1$ (1, 78)	368.66***	(1, 78) 60.46***	(1, 78) 297.68**	(1, 70) 87.53**	(1, 78) 34.92**
Unit Root Test of $\hat{\varepsilon}_t$	-1.71*	-1.78*	-1.53	-1.43	-2.48**
ADF	-1.70*	-1.91*	-1.74*	-1.80*	-2.49**
PP	9.35***	8.22***	9.35***	10.17***	14.47***

Note: *, **, and *** indicate significant at the 10, 5, and 1% levels

Table 3. Short Run Pass-through: ECM TAR Estimation

$\Delta r_{Lt} = \varphi_1^+ \Delta r_{Mt}^+ + \varphi_1^- \Delta r_{Mt}^- + \varphi_2^+ \varepsilon_{t-1}^+ + \varphi_2^- \varepsilon_{t-1}^- + u_t$

	Mortgage Non Residential	Mortgage Residential Apartment	Mortgage Residential Housing	Vehicle	Others
φ_1^+	-0.07	-0.04	0.01	-0.06	-0.01
φ_1^-	0.04	0.03	-0.01	-0.04	-0.06
φ_2^+	0.04	0.00	-0.15***	-0.11***	-0.09***
φ_2^-	-0.10**	-0.06*	0.00	0.00	-0.04
R^2	0.08	0.04	0.09	0.14	0.07
$\overline{R^2}$	0.05	0.00	0.05	0.11	0.02
Amount Asymmetry $H_0 : \sum \varphi_1^+ = \sum \varphi_1^-$ (1, 73)	3.02*	(1, 75) 0.49	(1, 77) 2.86*	(1, 73) 0.14	(1, 73) 0.07
Adjustment Asymmetry $H_0 : \varphi_2^{L+} = \varphi_2^{L-}$ (1, 73)	4.09**	(1, 75) 0.89	(1, 77) 4.02**	(1, 73) 6.26**	(1, 73) 0.07

Note: *, **, and *** indicate significant at the 10, 5, and 1% levels

Table 4. Short Run Pass-through: 3-Error Correction Term Estimation

$\Delta r_{Lt} = \varphi_3^+ \Delta r_{Mt}^+ + \varphi_3^- \Delta r_{Mt}^- + \varphi_4^{L+} \varepsilon_{t-1}^{L+} + \varphi_4^{L-} \varepsilon_{t-1}^{L-} + \varphi_4^S \varepsilon_{t-1}^S + u_t$

	Mortgage Non Residential		Mortgage Residential Apartment		Mortgage Residential Housing		Vehicle		Others	
φ_3^+		-0.07		0.00		0.01		-0.06		-0.01
φ_3^-		0.04		-0.02		0.00		-0.04		-0.06
φ_4^{L+}		0.04		-0.05		-0.14***		-0.11***		-0.09***
φ_4^{L-}		-0.11**		-0.06**		-0.01		0.00		-0.04
φ_4^S		-0.05		-0.29**		-0.02		0.07		0.08
R^2		0.12		0.12		0.08		0.15		0.07
$\overline{R^2}$		0.07		0.07		0.03		0.10		0.02
Amount Asymmetry $H_0 : \sum \varphi_3^+ = \sum \varphi_3^-$	(1, 76)	3.21*	(1, 74)	0.04	(1, 75)	0.02	(1, 76)	0.20	(1, 76)	0.07
Adjustment Asymmetry $H_0 : \varphi_4^{L+} = \varphi_4^{L-}$	(1, 76)	5.22**	(1, 74)	0.09	(1, 75)	5.86**	(1, 76)	5.5***	(1, 76)	0.07
$H_0 : \varphi_4^{L+} = \varphi_4^{L-} = \varphi_4^S$	(2, 76)	2.61*	(2, 74)	1.48	(2, 75)	3.07*	(2, 76)	3.31**	(2, 76)	0.7

Note: *, **, and *** indicate significant at the 10, 5, and 1% levels

to the money market rates change.

Consistent with the theory of costumer-reaction hypothesis and asymmetric information hypothesis, the housing mortgage rate and vehicle loans rate in Indonesia respond more strongly to official rates cuts than to an increase. However, there is also indication that when the nonresidential mortgage rates are below the desired level, the banks eliminate the gap by increasing their mortgage rates at a faster speed than that under positive disequilibria conditions. This, contrariwise, support the hypothesis of collusive-pricing behavior, as banks with market power have lower incentive to lower their lending rate when they are above the equilibrium. For the case of apartment mortgage rates, there are less conclusive evidence of asymmetries, implies that they adjust symmetrically to change of market rates.

From the perspectives of monetary policy, the result recommend that the easing policy will have more impact to the housing loan and vehicle loan borrower than the opposite contractionary monetary policy. As the falling official rates provoke the drop of lending rates, it will eventually increase the borrower's purchasing power. This means more capacity for consumption and more fuel for the economic growth. Meanwhile, the increase of rates might have the reverse comparable effect to the decrease of nonresidential mortgage borrower purchasing power. Thus, the monetary authorities should notice that both easing and tightening monetary policy appear to have varying impact to different credit market.

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