TIAC-BNM MONETARY AND FINANCIAL ECONOMICS WORKSHOP
SESSION 1: UNDERSTANDING THE MONETARY TRANSMISSION MECHANISM IN MALAYSIA

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The Monetary Policy Transmission Mechanism in Malaysia: Evolution Over the Past Two Decades

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This paper investigates the evolution of the monetary policy transmission mechanism (MTM) in Malaysia over the past two decades. Our paper aims to answer two questions, motivated by the changing dynamics of the MTM. First, has the pass-through of monetary policy to the target variables in Malaysia strengthened or weakened? Our empirical results indicate that the pass-through to output and inflation has weakened and strengthened, respectively. In terms of individual channels, we find that the asset price channel has gained in significance, while the interest rate channel and exchange rate channel have weakened over time. Second, what are the factors that have driven these changes? Our analysis focuses on the three factors that influence the MTM, namely, the monetary policy framework, the structure of the financial system and the structure of the economy. Our findings suggest that while the evolution of the monetary policy framework has strengthened the MTM, some gains have been offset by the developments in the structure of the financial system and the structure of the economy.

I. INTRODUCTION

Over the past two decades, the balance of risks to growth and inflation in emerging economies has shifted frequently, necessitating continued reassessments of the stance of monetary policy. During these times, understanding the monetary policy transmission mechanism is pivotal for the successful conduct of policy. Since the last comprehensive monetary policy transmission mechanism (MTM) study by Tang (2006) on Malaysia ten years ago, which detailed the impact of policy rate changes on economic growth and inflation, many features of the economic landscape have changed. Notable changes in policy and economic trends include the move from fixed to floating exchange rate regime, the introduction of a market-based interest rate framework, the increasing integration with the global financial system, the rise in financing from the capital markets and the diversification of the domestic economy.

Against this backdrop, we investigate the monetary transmission mechanism for Malaysia in order to understand its evolution, dynamics and implications for policy makers. Our paper aims to answer two questions. First, has the transmission of monetary policy to growth and inflation in Malaysia strengthened or weakened over the past decade? Second, what are the factors that have driven these changes?

We approach the first question empirically to examine the magnitude and speed of impact from a policy rate shock to the real economy using a vector autoregression (VAR) model from 1990 to 2015. Our results indicate that over time, the transmission mechanism to output and inflation has weakened and strengthened, respectively. In addition, the relative importance of the individual channels of the MTM has changed. The asset price channel and credit channel have gained some significance in accounting for the pass-through to

output, while the interest rate channel and exchange rate channel have weakened over time. On the whole, the uncertainty surrounding the transmission has reduced, and the impact of policy rate changes on growth and inflation has become more predictable.

To answer the second question, we turn to some stylised economic facts and trends in the global and domestic economy. In particular, we focus on the evolution of three factors that influence monetary policy, namely, the monetary policy framework, the structure of the financial sector and the structure of the economy to explain the changes in the monetary transmission mechanism in Malaysia. Our findings suggest that while changes in the monetary policy framework have improved monetary transmission, the gains have been offset by changes in the financial sector and structural shifts in the economy.

The rest of the paper is organised as follows. Section 2 reviews the existing literature on the MTM for Malaysia. Section 3 describes the empirical methodology. Section 4 presents the data and empirical results, while Section 5 discusses the results and implications for policy. Section 6 concludes.

II. LITERATURE REVIEW

This section provides a brief literature review on the MTM in Malaysia. The most recent comprehensive empirical study on the overall transmission mechanism for Malaysia was conducted by Tang (2006), whose paper we extend in our study. His paper examined the relative strength of the different channels of monetary transmission in Malaysia, concluding the interest rate channel to be the most significant in influencing output and inflation in a two-year horizon, with the credit channel beyond that. The asset price channel is also found to be relevant in the shorter horizon, while the exchange

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rate channel did not play an important role in transmission.

Other transmission mechanism studies in Malaysia have focused on individual channels. Goh, Chong and Yong (2007) investigated the bank lending channel using an autoregressive-distributed lag (ARDL) model and found that the bank lending channel may not be effective in Malaysia as banks are able to cushion a fall in deposits through adjustments in liquid financial instruments. In terms of the interest rate channel, Tai, Sek and Har (2012) showed that post-Asian Financial Crisis (AFC) in 1997, the pass-through from a policy shock to lending rates and deposit rates in Malaysia has increased significantly.

Evidence from the literature suggests that policy shocks result in a heterogenous impact on investment in different sectors and on consumption of certain goods (Erceg and Levin, 2005; Peersman and Smets, 2002). For the case of Malaysia, Ibrahim (2005) found that the manufacturing, construction, finance, insurance, real estate and business services sectors decline more than aggregate demand in response to a monetary policy tightening, suggesting that these sectors may be more interest rate-sensitive.

Past studies also suggest that key developments in the domestic economic and financial landscape have impacted the MTM in Malaysia. We discuss some of these evolutions and their impact on the effectiveness of monetary policy in greater detail later in the paper. Broadly, Cheong (2004) notes the introduction of market-based monetary policy procedures has made monetary policy transmission more effective, attributing it to BNM's efforts to enhance the transparency, to improve the payment and settlement arrangements and to accelerate prudential reforms. Ooi (2008) also argues that with better banking system efficiency in Malaysia, the speed and size of the interest rate pass-through from policy rates to interbank and retail rates have increased. In addition, Tan and Goh (2007) show that increased financial disintermediation activities in the early 1990s have contributed to the reduction of the effectiveness of the MTM in Malaysia.

In recent years, the link between global factors and the effectiveness of domestic monetary policy has been of increasing interest, especially among policy makers. Using a dynamic factor model and a structural vector autoregression (SVAR) model, Jain-Chandra and Unsal (2012) suggest that long-term interest rates in Asia are increasingly driven by global factors. In particular, the authors find that the contribution of U.S. interest rates to domestic bond yields is higher in countries with a large foreign presence in domestic government bond markets, such as Malaysia and Indonesia. In addition, the surge in global liquidity after the global financial crisis (GFC) has exerted a stronger influence on domestic financial conditions and therefore, on the conduct of monetary policy. In the face of these challenges, Singh (2014) notes that, in Malaysia, the effectiveness of the MTM is bolstered by the floating exchange rate regime and also expanded monetary

policy toolkit employed by the central bank.

III. METHODOLOGY

Our empirical methodology follows closely from Tang (2006). Where Tang's sample ends in 2004 (spanning 23 years from 1981), our study extends the sample period to 2015 from 1990. We compare the evolution of the monetary policy transmission mechanism by contrasting both the short sample (1990 to 2004) and the full sample (1990 to 2015)[1]. The sample is divided as such to capture pronounced shifts in the monetary policy framework, namely the move to a market-based interest rate framework in 2004 and the removal of the ringgit peg to the U.S. dollar[2] in 2005. As in Tang's study, we use a vector autoregression (VAR) model to examine the transmission mechanism over time, employing the shutdown technique to understand the relative strength of each transmission channel.

2.1 Data Collection and Transformation

In our study, we use quarterly data from 1990 1Q to 2015 1Q. We divide the variables in our estimation into a foreign block and a domestic block to identify the contemporaneous relationships and to capture impulse responses of the domestic variables to exogenous external shocks. Our foreign block consists of four variables, namely, the U.S. output gap (YUS), U.S. consumer price index (INFUS), and U.S. Federal Funds Rate (FFR). In addition, we use the world commodity price index (WCOM) to account for supply driven inflationary pressures. The foreign block in our model is completely exogenised, reflecting the fact that domestic variables do not affect U.S. real variables in a material manner.

The domestic block contains six variables that describe the Malaysian economy. Our target variables of monetary policy are Malaysia's real GDP (Y) and core inflation (INF), while we use the 3-month Kuala Lumpur Interbank Offered Rate (KLIBOR) (I) as the policy instrument. We chose the KLIBOR as the proxy for the policy rate as it provides a robust alternative to the OPR, which only starts in mid-2004. The remaining three variables represent the three individual channels of monetary policy. We use the USD/MYR spot exchange rate (EXR) to account for the exchange rate channel, given the significant position of the U.S. as Malaysia's trade partner[3]. To proxy for the asset price channel (AP), we use the

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[1] A number of studies examine potential structural breaks by splitting their sample. A selection of these studies on Malaysia includes Fung (2002), Tai, Sek and Har (2012) and Raghavan et al (2012).

[2] BNM implemented the New Interest Rate Framework (NIRF) with the introduction of the Overnight Policy Rate (OPR) on 26 April 2004. On 21 July 2005, the ringgit peg to the USD was replaced with a managed float system.

[3] For robustness, we also estimated the model with alternate proxies for the exchange rate (NEER and REER), inflation (headline), and global inflation (IMF commodity price index) and a dummy to capture a break post-AFC. None of the alternate specifications changed the results of the finding save for the post Asian financial crisis dummy.

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Kuala Lumpur Composite Index (KLCI), a capitalisation-weighted stock market index comprising of the 30 largest companies on the Bursa Malaysia[4]. While we considered the Malaysian House Price Index (MHPI)[5] as an alternative variable for the asset price channel, we were not able to use it as the series only started in the early 2000s. We use total loans outstanding to represent the credit channel (CRE). Unlike Tang (2006), we use the residual impact that is unexplained by the other channels of monetary policy as a proxy for the direct interest rate channel. While several studies have used this method to estimate the interest rate channel (see Disyatat and Vongsinsirikul, 2003 and Khundrakpam and Jain, 2002), we acknowledge that the results could also include other non-interest rate channel effects, such as the risk-taking channel or the expectations channel of monetary policy. All our variables are transformed into natural logarithm, and detrended using the Hodrick-Prescott (HP) filter[6] to estimate the data in gap terms. We use the Census X-12 method to adjust for seasonality.

2.2 Model Specification

Our study relies on the use of VAR models to understand the dynamics of the MTM in Malaysia. First introduced by Sims (1980), VAR models are dynamic systems of equations that are used to characterise the behaviour of the economy by capturing the interdependencies between multiple time series. Unlike other macroeconomic models, VAR models make few a priori assumptions about the economy, instead, allowing the data to determine the dynamics of the model. As in Tang (2006), we use a reduced-form VAR[7] model to examine the transmission mechanism in Malaysia. We estimate our VAR using one lag, as suggested by the Schwarz information criterion (SIC).

An important consideration in VAR studies is the ordering of variables using the 'recursive' Choleski decomposition. The ordering of the variables is important as it reflects an implicit assumption about the dynamics between the variables in the economy. In our model, the variables in the domestic block are ordered as follows: Y, INF, I, EXR, AP, CRE. Y and INF are ordered before I, output and inflation only react to shocks to the interest rate after a lag. As the financial market variables react almost contemporaneously to real and monetary developments, the asset price (AP), the credit (CRE) and the exchange rate (EXR) channel variables are ordered last.
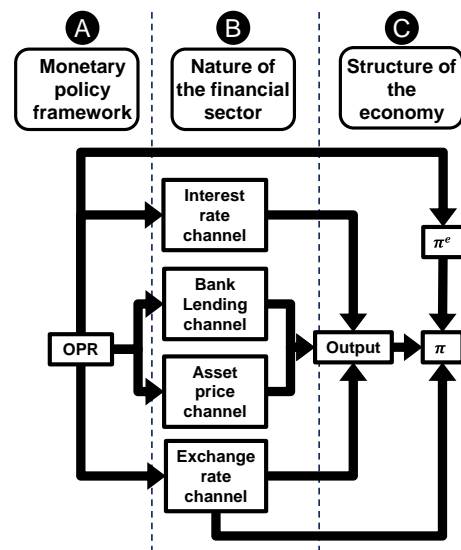
2.3 Model Estimation

We estimate two baseline VAR models incorporating all the variables in the foreign and domestic blocks, one for the short sample (1990 – 2004) and a second for the full sample (1990 – 2015). To examine the relative strength of individual channels, we use the shutdown methodology seen in Tang (2006). The broad idea behind the shutdown methodology is to compare the impulse responses of the target variables (output and inflation) to a policy shock under two scenarios. In the first (unconstrained) scenario, the VAR model is run with all channels operating. In the second scenario (constrained), the channel variable of interest is "turned off" by exogenising the channel variable. Both impulse responses are identified for each scenario. The difference between impulse response of the unconstrained and constrained model provides an indication of the strength of the channel of interest. Further details on the model specification can be found in Appendix I.

2.4 Qualitative Assessment

Finally, we subject our empirical findings to the stylised facts and the economic trends in Malaysia over the recent few years to try to understand the reasons underlying the changes in the MTM. To ensure a systematic and comprehensive approach towards examining the MTM, we focus on the three areas that determine the efficacy of the transmission process, that is, the monetary policy framework, the nature of the financial system and the structure of the economy (see Figure 1). Delving into each of these areas, we proceed to identify, based on existing literature, factors that would help explain the shifts uncovered in the empirical investigation (see Table 1). The analysis in this sub-section is mainly descriptive and comparative as it is intended to support the empirical findings in the previous sub-section.

FIGURE 1- Flow diagram of monetary policy transmission to output and inflation

Source: Author's schematic

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[4] Previously known as the Kuala Lumpur Stock Exchange (KLSE), Bursa Malaysia refers to the Malaysian stock exchange.

[5] The Malaysian House Price Index (MHPI) is compiled by the National Property Information Centre (NAPIC), under the Valuation and Property Services Department of Malaysia (JPPH).

[6] The HP-filter is a widely used statistical technique to estimate the potential output by fitting a trend to an economic time series (see Hodrick and Prescott, 1997). Chuah and Shahrier (2014) show that for Malaysian data, the HP-filter is able to consistently pick up important developments and pinpoint troughs and peaks of the business cycle in Malaysia.

[7] A reduced form VAR expresses each variable as a linear function of its own past values, the past values of other variables in the system, and a serially uncorrelated error term.

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TABLE 1-Factors that influence the transmission of monetary policy

| A	Monetary policy framework	• **Monetary policy regime:** A transparent framework increases the potency of monetary policy through the expectations channel. • **Market versus non-market interest rates:** A market-based framework strengthens the response of financial market prices from interest rates changes. • **Exchange rate regime:** A flexible exchange rate regime allows the impact of monetary policy to work through the exchange rate channel.
B	Nature of the financial sector	• **Extent of monetization:** Wider coverage of financial services increases scope of monetary policy. • **Competitive intensity:** Higher number of banks and lower lending spreads increase the pass-through of changes in cost of funds to retail lending rates. • **Ampleness of liquidity:** Higher holdings of more liquefiable assets increase banks' access to loanable funds and reduces reliance on central bank reserves, weakening the narrow credit channel. • **Financial disintermediation:** Arbitrage and competitive pressures from capital markets improve interest rate pass-through, although empirical investigations have found the impact ambiguous. • **Financial innovation:** Derivatives, such as securitization and hedging, lower transmission by insulating cash flows of banks and borrowers from the impact of monetary policy.
C	Structure of the economy	• **Industry mix:** Higher capital intensity in manufacturing and construction sectors increase sensitivity to interest rates. • **Demand mix:** Consumption of durables and residential investment financed by credit increase sensitivity to interest rates. • **Size of firms:** Small firms have less retained earnings and cannot access capital markets. A higher share of small and medium enterprises (SMEs) in an economy increases the bank lending channel of monetary policy. • **Degree of openness:** Trade increases sensitivity of prices and firm profitability to exchange rates, enhancing the exchange rate channel. • **Balance sheets of firms and households:** The size and type of assets and liabilities amplifies the wealth channel of monetary policy.

Source: Author's compilation

IV. RESULTS

3.1 Empirical results

Figure 2 shows the impulse responses of both the domestic intermediate and target variables in response to a one standard deviation shock in interest rates, using the 2015 base model. Broadly, the domestic variables respond in a way consistent with economic intuition. Following a one standard deviation tightening of monetary policy – corresponding to approximately 40 bps increase – output reduces by 30 bps after three periods with a persistence of about seven quarters. Prices increase slightly, indicating some evidence of the price puzzle[8] before falling to 5 bps below the baseline after nine quarters.

**FIGURE 2- Factors that influence the transmission of monetary policy**
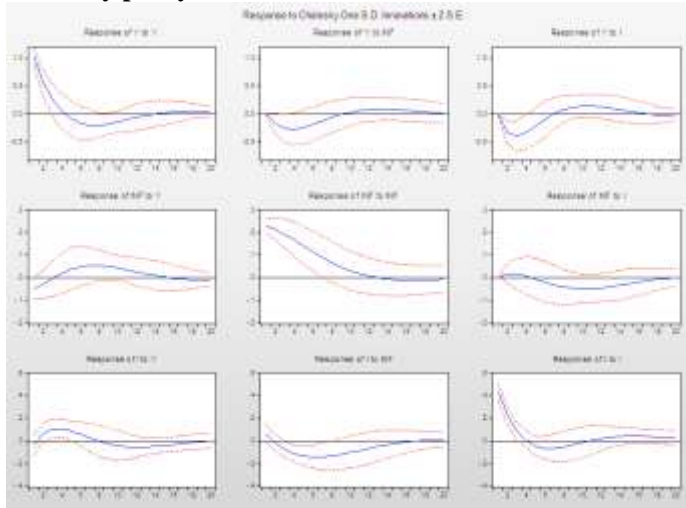
Source: Author's estimates

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[8] The price puzzle refers to the positive relationship between interest rates and inflation. It is a puzzle because an unexpected tightening of monetary policy is typically expected to be followed by a decrease in the price level, instead of an increase. The price puzzle was initially described by Sims (1992).

The channel variables also generally respond as expected, with asset prices and bank loans falling in response to an interest rate increase. However, contrary to conventional theory, a hike in the policy rate counter intuitively leads to a contemporaneous depreciation in the ringgit (increase in USDMYR), a result that is also observed in various countries including Brazil, Mexico and Chile (see Kolscheen, 2011).

We take away a few main conclusions from our empirical model. First, we find that over time, the transmission mechanism to output has weakened slightly with a shorter persistence in recent years (see Figure 3). Our impulse response function indicates that the transmission to output has decreased by about 10%, taking approximately three periods for maximum impact with the effect on output dissipating after six quarters. A 100 bps positive shock to the policy rate results in a decrease in output of about 90 bps in the full sample compared to about 100 bps in the short sample, indicating lower monetary policy pass-through in recent years. However, the pass-through to output has marginally increased in speed over time. In addition, we find that the standard error bands around our impulse response functions for the transmission to output and inflation have narrowed, implying a decreased in variability of monetary policy's impact on economic activity over time.

FIGURE 3- Impulse response function of output (Y) to a 100 bps policy rate shock for the samples from 1990 to 2004 and 2015
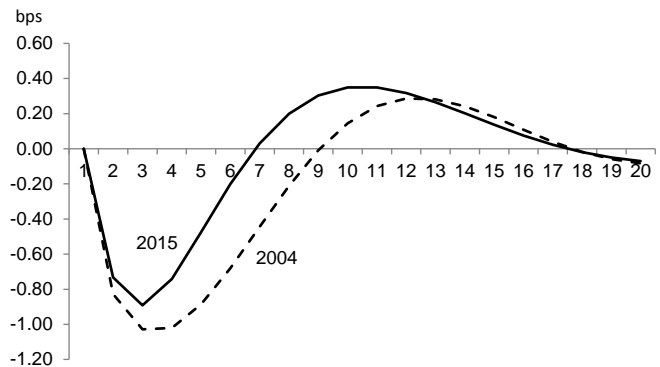

Source: Author's estimates

The weakening of the overall transmission mechanism can be attributed to the decrease in strength of the exchange rate and interest rate channel as the deviation between the impulse response functions with these channels exogenised, and that of the baseline, yields a smaller difference over time. The exchange rate channel has also slowed the overall pass-through to output to three quarters compared to two quarters previously. The slight decrease in strength of the interest rate channel, proxied by the residual impact unexplained by the other channels, is likely to have caused the overall weakening given its importance to the transmission mechanism[9].

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[9] Please refer to Appendix 1B for further details on the impulse response functions of the individual channels.

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In the short sample, our results indicate a counterintuitive response of the credit channel in transmitting policy shocks to output. According to the credit channel, credit should decline when monetary policy is tightened, constraining growth and inflation. However, in the short sample, our results indicate that blocking the credit channel leads to a stronger effect to output from a policy rate hike. In other words, the presence of the credit channel inhibits the full transmission of a policy rate shock to output. A plausible reason for this result is if, in response to an unanticipated monetary policy shock, borrowers increase demand for credit (instead of decreasing demand) in order to hedge against potential rate increases in the future. Figure 4 shows that during the policy rate tightening cycle in 2010, banking system loans growth rose contemporaneously, in line with expectations of higher interest rates.

FIGURE 4- Banking system loans growth and the Overnight Policy Rate (OPR)
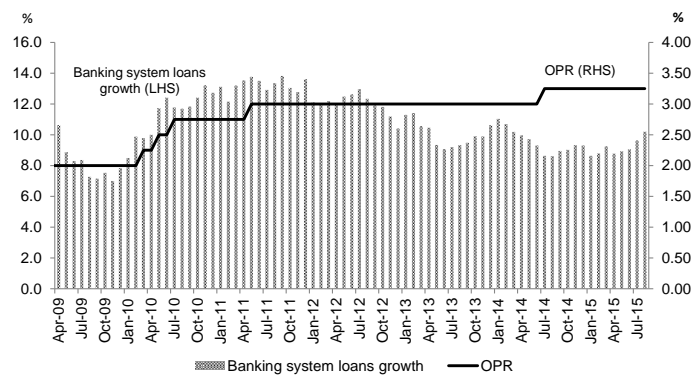

Source: Bank Negara Malaysia

However, in the full sample we find that this effect has declined significantly, as observed by the close tracking of the impulse response function of output with the credit channel exogenised and that of the baseline model for the first four quarters. Beyond the fourth quarter, the credit channel begins to have a positive impact on the transmission channel before tapering off after nine quarters. Although most of the channels have gotten weaker over time, we find that these effects are offset by the gains in strength of the asset price channel, which now account for about 45% of the total transmission to output. However, we note that the share of the asset price channel may be slightly overstated in our results for two reasons, especially as the equity holdings as a share of household wealth in Malaysia is only at around 11%. First, as asset prices are a leading indicator of economic conditions, the asset price channel may be capturing general consumer expectations about the future state of the economy, in addition to the direct wealth effects in response to a monetary policy shock. Second, as the correlation between the KLCI and the Malaysian House Price Index (MHPI) from 2005 to 2010 is high at 0.93, we anticipate that a sizeable portion of the asset price channel may be derived from the effects from higher housing wealth in recent years, in addition to that of equity holdings.

The speed and persistence of the transmission with the asset price channel exogenised and endogenised remain broadly similar, with output hitting its trough by two quarters and lasting for five quarters.

FIGURE 5- Impulse response function of inflation (INF) to a 100 bps policy rate shock for the samples from 1990 to 2004 and 2015
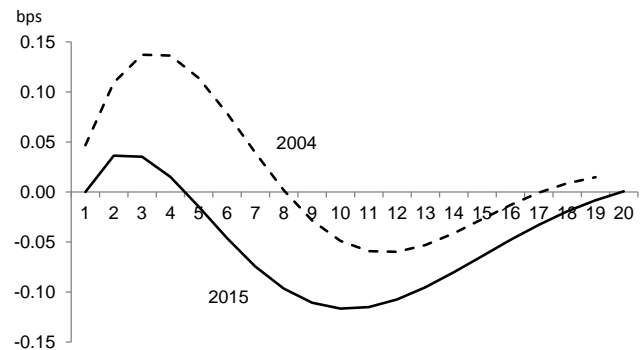
Source: Author's estimates

In terms of transmission to inflation, Figure 5 shows that the pass-through has both strengthened and increased in speed over the two samples. A 100 bps increase in the policy rate results in a maximum decline in inflation of about 12 bps after ten quarters in the full sample, compared to 6 bps after twelve quarters in the short sample. The pass-through to inflation is also more persistent, lasting for about nineteen quarters compared to sixteen quarters previously. It is also worth noting that the price puzzle has declined significantly in recent years.

4.2. Evolution of the factors of monetary policy transmission

What are the factors that have driven these changes in the transmission mechanism for Malaysia over time? To answer this question, we identify the three factors that influence the effectiveness of the MTM for a particular country, that is, the monetary policy framework, the structure of the financial sector and the structure of the economy (See Table 2). These factors have evolved over time and we look to stylised facts and trends to explain our empirical results. Overall, the analyses in this section appear to concur with the empirical findings of a slightly weaker transmission to output. While the MTM in Malaysia has increased in potency due to the changes in the monetary policy framework, its gains have been offset by the evolution of the financial sector and developments in the structure of the economy.

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TABLE 2- Evolution of factors influencing the monetary policy transmission mechanism

		Strengthen	Weaken	Ambiguous	Overall Effect on the MTM
A Monetary policy framework	Monetary policy framework	✓			• **Shift in monetary policy framework is likely to have intensified the MTM** by strengthening impulses to bond markets and exchange rates.
	Market versus non-market interest rates	✓			
	Exchange rate regime	✓			
B Nature of the financial sector	Extent of monetization	✓			• **The impact of financial sector development is mixed** as stronger transmission by banks may be countered by weakened transmission via bond markets.
	Competitive intensity			✓	
	Ampleness of liquidity		✓		
	Financial disintermediation			✓	
	Financial innovation		✓		
C Structure of the economy	Industry mix		✓		• **Changes in the economic structure** of demand, movements away from capital intensive industries and lower export share is **likely to have reduced sensitivity to monetary policy.**
	Demand mix		✓		
	Size of firms	✓			
	Degree of openness		✓		
	Balance Sheets	✓			

Source: Author's schematic

The monetary policy framework plays a central role in the MTM of an economy as it is the source of monetary impulses to the economy. In April 2004, Bank Negara Malaysia (BNM) introduced the New Interest Rate Framework (NIRF), transitioning towards a market-based interest rate-targeting framework. In financial systems where intermediation is organised around banks and capital markets, the use of market based monetary instruments can increase the pass-through of monetary policy as the setting of short-term interbank rates influences the funding costs of banks and the prices and returns in the financial markets[10]. The shifts in the monetary policy framework resulted in greater emphasis on the role of communications in shaping expectations, such as through the publication of a Monetary Policy Statement (MPS) following monetary policy meetings. Central bank communication plays an important role in the transmission mechanism by increasing the potency of the expectations channel. By shaping expectations about the future path of the policy rate, central banks have greater influence on longer term financial market prices, as well as, expected prices of goods, services and factors of production. Indeed, Ooi (2008) shows that the new monetary policy regime resulted in faster and more complete pass-through from the policy rate to interbank rates and retail lending rates. In terms of the exchange rate regime, Malaysia removed its currency peg to the U.S. dollar, moving to a floating rate regime in July 2005[11]. This shift in exchange rate regime opened up an additional channel of monetary policy transmission through the exchange rate channel. As a whole, we summarise the developments of the monetary policy framework as having increased the strength of the MTM, in particular, along the interest rate and exchange rate channels.

The structure of the financial system is another important

factor that influences the effectiveness of the MTM, as it constitutes the environment that monetary policy operates in. An increase in the number of business and households that have exposure to financial services, products or assets is likely to increase the influence of monetary policy[12]. In the case of Malaysia, significant gains in financial inclusion have been made; according to the World Bank's 2014 Global Financial Index (Global Findex), 81% of adults had access to an account at a financial institution in Malaysia, up from 66% in 2011. High financial inclusion in Malaysia is also evidenced by a high degree of monetisation, as proxied by the ratio of M3 to GDP. According to studies (see Kokoszczyński, Łyziak and Wróbel, 2002), a high degree of monetisation improves the pass-through of monetary policy.

From the perspective of the banking system, balance sheets play a role in the transmission of monetary policy. For example, banks that hold adequate amounts of liquid assets on their balance sheets are able to draw down on these assets during policy tightening cycles, meeting demand for credit despite lower supply of loanable funds. This trend could weaken the narrow credit channel[13]. We observe this scenario in the Malaysia, as the share of liquid assets as a ratio of total asset holdings of commercial banks in Malaysia is high at 42% (see Figure 6). Counterbalancing this impact, however, is the increasingly competitive banking landscape as evidenced by the tightening lending spread of banks. Higher competition to lend amid compressed lending spreads is likely to result in greater pass-through from changes in banks' funding costs to retail lending rates[14].

In terms of the financial markets, the increasing trend of financial disintermediation has resulted in structural changes in the functioning of the financial system as borrowers are able to tap into capital markets for their funding needs. To the extent that the rise in financial disintermediation drives financing activity towards markets such as the shadow banking system and the markets for securitised assets, which are further removed from the direct effect of monetary policy, this trend could reduce the strength of the transmission mechanism (see Estrella, 2002). In the case of Malaysia, we observe a strong trend of financial disintermediation from the bank based financing toward lending activity that is bond market-based. Figure 7 shows that in 2014, the share of capital market financing out of the total private sector financing in Malaysia was 34%, compared to only 21% in 1996. The pass-through of monetary policy changes to the cost of borrowing

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[10] In comparison the use of non-market based monetary instrument such as credit ceilings, reserve requirements and moral suasion is likely to be more limited as it affects are focused mainly on lending conditions within the banking system.

[11] The currency peg was introduced in September 1998 to stem short-term capital outflows and to stabilise the currency during the 1997 Asian Financial Crisis (AFC).

[12] According to Mehrotra and Yetman (2015), the increase in financial inclusion in countries amplifies the transmission channels by significantly changing the behaviour of firms and consumers.

[13] The narrow credit channel (also known as the bank lending channel) works through the banking system. If the supply of bank loans is disrupted due to a monetary tightening, bank-dependent borrowers may find it more difficult to obtain credit, thus reducing real activity (see Bernanke and Gertler (1995) for further details.

[14] We note however that in the short run higher competition could also result in a weaker pass-through of increases in the policy interest rate to retail lending rates, if banks compress margins to retain market share.

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in the bond market is also found to be less complete than the high transmission observed in retail lending rates of the banking system (see Figure 8). In addition, certain types of financial innovation such as hedging instruments may weaken the MTM by insulating borrower cash flow from the effects of monetary policy shocks. The development of markets such as the KLIBOR futures market, the interest rate swap market and the equity futures market in Malaysia may have contributed towards the weakening MTM.

FIGURE 6- Share of liquid and non-liquid asset holdings of commercial banks
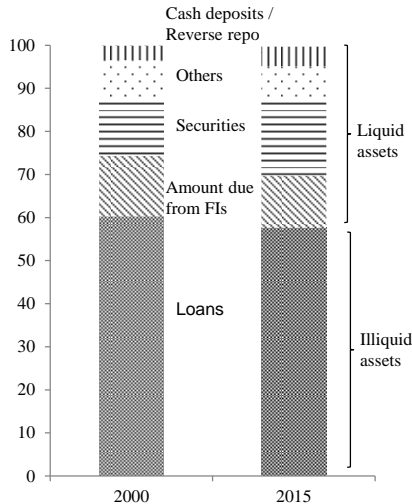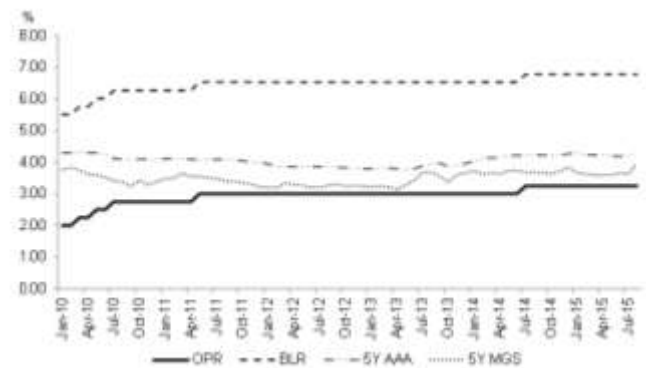

Source: Bank Negara Malaysia

FIGURE 7- Share of capital market financing to the private sector
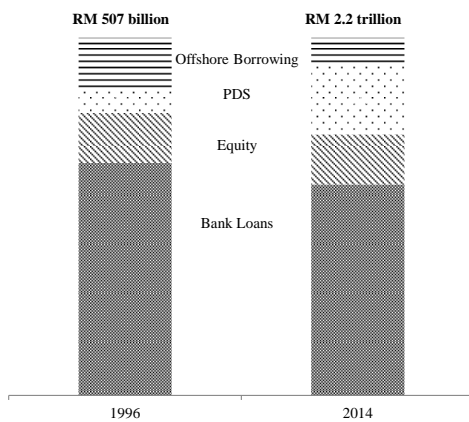
Note: Private Debt Securities (PDS) refer to negotiable instruments issued by private corporations to raise funds for a variety of purposes.
Source: Bank Negara Malaysia

FIGURE 8- Interest rate pass-through to bond market rates and retail lending rates


Note: Up till 2 January 2015, the Base Lending Rate (BLR) served as the main reference rate on retail floating rate loans in Malaysia, until it was superseded by the Base Rate (BR). Corporate bond yields are proxied by 5-year AAA bonds, while government bonds yields are proxied by 5-year Malaysian Government Securities (MGS).
Source: Bank Negara Malaysia

In the context of a highly open economy, greater integration between domestic financial markets with the global financial system has important implications for the MTM. Measures of cross-border financial transactions for Malaysia indicate greater two-way movement of capital and a sharp increase in domestic assets owned by foreign investors. Rey (2015) argues that increased global financial integration can render national monetary policies less effective, as domestic monetary conditions become overwhelmed by shifts in the global financial cycle. In addition, Jain-Chandra and Unsal (2012) find that large capital inflows weaken the link between the policy rate and lending rates, resulting in long-term interest rates being largely determined by global factors. We also find closer synchronisation of domestic bond market yields with global bond yields, as shown by a higher correlation between the two rates (2011-2015: 0.71; 2004-2010: 0.34). This finding is in line with other studies on Malaysia. For example, Singh (2014) shows how, despite an unchanged monetary policy stance, large capital inflows impacted the Malaysian economy through direct and indirect effects, by boosting domestic equity prices, and exerting downward pressure on financial and bank interest rates.

As a whole, we observe that evolving developments to the structure of the financial sector appear to have a mixed impact on the MTM. Some developments, such as greater financial inclusion, is likely to have strengthened the pass-through, while other developments, including increasingly integrated global capital and financial markets, appear to have weakened the MTM. Putting these findings together with the empirical results, on balance, we conclude that changes in the financial sector have most likely resulted in weakening of the MTM, in particular along the interest rate and exchange rate channel.

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As the target variables of monetary policy are real variables, changes to the nature of the economy would naturally affect the transmission mechanism. A number of studies find that economies with a higher concentration of consumption of durables and residential investment (demand mix) are more sensitive to interest rate changes, as the spending on these items are typically financed through credit. As shown in Figure 9 and 10, the share of consumption of durables and residential housing compared to the past decade has declined, implying reduced sensitivity of consumption and investment to interest rate changes. Closely related to the demand mix is the industry mix, whereby economies with larger manufacturing and construction sectors also display higher sensitivity to interest rate changes, in part due to the high capital intensity of these sectors.

FIGURE 9- Share of durables over total private consumption
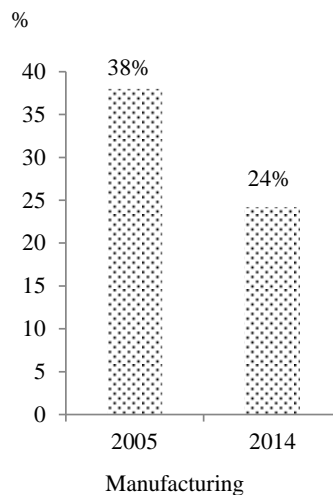
%

Durables
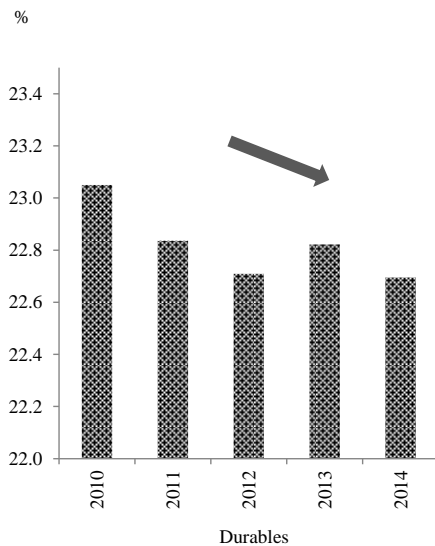
Source: Bank Negara Malaysia

FIGURE 10- Share of residential housing over total private investment

%

Residential Housing
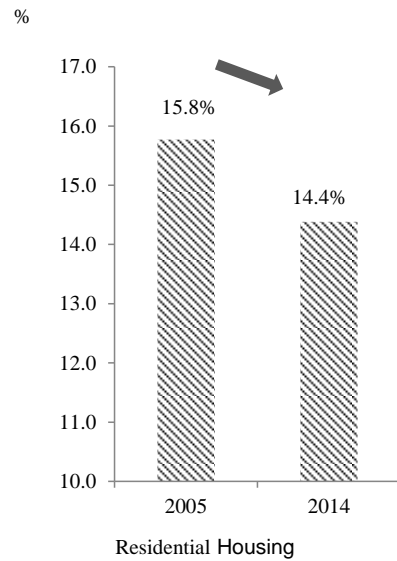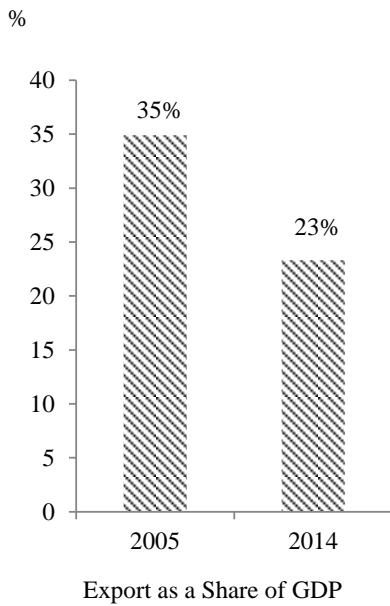
Source: Bank Negara Malaysia

Figure 11 shows that the manufacturing sector as a share of total private investment has decreased substantially over time from 38% to 24%. The manufacturing sector is one of the sectors in Malaysia that is most interest rate-sensitive (see Ibrahim, 2005). However, the decline may be partially offset by slight gains in the share of the construction sector, which is another interest-rate sensitive sector. Turning from the domestic economy to the external sector, the level of trade openness of a country can also affect the transmission mechanism by increasing the importance of the exchange rate channel. The smaller size of the external sector, as reflected by the decline of exports as a share of GDP from 92% to 76% suggests a lower impact of monetary policy from the exchange rate channel (see Figure 12).

FIGURE 11- Share of manufacturing over total private investment

%

Manufacturing

Source: Bank Negara Malaysia

FIGURE 12- Export as a share of GDP

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Export as a Share of GDP
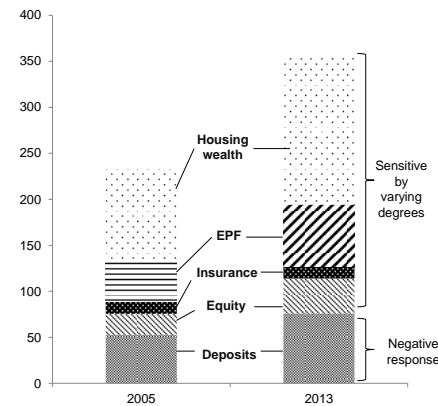
Source: Bank Negara Malaysia

While patterns of demand may have weakened the channels, we find that the trend of household asset holdings, including the size and the type of asset holdings may explain the increased potency of the asset price channel. Over the past decade, the household balance sheet has grown in size, both in terms of assets and debt[15]. From 2003-2013, total household assets grew at an annual rate of 10.4% to 321.6% of GDP as at end-2013. Housing wealth, while remaining the largest component of household assets, has increased significantly as a share of GDP over time (2005: 102%; 2013: 160%) as reflected by the MHPI more than doubling since 2000. Although we did not include the MHPI in our estimates, the high correlation between equity prices and housing prices indicate that housing prices is likely to play an important role in the asset price channel (see Figure 13). These trends suggest the strengthening of the asset price channel, as a reversal in price gains is like to lead to a larger reduction in wealth, causing a scale-back in household spending. In addition, the composition of household assets has become more diversified over time with an increase in accumulation of unit trusts and equities, increasing the speed and magnitude of policy shocks to consumption in the real economy through changes in asset prices (see Figure 14).

FIGURE 13- Malaysia House Price Index (MHPI) and Kuala Lumpur Composite Index (KLCI)
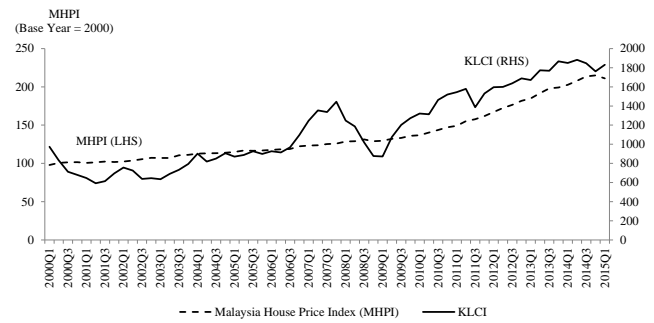
Source: National Property Information Centre (NAPIC) and Bank Negara Malaysia

FIGURE 14- Household Assets as a Ratio to GDP

Source: Bank Negara Malaysia

Broadly, we observe that the evolution in the structure of the economy, as reflected by the domestic demand and supply factors and also the developments in the external sector, has reduced the sensitivity of economy activity to monetary policy impulses. In contrast, within the household sector we find that the cash flow and wealth effects are becoming more sensitive to policy movements, supporting the finding of increased potency of the asset price channel uncovered in our empirical analysis.

V. POLICY IMPLICATIONS

Our empirical results and analysis provide some insight to the conduct of monetary policy. First, as the transmission mechanism to output has weakened slightly over the past decade, for the same type of shocks to growth, the OPR would have to be adjusted by a larger magnitude than before to have the same offsetting impact on aggregate demand. In contrast, our results indicate that the transmission mechanism to inflation has strengthened, implying that to offset inflationary impact from movements in the policy rate, the OPR would need to be adjusted by a lesser magnitude compared to before to achieve the same results.

These trends indicate that BNM faces a lower sacrifice ratio[16] compared to before when it contemplates raising rates to rein in inflation. Due to the lower sacrifice ratio, BNM has

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[15] Bank Negara Malaysia Annual Report 2013

[16] An economic ratio that measures the costs associated with slowing down output to change inflationary trends.

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greater policy space to adjust rates as the costs to growth are more muted. The empirical results however indicate that the cost to economic activity will be in the near terms, while the benefit of lower inflation is only likely to materialize over the longer term. Nevertheless, the improved capacity to deal with inflation shocks will strengthen monetary policy at a time when the on-going removal of domestic price subsidies and controls, as well as, other structural shifts in the labour market are likely to increase the variability of inflation going forward.

The results of the channel study confirm that in recent years, a sizeable portion of monetary policy effects occur outside the traditional interest rate and bank lending channels. This underscores the continued need for close surveillance of the capital and foreign exchange markets to ensure that monetary policy is having the expected impact. The formulation of policy will also need to account for how dynamic changes in the structure of Malaysia's economy and financial may alter the functioning of certain channels, resulting in weakened or impaired transmission. The experience of the U.S. during the subprime crisis provides a clear example of how extreme financial instability can impair specific channels of monetary policy transmission. Although the Federal Reserve lowered the Federal Funds Rate to near zero levels, demand for credit was muted due to severe household balance sheet damage during the crisis, nullifying the transmission through the interest rate channel. In the banking system, the bank lending component of the credit channel was also weakened as banks preferred to hoard capital instead of lending to borrowers to hedge against potential credit risks at a time of high default rates. These disruptions to the transmission channels during the subprime crisis rendered the transmission mechanism of the U.S. largely impotent until financial stability was restored.

Lastly, the results also indicate that the uncertainty surrounding the effects of OPR changes on the economy has reduced. The reduction in uncertainty provides scope for less gradualism[17] in monetary policy adjustments. While in the past, policy adjustments have been undertaken in a measured pace, evidenced by the normalisation cycle that began in 2010 and continued up until 2014, the reduction in instrument uncertainty may enable more decisive adjustments to counter higher-than-anticipated inflationary pressures or asset price increases given the reduced risk of such an adjustment inadvertently dampening economic growth. However, we emphasise that this finding does not suggest the elimination of uncertainty surrounding the transmission of monetary policy in Malaysia. For this reason, continued monitoring of the factors surrounding transmission coupled with a measured

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[17] This strategy follows from Brainard's principle of attenuation (Brainard, 1967), which says that if the central bank is unsure of the magnitude of the effect on the real economy from a change in the monetary policy instrument, it should adjust the instrument by a lesser degree than if it were to be sure. Indeed, there are gains to this strategy, as it reduces the risk of reversing policy decisions should economic data show an unexpected turnaround and it lowers financial market disruptions and policy mistakes in an uncertain environment.

approach to policy adjustments remains appropriate.

VI. CONCLUSIONS

The aim of this paper was to answer two questions about the transmission mechanism in Malaysia. First, has the transmission of monetary policy to growth and inflation in Malaysia strengthened or weakened over the past decade? Second, what are the factors that have driven these changes?

Through our quantitative results and qualitative assessments, our key findings are as follows:

1. The monetary transmission mechanism to output has weakened over the past decade.
2. However, the monetary transmission mechanism to inflation has increased.
3. In terms of the transmission to output, the interest rate channel and exchange rate channel has declined in strength. The credit channel does not seem to have a material impact in transmitting policy impulses to output, while the asset price channel has gained in significance.
4. The overall monetary policy transmission mechanism has become less uncertain in terms of its impact on the targeted real variables.
5. While changes in the monetary policy framework have improved the transmission of monetary policy to output, the gains have been blunted by changes in the financial sector and structural shifts in the economy.
While this study has provided some insight into the MTM for Malaysia and implications for policy, we note that the nature of the transmission mechanism is a dynamic system that is constantly evolving. As such, continued monitoring of the developments and greater research on the MTM are important in order to deepen the understanding for effective policy making in Malaysia.

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APPENDIX I: SHUTDOWN METHODOLOGY AND ESTIMATION RESULTS

A. Introduction to the shutdown methodology

We investigate the individual strength of each transmission channel by comparing the impulse responses of both the target variables of output and inflation in response to a monetary policy shock under two scenarios: a baseline VAR model that includes all the channels and a constrained model that excludes the channel of interest.
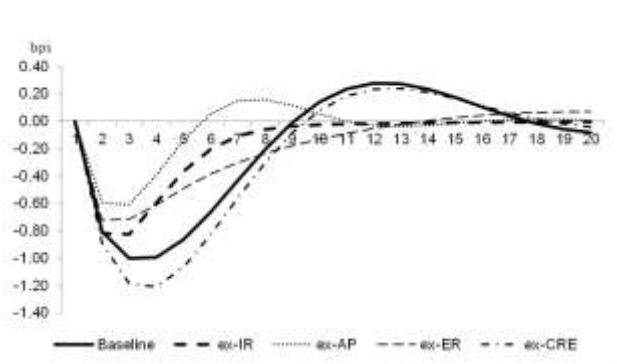
The operation of such a procedure is as follows. First, the baseline model is run, and the impulse response function for output and inflation in response to a monetary policy tightening is identified. Next, a transmission channel is shut down by exogenising the associated variable. A similar impulse response function is then plotted and compared to the baseline. By exogenising the variable that proxies for the channel of interest, we are effectively blocking off any response that passes through the VAR through the said variable.

The difference between the impulse response of the baseline (unconstrained) model and that of the constrained model provides a measure of the strength of the channel of interest. The greater the deviation of the impulse response function of the constrained model from the baseline for a particular channel of interest, the higher its significance in the transmission mechanism. Conversely, the closer the impulse response function of the constrained model tracks that of the baseline, the lower the importance of the associated channel.

Similar counterfactual experiment methodologies, pioneered by Ramey (1993), have been employed in various monetary transmission mechanism studies in a variety of contexts. Disyatat and Vongsinsirikul (2003) examine the degree and channels of pass-through from money market rates to retail rates by shutting down the asset price channel, exchange rate channel, and credit channels. Endut, Morley and Tien (2014) perform a similar study on the US transmission channels using a structural VAR (SVAR) approach. Closer to home, Tang (2006) employs this technique to gauge the strength of the interest rate, exchange rate, credit and asset price channels to monetary policy. It is with his study that ours most closely relates to, and we compare some of the broad results with that of his study.
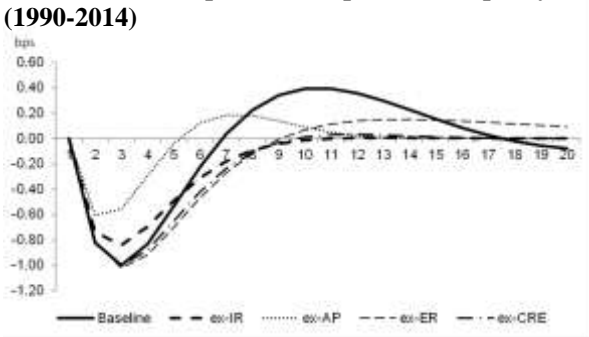
B. Impulse Response of the Individual Channels

FIGURE 1- Impulse response function of individual channels for a response of output (Y) to a policy rate shock (1990-2004)

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Source: Author's estimates

FIGURE 2- Impulse response function of individual channels for a response of output (Y) to a policy rate shock (1990-2014)

Source: Author's estimates