

Working Paper 6/2014

**ALTERNATIVE MONETARY POLICY FRAMEWORKS
FOR PRICE AND FINANCIAL STABILITY**

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**The South East Asian Central Banks (SEACEN) Research and Training Centre
Kuala Lumpur, Malaysia**

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Abstract

With revolutionary changes of the financial environment, due in particular to the progress of information and communication technology and the aftermath of the global financial crisis, central banks are facing new challenges in the pursuit of price, financial and exchange rate stability. This research paper looks at how central banks can enhance the effectiveness of monetary policy when in practice, the policy tools available to them are rather limited. In fact, many of them have no better option but short-term interest rates.

This paper compares three alternative monetary policy operation frameworks viz. the Channel System, Interest-on-Reserves and Asset-based Reserve Requirements. All the three frameworks have one thing in common - they all allow central banks to preserve their leverage over short-term interest rates and effectively pursue financial stability by controlling the total volume of credit in the economy. However, their practical implementation varies to a large degree.

Keywords: Central Bank, Monetary Policy, New Normal, Financial Stability, Channel System, Interest-on-Reserves Regime, Asset-Based Reserve Requirements

JEL Classification: E44, E52, E58

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ALTERNATIVE MONETARY POLICY FRAMEWORKS FOR PRICE AND FINANCIAL STABILITY

1. Introduction

Until recent times, central banks (CBs) used to only have to worry about price stability. But currently, most CBs have two additional simultaneous jobs to perform: exchange rate stability and financial stability (Goodhart, 2005). Viewed systemically, these mandates are not independent but correlated. Obviously, given multiple mandates, policy conflicts are inevitable (Orphanides, 2013). Even then, from the CBs' point of view, the monetary policy framework has not evolved sufficiently in the past few decades and the policy tools that come with it have not improved much either. For example, the traditional discount rate policy and the required reserve ratios are still being used. Meanwhile, conducting open market operations to effect changes in the short-term interest rates is still one of the very few policy tools frequently utilized in modern central banking. But short-term interest rate policy, like others, has seen their effectiveness eroded in the changing environment. For one, the CBs' leverage over interest rates are constantly being challenged and threatened by the comparatively shrinking demand for monetary base, as a result of financial innovations and rapid technological development. In other words, the task of maintaining price stability, not to mention the other mandates, is now made much more difficult, especially at a time when CBs are just not equipped with enough effective policy tools to achieve the given multiple objectives.

In this respect, the paper proposes three alternative and viable monetary policy operation regimes, namely, the Channel System (standing lending facility), Interest-on-Reserves Regime and Asset-based Reserve Requirements. The proposed monetary policy operation frameworks are intended to preserve CB's leverage over interest rates, while still being able to independently manage the total volume of credit in the overall financial system. In this way, given strong banking and external sectors, the objectives of multiple mandates can be achieved.

2. Evolution of Monetary Policy

Monetary policy has seen many rounds of evolution. As far as memory serves us, the primary goal of the central bank has been price stability. However, it is interesting to note that historically, the mandate of financial stability preceded that of price stability. Both the Bank of England, one of the first modern CBs established in the 19th century and the US Federal Reserve in early 20th century, initially focused primarily on financial stability. It was much later that this financial stability mandate was expanded to encompass price stability.

From the end of World War II till 1950 and for the following two decades, most governments tried to achieve high economic growth and employment, resulting in spiraling inflation. With the primary aim of managing the inflation rate then, CBs around the globe successfully implemented monetary policy using monetary aggregates as the intermediate target and reserves as the operational target (also known as monetary targeting framework). But its effectiveness was tested in the 1980s when the stable relationship between monetary aggregates and the real economy began to collapse during the period of the *Great Moderation* (Stock and Watson, 2002), at a time when financial liberalization and financial innovations advanced rapidly. Against this compelling development, many economies started to adopt the short-term rate as the main operational target in the monetary policy framework.

Until the early 1980s, there existed in many economies, a system in part to rein in and constrain the over-expansion of credit. For instance, before World War I, the world economy operated under the gold standard and money and credit supply were strictly controlled, reflecting gold supply through production and flows between countries. After the collapse of the gold standard, the fixed exchange regime under the Bretton Woods System played the role of nominal anchor to control credit supply. The monetary targeting framework was able to control credit supply in the financial market. The way the financial system was regulated and supervised also played a part in enabling CBs to commendably control money, credit and interest rates by supplying the monetary base in a monopolistic way. Supervision on the business territory between banks and non-banks, regulations on interest rates, credit, capital flows, liquidity and reserve requirements were vigorously implemented.

However, two developments served to reduce the controllability of credit supply. Firstly, in the process of credit creation by banks, the increasing role of marketable debts not subject to reserve requirements was observed. Secondly, for non-banks, which basically create credit based on debt, the supply of money and credit are now increasingly dependent on market forces rather than monetary policy. By the 1990s, when the monetary targeting regime collapsed, inflation targeting (IT) was seen as a panacea to cure inflation and inflation related illnesses.² IT, however, has a structural weakness for the prevention of excessive credit expansion, since it is difficult by nature, under an IT regime, to adjust interest rates in a preemptive manner, particular in cases where the inflation pressure is not due to excessive demand.³

² After the GFC, some economists argued that inflation targeting should be refined (Reichlin and Baldwin, 2013), while Frankel (2013, 2012) instead proposed nominal income targeting or product price targeting.

³ For advantages and disadvantages of IT, see Mishkin (2013) pp. 442-3.

3. The Trilemma of Mandates of Central Banks

As mentioned above, CBs have been increasingly burdened by the “Trilemma” imposed by the tri-mandates of price, financial and exchange rate stability. The “Trilemma” in this case exists because a consistent set of policies may result in conflicting outcomes for the three different mandates. For instance, it is obvious that price stability does not guarantee financial stability and vice-versa (Zeti, 2013). The global financial crisis (GFC) is such fine example. Price stability achieved by CBs for a prolonged period generated optimism but this together with low interest rates stimulated asset price bubbles. Former Fed Chairman, Alan Greenspan, once regarded as the bastion of stable growth and low inflation rate is now criticized for directly creating the sub-prime mortgage crisis. Also, the mere fact of wanting to do good for financial stability leads to the “Trilemma”. It is common for CBs to increase market participants’ confidence in the financial markets by bailing-out problem financial institutions during crises, supplying abundant liquidity and reducing interest rates. These very acts, however, are likely to firstly, worsen moral hazard of market participants and increase the odds of financial crises and secondly, create inflation expectations and inflationary pressure in the future.

Let us consider another angle of the “Trilemma” - for example, implementing a restrictive monetary policy to establish price stability by increasing interest rates, thus causing the appreciation of the exchange rate, which would then reinforce one other to reduce import prices, creating a low inflation environment. This chain of events is causative as long as capital flows are not taken into account. In other words, when capital flows are taken into account, the interest rate effect on exchange rate can be ambiguous, through one of the two conflicting channels. Channel one involves a hike in interest rates. The increased spread between domestic and international interest rates then results in a rise in foreign investment in the domestic bond markets. On the other hand, a hike in interest rates can result in a downturn in the business cycle, decreasing foreign investment in the domestic stock markets. The first scenario is one of capital inflows while in the second, capital outflows, causing an appreciation and depreciation of exchange rate respectively. In other words, depending on the prevailing economic situation, the “Trilemma” may be unavoidable.

To avoid the “Trilemma”, there seems to be a consensus that monetary policy should be used independently to primarily achieve price stability with the implementation of other policies such as liberalization of capital accounts and free floating exchange rates (so called Washington Consensus). In fact this is the route many emerging countries, SEACEN economies included, have taken, either *de jour* or *de facto* since the 1997 Asia currency crisis. However, under the free floating exchange rate regime, the volatility of exchange rates can be excessive, causing instability and therefore frequent intervention is deemed necessary. Besides, most small open economies have very limited tools to manage exchange rates. While sterilized intervention is one

of the better known policies in managing exchange rates, its efficacy is also limited in preventing depreciation when foreign reserves are insufficient or in the case of excessive high mobility of capital flows (Glick and Hutchison, 2000). Again, this is a situation of having too many mandates with limited policy choices. The most commonly used instruments in the SEACEN economies are open market operations, discount policy and reserve requirement policy (see Table 1).

Table 1
Main Monetary Policy instruments in
Selected SEACEN Member Banks

	Open Market Operations	Discount Policy	Reserve Requirement	Reference Foreign Exchange	Directed Lendings	Repo under Liquidity Adjustment Facility	Special Deposit account	Re-deposits of FIs	Lending Facilities
<i>National Bank of Cambodia</i>			X	X					
<i>Reserve Bank of Fiji</i>	X	X	X		X				
<i>Reserve Bank of India</i>	X		X			X			
<i>Bank Indonesia</i>	X		X						
<i>Bank of Korea</i>	X		X						X
<i>Bank of the Lao PDR</i>	X	X	X	X					
<i>Bank Negara Malaysia</i>	X	X	X						
<i>Central Bank of Myanmar</i>	X	X	X						
<i>Nepal Rastra Bank</i>	X	X	X		X				
<i>Bangko Sentral ng Pilipinas</i>	X	X	X				X		
<i>Central Bank of Sri Lanka</i>	X		X						
<i>Central Bank, Chinese Taipei</i>	X	X	X					X	
<i>Bank of Thailand</i>	X	X	X						
<i>State Bank of Vietnam</i>		X				X			

Source: Survey Conducted by SEACEN, 2014.

Post the GFC, to partially solve the “Trilemma”, there has been a consensus that macroprudential policies may be used concurrently with monetary policy. The emerging paradigm is, therefore, one in which both monetary and macroprudential policies are used together for countercyclical management: monetary policy is primarily aimed at price stability while macroprudential measures at financial stability. But these policies interact with one other and therefore, may either enhance or contradict one other. For example, monetary policy affects borrowing and ultimately output by changing risk-taking incentives of economic agents. On the other hand, macroprudential policies affect output by changing the availability of loans and/or constraining borrowing and thus expenditure in certain sectors of the economy, which cannot be captured by monetary policy. By putting these two effects together, it is unclear how economic agents may interact and behave in such circumstances (Claessens and Valencia, 2013). In other

words, one needs to fully explore the transmission mechanism of macroprudential policies in relationship with that of monetary policy.⁴

4. Games-Changing Environment for Central Banks

As mentioned above, implementing monetary policy to be consistent with price, exchange rate and financial stability simultaneously amidst the fast changing environment faces many challenges. The game-changing environment may create a situation which may reinforce the “Trilemma” effect to reduce the effectiveness of monetary policy.

4.1 Liberalization and Globalization

In the last two to three decades, liberalization of trade, investment and financial transactions has been increasing rapidly resulting in the further integration of global financial markets and the economies. For example, liberalization has expanded the financial derivatives markets, deepened financial securitization and expedited M&A among financial institutions. However, integration can pose some major concerns for CBs.

Firstly, cross-border dynamics and spillovers between macroeconomic conditions and financial system (so called macro-financial linkage) can amplify business cycle fluctuations and impair the real economy, in particular for small open economies. Secondly, liquidity and credit can be very volatile in the domestic financial markets when they are closely integrated with international financial markets. For example, the procyclicality of the financial system has become more severe, reducing the effectiveness of monetary policy since economic agents depend more on business conditions than monetary policy.⁵ Thirdly, integration makes capital flow management extremely difficult. Excessive capital inflows or outflows tend to increase exchange rate volatilities, thus aggravating macroeconomic and financial instabilities.⁶ For example, disproportionate capital inflows can expand domestic liquidity excessively in small open economies, thereby creating asset price bubbles. Thus, it has become increasingly difficult for CBs to achieve both domestic and external balances at the same time, using independent

⁴ In terms of institution, it is better to assign both policies to the same authority, i.e., the CB, as policy coordination is critical for maximum effect. In this manner, CBs can thus optimally choose trade-offs between the use of the interest rate instrument and macroprudential measures. However, safeguards are needed to avoid the risks of dual objectives and conflict of interest (Claessens and Valencia, 2013). When the responsibilities are assigned to different jurisdictions, CBs should coordinate with the relevant authorities to ensure that policies are well communicated.

⁵ During the boom period, as banks can borrow funds easily in liquidity abundant financial market at a low cost, they can expand credit supply. On the other hand, during the recession period, when the availability of bank credit is tight, banks experience difficulties in borrowing the required funds needed to lend, even if they are willing to pay more. However this concern is partly addressed by the introduction of the Basel III counter-cyclical buffer.

⁶ Given that there is a possibility of the key international currency evolving to two or three in the future, this would create even greater volatility of exchange rates.

monetary policy.⁷ Fourthly, international capital market players now have a much bigger role in determining exchange rates, liquidity and interest rates, limiting the capacity of CBs to manage these variables.

Also, it is interesting to note as we have seen in the instance of the European Central Bank, that the roles of CBs are expected to be reduced significantly when regional economic integration develops. The increased need for international cooperation in macroeconomic policies spurred by various crises also makes carrying out independent monetary policy difficult.

4.2 Rapid Progress of Information and Communication Technology (ICT)

Rapid progress in ICT and financial innovations have permeated every level and structure of economic activities, ranging from production, consumption and distribution. Decision-making is now much quicker across the board. Productivity has increased and transaction costs are greatly reduced across all industries. While this has somewhat stabilized prices, there are concerns that these developments can impact the effectiveness of monetary policy. Monetary policy is conducted based on the assumption that economic agents use currency for transactions and credit is created based on reserves deposited at CBs by deposit taking financial institutions. CBs thus can influence short-term interest rates by adjusting reserves through open market operations. The causation is, however, predicted to weaken in the face of rapid ICT development in electronic payment systems. For instance, the proliferation of e-money in some economies could eventually replace traditional currency. King (1999) expects that electronic payment settlement tools would replace CBs' monetary base significantly simply because of convenience. Friedman (1999) goes even further to say that e-money could completely replace currency in the future when it can be issued without deposits. In theory, the demand for monetary base, which CBs supply monopolistically, can become absolutely zero. This declining demand for reserve money, relatively or absolutely, weakens the transmission channels of interest rates besides decreasing the central bank's ability to create seigniorage. In some cases, the advancement of ICT has reached a stage where various private electronic settlement tools such as electronic money, for example Bitcoin, do not rely on CBs or banking settlement systems.⁸

4.3 The New Normal⁹

The effectiveness of monetary policy has also been called to question following the aggressive quantitative and monetary easing in the advanced economies due to the GFC which have driven interest rates to very low levels. To some extent, this potentially results in a number of risks to stability arising out of the macro-financial linkage. In a low interest rate environment,

⁷ This is even so for small open economies that find it difficult to attain price stability using independent monetary policy. These economies may be forced to adopt fixed exchange rate regime, currency board, dollarization or even join a regional currency union.

⁸ On the other hand, Goodhart (2000) and Freedman (2000) argue that currency cannot be fully replaced by e-money because of the elements of anonymity and no risk of bank notes. But rapid development of cutting-edge financial products has also resulted in a big gap in capacity of risk management.

⁹ This section is based on Lim and Chang (2013).

the profitability and financial soundness of financial institutions may decline, and financial disintermediation in the real sector may occur, resulting in lower economic growth. Furthermore, the change in the risk-taking behavior of economic agents, be they financial institutions or individuals, has been increasingly observed. Financial institutions searching for higher yields are likely to increase their risk appetite amid the search for higher returns under a prolonged low interest rate environment – e.g. competitive underwriting practices, proliferation of innovative credit products, venturing into new customer/borrower segments with higher risk profile and rapid expansion into neighboring economies with higher yields.

Similarly, institutional investors such as pension funds, insurance companies and mutual funds in the money market are seen to increasingly invest in high-risk assets. Also investment by households in risky asset such as stocks, gold, housing has rapidly increased, leading to higher growth of private credit and household debts. As such, the low-interest rate environment, if prolonged (the so called new normal) is likely to cause housing price bubbles as households over-extend themselves in the housing market. The rise in asset prices may eventually lead to a general price increase. There have been discussions on how monetary policy should respond to volatile asset prices. Asset price bubbles can occur for two reasons: one that is driven by easy credit and the other, driven purely by expectations that are deemed too optimistic (Mishkin, 2013). In general, whatever the cause of asset price inflation, there is a consensus that CBs should react to volatile changes in asset prices using monetary policy, but there are different views on how and when to react.¹⁰ Obviously, it is difficult to identify whether there exists a bubble in asset markets.¹¹ However, after the GFC, it has been increasingly acceptable that CBs should proactively respond using monetary policy to counteract volatile asset price changes for financial stability (Eichengreen et al., 2011; Canuto and Cavallari, 2013). Some argue that it is desirable to adjust the policy rate in response to asset price changes to the extent only if it influences expectation on future inflation (Bernanke and Gertler, 1999; Woodford, 1999). In general, it is fair to say that conventional monetary policy may be ineffective in an environment of asset price bubbles where both price and financial stability is at risk.

5. Towards a New Monetary Policy Framework

As noted above, CBs over the years, encountered many difficulties in carrying out their roles effectively using traditional monetary policy instruments. The general observation is that when credit supply is not managed effectively, particularly during the boom-bust cycles of expansion and collapse of credit and asset prices due particularly to volatile capital flows, systemic financial risk may emerge resulting in economic instability. In this regard, unless there is an efficient way to control credit effectively when implementing monetary policy, CBs would struggle to contribute to price and financial stability while maintaining stable growth at the same time.

¹⁰ It is argued that asset price bubbles driven by easy credit should be treated as the case for “leaning”, while bubbles driven purely by optimistic expectation the case for “cleaning up” afterward.

¹¹ The “Greenspan Doctrine” argues that CBs should not try to prick bubbles (Mishkin, 2013, p.451).

There are at least three approaches to finding ways to enhance the effectiveness of monetary policy.¹² The first approach is to set objective(s) that are reachable (S.M.A.R.T - specific, measurable, attainable, realistic and timely) goals, in the literature of measuring performances given the environment CBs are operating in. This implies a “back-to-basics” rule - setting price stability as the main objective. Setting price stability as CBs' sole objective is not because the other mandates are unimportant but because CBs just do not have sufficient tools to deal with multiple mandates in the long-run (Poole, 2000). However, as noted earlier, in the long-run, as experience has shown, focusing only on price stability can lead to financial instability. It is now generally agreed that excessive credit expansion, accumulation of debt and asset price bubbles can occur even when inflation is low and stable. Also, ironically, the current existing monetary policy framework has structural limits in an environment of extremely low interest rates and inflation rates, should there occur excessive fluctuations of credit and asset prices.

The second approach is to complement or enhance the current monetary policy framework (see Table 2) to improve the leverage of CBs over money, credit and interest rates, such as for example, paying interest on required reserves and improving mechanism of the discount system. One such approach is the Channel System where a CB can alter its policy at will (e.g., tightening or loosening) by altering the interest-rate spread around the target rate without changing its target rate. The other is the Interest-on-Reserves Regime.¹³ Obviously, under the right environment, enhancing existing monetary policy tools could strengthen the linkage between monetary policy and behavior of financial institutions, contributing to improving the controllability of CBs on the management of money, credit and interest rates.

¹² The drastic approach, based on the philosophy market efficiency, is to let the market mechanism determine the level and growth rate of macroeconomic variables, such as money, credit, interest rates since it is difficult in reality to derive effective monetary policy instruments. For instance, F. Hayek and M. Friedman support a free banking system as they have expressed doubt that central banks can ever do their job efficiently. However, this laissez-faire philosophy cannot be justified based on the experiences of the many global financial crises. During the last few decades, the central bank as a lender of last resort had been much needed.

¹³ Some SEACEN member banks have implemented such regimes. It, however, only affects commercial banks and thus may have a limit to effectively control the overall credit of the financial sector.

Table 2
Current Monetary Framework of
Selected SEACEN Member Banks

	Inflation Targeting	Exchange Rate Targeting	Monetary Targeting	Interest Rate Targeting	Multiple Indicator Approach
<i>Autoriti Monetari Brunei Darussalam</i>		X			
<i>National Bank of Cambodia</i>		X			
<i>People's Bank of China</i>					X
<i>Reserve Bank of Fiji</i>				X	
<i>Reserve Bank of India</i>					X
<i>Bank Indonesia</i>	X				
<i>Bank of Korea</i>	X				
<i>Bank of Lao PDR</i>					X
<i>Bank Negara Malaysia</i>				X	
<i>Central Bank of Myanmar</i>			X		
<i>Nepal Rastra Bank</i>			X		
<i>Bangko ng Pilipinas</i>	X				
<i>Monetary Authority of Singapore</i>		X			
<i>Central Bank of Sri Lanka</i>			X		
<i>Central Bank, Chinese Taipei</i>			X		
<i>Bank of Thailand</i>	X				

Source: Survey Conducted by SEACEN, 2014.

Quite distinct from the second approach, the third approach is to introduce a new innovative monetary policy framework that runs parallel with the evolving financial environments. The main aim remains the same: to enhance the controllability of CBs in the management of money, credit and interest rates. For example, the asset-based reserve requirement (ABRR) system is one such an innovative framework that requires reserves on various asset classes held by all financial institutions to be deposited at CBs, instead of the reserve requirement system which only imposes reserves on deposit liabilities held by banks.

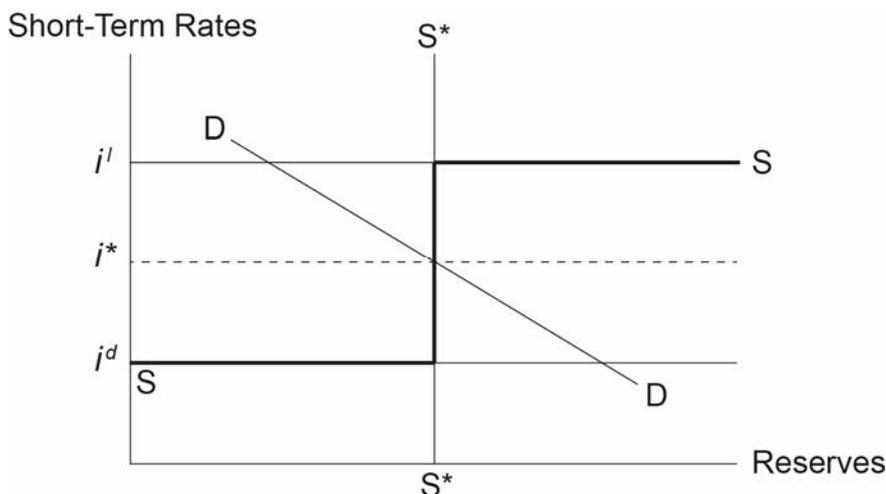
5.1 The Channel System

The Channel System introduces the Lombard¹⁴-type loan system to the banking system where banks can borrow freely against securities, such as government bonds from CBs but at a

¹⁴ The name, Lombard comes from Lombardy, a region in northern Italy which was once an important center for banking in the Middle Ages (Mishkin 2013, p.420). The US Fed's discount loans to banks are one type of Lombard facility. The practice of Lombard credit is still commonly used in central banking, where CBs lend against marketable securities, such as government bonds. Modern repos (repurchase-sale transactions) are also a form of Lombard lending: one bank sells marketable securities to another with an agreement to repurchase the securities in a fixed period of time. Although the legal documentation of the transaction is that of a sale and subsequent repurchase, the substance of the transaction is a secured loan. Pawn shops in many countries are often still referred to as Lombards.

higher interest rate (i^l) than the target rate (i^*). On the other side of the coin, CBs pay interest to banks on the reserves deposited with them but at a lower rate (i^d) than the target rate. Thus, the Channel System is a standing lending facility where the target rate hovers between a channel (so called the Channel System by the Reserve Bank of New Zealand and Woodford (2001)) created by the lower and upper limits.

Figure 1
Supply of and Demand for Reserves under the Channel System



S*S*: Targeted supply of reserves
 DD: Demand for reserves by banks
 SS: Supply of reserves by CB

As seen in Figure 1, with the standing lending facility as a liquidity adjustment mechanism likened to open market operations, banks can borrow from CBs at a higher loan interest rate (i^l) than the target rate (i^*) when banks are short of reserves. On the other hand, CBs pay interest on deposits by banks with a deposit rate (i^d) lower than the target rate (i^*). The market rate will not fall below (i^d) because if interest rate falls below this rate, banks would be able to borrow at this rate and by arbitrating, make pure profit. In this case, the target rate (i^*) fluctuates in a range between the upper limit of the loan rate (i^l) and lower limit of the deposit rate on reserves (i^d). In practice, the spread ($i^l - i^d$) could be very thin as it can converge close to zero when the uncertainty of bank funds flow diminishes with the progress of financial technologies.¹⁵ In particular, when $i^* = i^d$, CBs can supply any level of reserves (monetary aggregates) independently from the target

¹⁵ The Channel System is one version of the Interest-on-Reserves Regime in the sense that CBs pay Interest on Reserves in implementing the channel system. In this case, the channel system converges to Interest-on-Reserves Regime. Interest-on-Reserves Regime is different from the Channel System in a sense that the former does not necessarily need a standing lending facility. However, it is possible to operate standing lending facility with the interest rate paid on reserves and in this case, two systems are practically identical.

rate, implying CBs preserve their leverage over short-term interest rates and can effectively pursue financial stability by controlling credit in the economy.

The Channel System has been successfully implemented in many economies. For example, many CBs supply reserves significantly through massive open market operations at the end of 1999 to cope with the uncertainty of cash demand due to the Y2K problem. New Zealand and Australia increased supply of reserves by 10 and 2 times respectively through the Channel System. Short-term interest rates, however, went barely off from the target rate (Woodford, 2001). On the other hand, the Fed also tried to manage short-term rates by adjusting the supply of reserves but the federal funds rate dropped by 150bp from the target rate when it conducted massive purchase under open market operations at the end of 1999. Subsequently, it also experienced federal funds rate hikes far beyond the target rate when it absorbed excessive liquidity by open market operations of massive sales. The Fed finally introduced the Lombard loan system in 2003 where the Lombard rate is the upper limit of the federal funds rate and interest rate payable on reserves, the lower limit of the federal funds rate.

The Channel System has several advantages. Firstly, CBs can maintain the target rate within the range without transacting reserves in large amounts through open market operations since banks, under the standing lending facility, can always deposit at CBs at a given deposit rate or borrow from CBs at a given loan rate. CBs can also secure the leverage over interest rates by maintaining a constant spread between the loan/deposit rates regardless of the volume of reserves. Thus, CBs can maintain the leverage over interest rates even when the demand for reserves reduces significantly or vanishes. Secondly, when CBs want to change the target rate in the Channel System, CBs can just adjust the short-term rate towards the target rate by simply announcing the change of the spread between the loan and deposit rate without the need to adjust the supply of reserves. In other words, CBs can effectively manage short-term rates without unnecessary interventions in the financial market since there already exist a practice for market participants to transact funds at the target rate in the inter-bank market. Thirdly, under the monetary policy framework where CBs manage short-term rates by adjusting supply of reserves through open market operations or discount window, CBs have to determine daily the amount of open market operations and types, such as sale or repurchase of repos, frequency of transactions and duration of repos to achieve the target rate. Under the Channel System with standing lending facility where deposits at CBs and loans by CBs are determined automatically based on the demand by banks, the volume and types employed are not detrimental since short-term rates do not fluctuate substantially even when CBs happen to mis-forecast the demand for reserves.

5.2 Interest-on-Reserves Regime

The Interest-on-Reserves Regime, by definition, is when CBs pay interest on reserves deposited and utilize this rate as an operational target of monetary policy (Goodfriend, 2002). CBs set the interest rate on reserves as a target rate and adjust short-term rates towards this rate through open market operations if it is deemed necessary. When CBs pay the same interest on reserves as the short-term rates, the opportunity cost of holding reserves (short-term rates - interest rate on reserves) becomes zero and interest rate on reserves is both the upper and lower

limit of short-term interest rates since banks do not extend loans at a lower rate than interest on reserves or borrow funds at higher rate than interest on reserves. As the opportunity cost of holding reserves does not exist, banks therefore do not have any incentive to avoid reserves and will demand any volume of reserves (Goodhart, 2000; Woodford, 2001).¹⁶ The implementation of Interest-on-Reserves Regime of selected SEACEN economies is illustrated in Table 3.

Table 3
Implementation of Interest-on-Reserves Regime
in SEACEN Economies

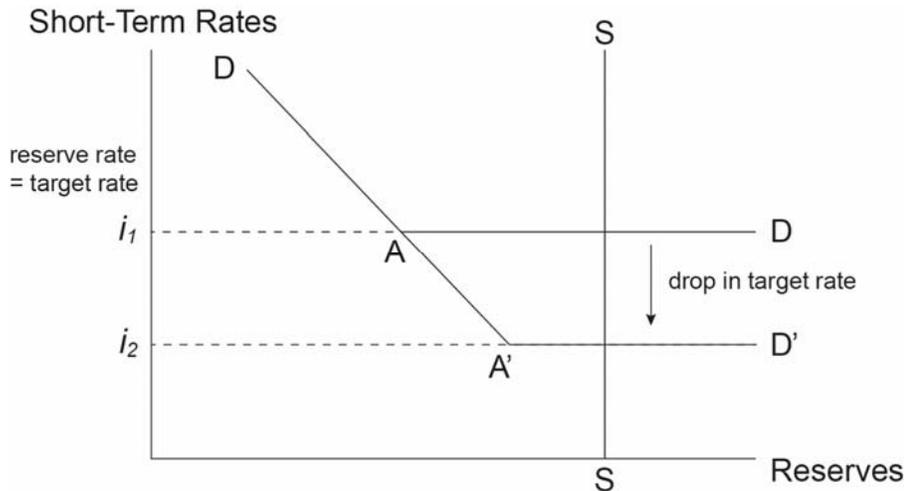
	<i>Reserve Requirement Policy</i>	<i>Interest Payment</i>
<i>Autoriti Monetari Brunei Darussalam</i>	Yes	No
<i>National Bank of Cambodia</i>	Yes	Yes
<i>People's Bank of China</i>	Yes	Yes
<i>Reserve Bank of Fiji</i>	Yes	Yes
<i>Reserve Bank of India</i>	Yes	No
<i>Bank Indonesia</i>	Yes	Yes
<i>Bank of Korea</i>	Yes	No
<i>Bank of Lao PDR</i>	Yes	No
<i>Bank Negara Malaysia</i>	Yes	No
<i>Central Bank of Myanmar</i>	Yes	No
<i>Nepal Rastra Bank</i>	Yes	No
<i>Bangko ng Pilipinas</i>	Yes	No ^{1/}
<i>Monetary Authority of Singapore</i>	Yes	No
<i>Central Bank of Sri Lanka</i>	Yes	No
<i>Central Bank, Chinese Taipei</i>	Yes	Yes
<i>Bank of Thailand</i>	Yes	No
<i>State Bank of Vietnam</i>	Yes	Yes

1/ Discontinued in April 2012.

Source: Survey Conducted by SEACEN, 2014.

¹⁶ In the case of Japan which encountered long-run stagnation, BOJ tried to stimulate the economy with zero interest rate and expansion of reserves as attempts to raise the effectiveness of monetary policy through quantitative easing independently from interest rate policy. The quantitative easing by the Fed with almost zero interest rate and the introduction of Interest-on-Reserves after the GFC is similar to Japan. In both cases, zero interest rate policy is equivalent to paying zero interest on reserves.

Figure 2
Supply of and Demand for Reserves under
the Interest-on-Reserves Regime



SS: Supply of reserves
 DAD, DA'D': Demand for reserves by banks

As seen in Figure 2, the demand curve for reserves (DAD/DA'D') is sloping downward to the right and kinked horizontally (perfectly interest elastic) at the level the target rate equals to interest rate on reserves (i_1 or i_2). Demand for reserves will increase when interest rate falls, but it becomes perfectly elastic when it reaches the rate (i_1 or i_2 respectively) payable by central bank on the reserves. As long as CBs supply reserves more than the demand for reserves at the kinked point (A or A') onwards, CBs can independently control short-term rates by adjusting the interest on reserves and at the same time, can manage total reserves (monetary aggregates) using open market operations. In other words, CBs can supply any level of reserves at the target rate as long as they supply more than the minimum level of demand for reserves indicated by the kinked point that is necessary to maintain target rate at the level of interest rate on reserves.

The obvious advantage of the Interest-on-Reserves Regime is that CBs can use interest policy for macroeconomic stability while reserves policy (quantity policy) can be used for financial stability (Goodfriend, 2002). In other words, the target rate can be maintained while enhancing financial stability at the same time by changing its reserve policy. For example, in the case of a credit crunch, CBs can manage short-term rates effectively under the Interest-on-Reserves Regime even when the demand for reserves declines to zero. In addition, the Interest-on-Reserves Regime is easily understood, transparent and easier to implement. It is also efficient as CBs can control short-term rates precisely so that the volatility of short-term rates can be reduced significantly. As transactions between CBs and banks are freely determined based on market principles, the biased and partial shifts in funds can be avoided. As for the banks, they can reduce

the cost of managing funds because funds can be borrowed from CBs at market rate when needed while excess funds can be deposited with the CBs at market rate.

5.3 Asset-based Reserve Requirements (ABRR)¹⁷

Asset-based reserve requirements (ABRR), like the name suggests, impose reserves on assets as opposed to deposit-based reserve requirement (DBRR) that levies reserves on deposits at banks. The ABRR effectively links reserve holdings to assets through a specific ratio or ratios. To enhance its effectiveness, this ratio(s) can be applied to all financial institutions.¹⁸ From the CBs' point of view, a higher ratio can be applied to assets with higher risk, faster expansion and faster price inflation. This could, in theory, isolate particular assets from expanding excessively since this is akin to targeting specific sectors, thereby avoiding a systemic risk spillover to the entire economy. For example, at times of rising asset prices (e.g., the real estate market), CBs may need to increase interest rates to cope with bubbles due to excessive liquidity but if this is done during a recession period, the effect could be dire across the entire economy. However, under ABRR, the amount of reserves of a particular asset (in this case the real estate market) rises automatically if the reserve ratio for this sector is increased, thus curtailing the amount of credit creation in the real estate market.

From the financial institutions' perspectives, the opportunity cost of holding a particular asset class that has been imposed higher reserve ratio rises, implies a declining marginal rate of revenue of that particular asset. In response, and as profit maximizing agents, financial institutions would reduce holding that asset class and divert their investment to other alternatives that have lower reserve ratios (and hence relatively higher revenue rate). This is different from the DBRR, for which banks have no such option. In other words, when CBs set the reserve ratio differently across different asset classes based on the degree of risks, it affects the relative yield of various assets and encourages financial institutions to manage their risk and optimize their portfolio allocations. This serves the objective of ABRR indirectly through the market mechanism.

It must be emphasized that the rationale for ABRR is quite different from the provisions that financial institutions accumulate in cases of asset deterioration, and also from the Basle equity capital requirements.¹⁹ ABRR is an efficient automatic stabilizer in contrast to the Basle capital requirement which strengthen procyclicality thereby exacerbating the business cycle.²⁰ When asset prices rise or new assets are introduced during the boom period, the volume of reserves of financial institutions increases accordingly in the case of the ABRR which can reduce business fluctuations. Thus, the ABRR can moderate somewhat the effects of procyclicality created by the Basle capital requirement. In a broad sense, the ABRR is a useful policy tool for

¹⁷ For details, see Palley (2011, 2004, 2003, 2000).

¹⁸ In this way, CBs can effectively manage aggregate credit of both banks and non-banks, thus enhancing the effectiveness of monetary policy

¹⁹ BIS' criteria for equity capital is to ensure banks hold more equity capital against high risk assets and prevent banks from taking excessive risk (moral hazard).

²⁰ For example, during a recession, when loan quality deteriorates and default risk increases, banks are required to raise additional capital at times when bank capital is hardest to raise. This can produce a credit crunch that amplifies the downturn.

enhancing overall monetary policy effectiveness by imposing reserves on assets of not only banks but also non-banking financial institutions. At the same, the ABRR can promote financial stability by managing the total credit at an appropriate level in the economy thus preventing financial imbalances of excessive liquidity and sudden changes of asset prices.

6. Conclusion

Given the multiple mandates and the game changing environment, CBs are increasingly finding it difficult to manage credit at the appropriate level to circumvent boom-bust credit cycles and secure financial and macroeconomic stability simultaneously. Although macroprudential measures can be used to cope with financial instability, CBs would be in better position if they have access to additional policy tools. Under the current monetary policy framework, there is always the problem of “one policy instrument practically.” For example, even when the relationship between reserves and interest rates is stable, the relationship between reserves and short-term interest rates is inseparable. That is to say, short-term interest rate is automatically determined when the amount of reserves is set and vice-versa.

The three frameworks, however, can help CBs to enhance financial stability in addition to maintaining the leverage over short-term interest rates. However, this begs the question of which is the most appropriate for implementation by CBs. When we look at the four factors in Table 4, namely, the ease of implementation, general acceptability of the market, consistency with financial stability agenda and cost to central banks, we note that the Channel System and the Interest-on-Reserves Regimes are the easiest to implement. All three may, however, require an amendment to central banking acts. As noted above, the ABRR, by virtue of its ability to distinguish between different asset classes can be implemented in harmony with the financial stability agenda. However, it can be difficult to implement as constant updating is required in tandem with ever-evolving financial innovations (Palley, 2004). Also while it is less costly to implement, the mere act of imposing “discriminating” levy reserves on different asset classes may be difficult to accept by the general public. From the perspective of the traditional monetary framework, perhaps the Channel System and the Interest-on-Reserves Regimes are easier to implement as the transition is less complicated.

**Table 4
Implementation Process**

	Channel System	Interest-on-Reserves Regime	Asset-based reserve requirements
Ease of Implementation			
General Acceptability			
Consistency with Financial Stability Agenda			
Less Cost to Central Bank Balance Sheet			

 Yes
  Somewhat
  No

While we note that some member banks pay interest on reserves, the policy objectives may be deemed different from the discussion above. Nevertheless, we see it as an opportunity for member central banks in the SEACEN economies to implement these various options, which provides CBs with additional policy tools to effectively carry out monetary policy - tools to enable CBs to achieve the desired level of reserves (quantity) in response to the CBs' mandate of financial stability and interest rate (price) to achieve inflation and output objectives.

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