
MONETARY POLICY OPERATIONS IN SINGAPORE

Monetary Authority of Singapore

March 2013



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Monetary and Domestic Markets Management Department

Monetary Authority of Singapore

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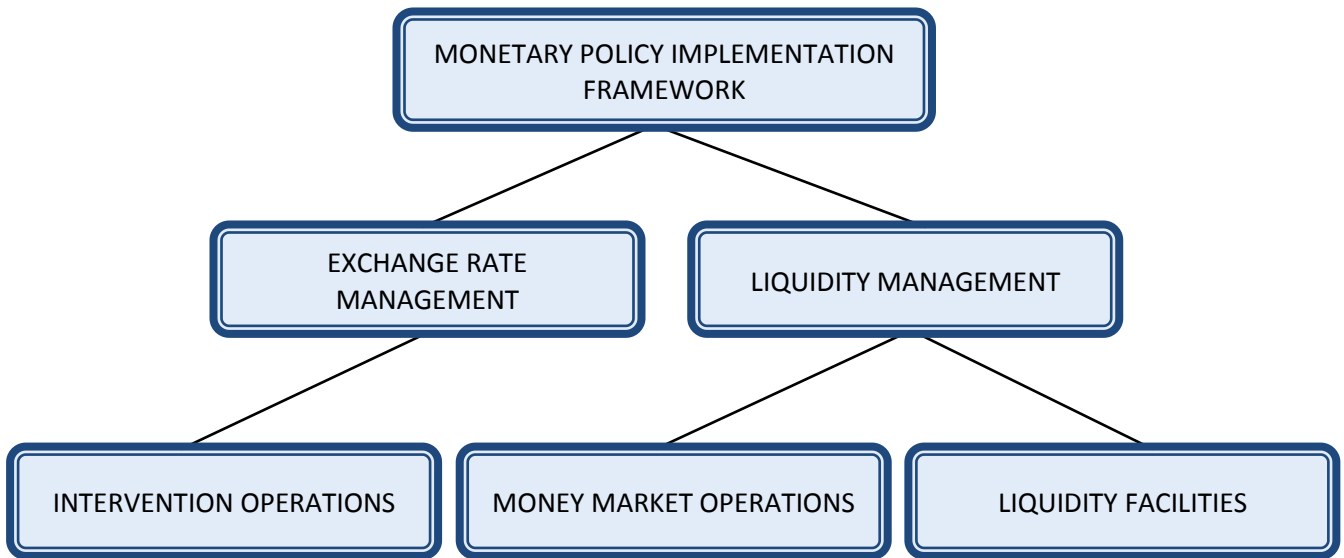
1 INTRODUCTION

1.1 The Monetary Authority of Singapore (MAS) is the central bank of Singapore and carries out a full range of central banking functions. The Monetary and Domestic Markets Management Department (MDD) is responsible for monetary policy implementation, which includes managing:

- i) the exchange rate through intervention in foreign exchange markets; and
- ii) banking system liquidity through money market operations and liquidity facilities.

1.2 Over the years, various aspects of monetary policy operations have been of much public and policy interest. This monograph provides details on MAS' foreign exchange and money market operations, and describes the liquidity facilities that MAS provides to financial institutions in Singapore.

1.3 The monograph is organised as follows. Section 2 describes the objectives of MAS' exchange rate-based monetary policy and illustrates how MAS carries out intervention operations. Section 3 outlines how MAS manages liquidity in Singapore's banking system through daily money market operations and the two liquidity facilities, namely, the Intraday Liquidity Facility and the Standing Facility.



2 IMPLEMENTATION OF EXCHANGE RATE-BASED MONETARY POLICY

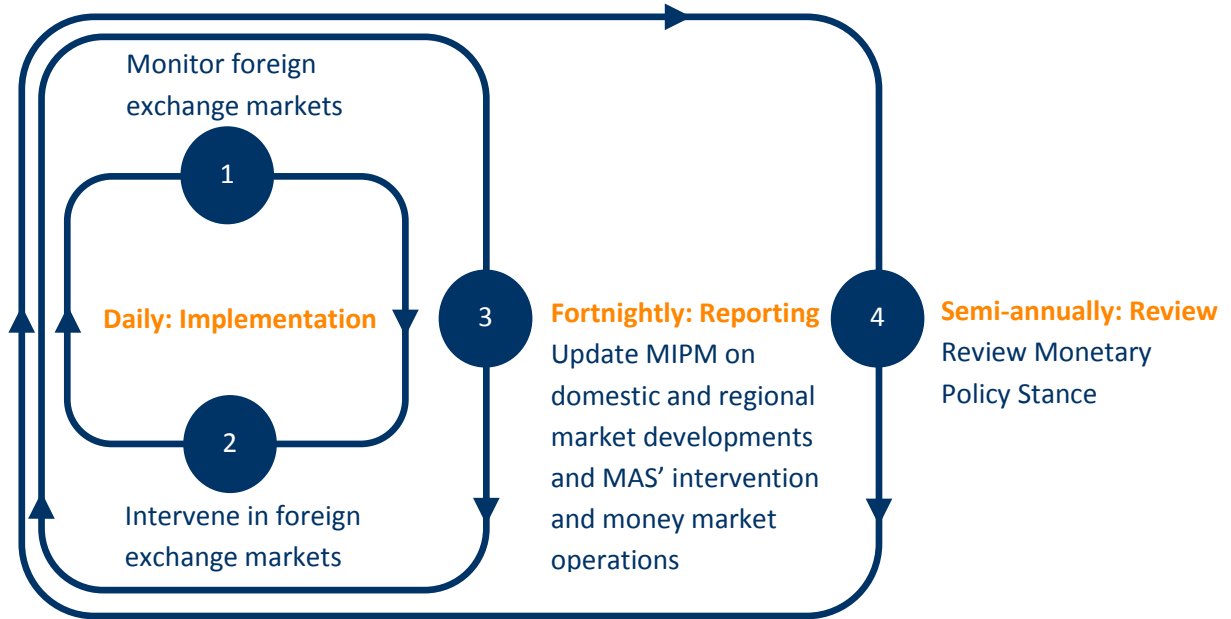
2.1 This section describes Singapore's exchange rate-based monetary policy framework and how MAS carries out foreign exchange market intervention operations.

2.2 The primary objective of Singapore's monetary policy is price stability for sustainable economic growth. Since 1981, Singapore's monetary policy has been centred on the exchange rate. MAS operates a managed float regime for the Singapore dollar. It manages the Singapore dollar against a trade-weighted basket of currencies of Singapore's major trading partners and competitors, and maintains it broadly within an undisclosed target band. When necessary, MAS intervenes in the foreign exchange market to maintain the trade-weighted Singapore dollar exchange rate, also known as the nominal effective exchange rate (NEER), within the policy band.

MONETARY POLICY IMPLEMENTATION CYCLE

2.3 Chart 1 illustrates the implementation cycle of MAS' exchange rate-based monetary policy.

CHART 1: MONETARY POLICY IMPLEMENTATION CYCLE



2.4 On a daily basis, MAS monitors the movements in the NEER closely and ensures that it moves in an orderly fashion broadly within the policy band. When the NEER reaches the edge of the policy band on either side, or when there is undue volatility or speculation in the Singapore dollar, MAS will intervene in the foreign exchange market using spot or forward transactions. MAS may also intervene before the band is reached, or allow the NEER to breach the band before intervening. Intervention operations may take the form of a purchase of the Singapore dollar against the US dollar to stem the depreciation of the Singapore dollar, or a sale of the Singapore dollar against the US dollar to moderate the appreciation of the Singapore dollar. As far as possible, MAS refrains from intervening unnecessarily and allows market forces to determine the level of the Singapore dollar exchange rate within the policy band. Box 1 shows the impact of intervention operations on MAS' balance sheet.

BOX 1: IMPACT OF INTERVENTION OPERATIONS ON MAS' BALANCE SHEET**Sell USD/Buy SGD**

Assets	Liabilities
Foreign Assets ↓	Deposits of Banks ↓

When MAS sells USD and buys SGD, both MAS' assets and liabilities on its balance sheet decrease.

Buy USD/Sell SGD

Assets	Liabilities
Foreign Assets ↑	Deposits of Banks ↑

When MAS buys USD and sells SGD, both MAS' assets and liabilities on its balance sheet increase.

2.5 MDD reports on its intervention operations at the fortnightly Monetary and Investment Policy Meeting (MIPM), which is the equivalent of other central banks' Monetary Policy Committees. MDD also provides updates on domestic and regional market developments to MIPM. More frequent updates are provided in times of heightened market volatility.

2.6 Monetary policy formulation is undertaken as a separate function in MAS to keep monetary policy decisions unencumbered by short-term implementation considerations. The Economic Policy Group, which is responsible for Singapore's monetary policy framework, continually assesses the path of the exchange rate to avoid a misalignment in the currency value of the Singapore dollar. It reviews monetary policy semi-annually and recommends the appropriate level, slope and width for the exchange rate policy band to ensure consistency with economic fundamentals and market conditions. As monetary policy affects the economy with some lag, it has to be pre-emptive and forward-looking, with a medium-term focus on low inflation and sustained economic growth. After

each review, a Monetary Policy Statement (MPS) is released, providing information on the recent movements of the exchange rate and explaining the exchange rate policy stance. An accompanying report, the Macroeconomic Review, provides detailed information on the assessment of macroeconomic developments and trends in the Singapore economy, and is aimed at enhancing market and public understanding of the monetary policy stance.

3 **MANAGING LIQUIDITY IN SINGAPORE'S BANKING SYSTEM**

3.1 This section provides an overview of MAS' banking system liquidity management framework, which comprises money market operations and liquidity facilities.

3.2 Unlike most other central banks, MAS does not target domestic interest rates. The Theorem of the Impossible Trinity—also known as the Open-Economy Trilemma—posits that a country that maintains an open capital account cannot simultaneously manage its foreign exchange rate and domestic interest rates. Thus, Singapore's open capital account and exchange rate-based monetary policy imply that domestic interest rates and money supply are necessarily endogenous.

3.3 MAS' liquidity management framework therefore does not target any level of interest rate or money supply. Instead, it aims merely to ensure that there is an appropriate amount of liquidity in the banking system: sufficient to meet banks' demand for precautionary and settlement balances, but not excessive. The following sections discuss the determinants of money demand and money market factors, and explain how MAS manages the level of liquidity in the banking system.

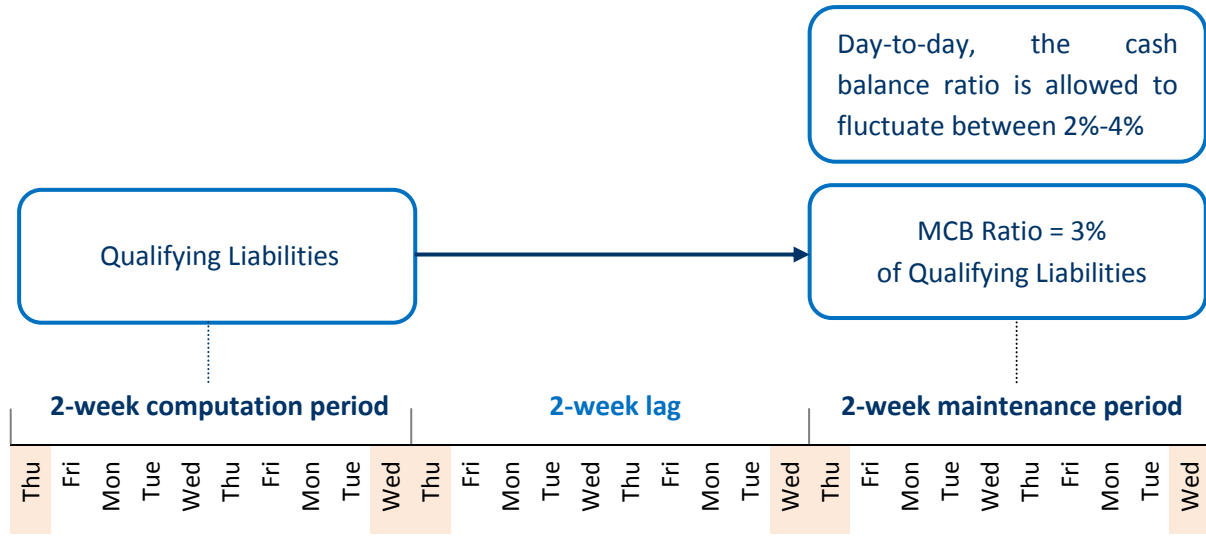
DEMAND FOR FUNDS

3.4 All banks in Singapore maintain cash balances in their current accounts with MAS. Banks are required to maintain a Minimum Cash Balance (MCB)¹ equivalent to a specified proportion of their lagged qualifying liabilities on a two-week average basis, as

¹ As set out in MAS Notice 758, which applies to all banks in Singapore.

shown in Chart 2. Given the lagged maintenance period, both MAS and the banks themselves can project with certainty the banks’ requirement for central bank balances.

CHART 2: COMPUTATION AND MAINTENANCE OF MCB



3.5 In July 1998, the MCB ratio was reduced from 6% to 3% of banks’ liabilities base to allow banks greater flexibility in managing their liquidity and improve their return on assets. The reduction in MCB did not compromise MAS’ prudential standards, nor did it signal an easing of monetary policy.

3.6 Two design elements of the MCB help to reduce daily interest rate volatility. First, banks’ end-of-day cash balances are allowed to fluctuate between 2% to 4%² of their qualifying liabilities base from day to day. This averaging provision for MCB requirements has the effect of making demand for cash balances more interest rate-sensitive, thus preventing large swings in domestic interest rates. Second, banks are allowed to utilise the full amount of their cash balances on an intraday basis to settle payment obligations. This

² Cash balances in excess of 4% of liabilities base do not count towards meeting the MCB requirement.

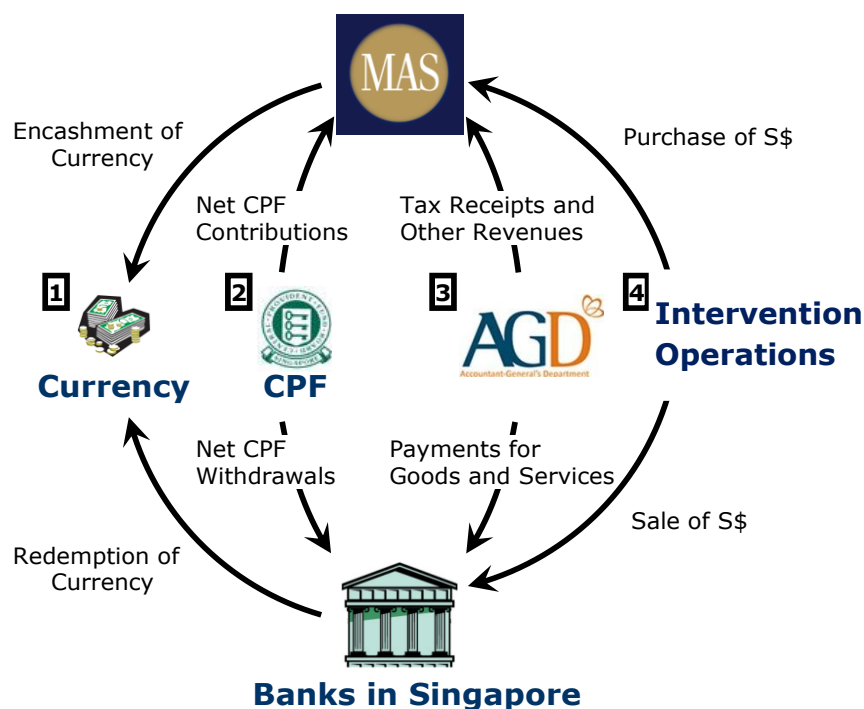
helps to alleviate intraday liquidity pressures in the banking system and minimises interest rate volatility.

3.7 The MCB requirement forms a base demand for cash balances. The total demand could, however, vary across periods as banks may hold excess cash balances for other purposes, such as to make large payments (settlement purposes) and to use as high quality liquid assets (regulatory purposes). Empirically, banks tend to maintain higher cash balances during the start of a maintenance period so as to avoid being caught short of cash towards the end of the period. Since the global financial crisis, there has also been a tendency for banks in Singapore to hold slightly more liquidity for settlement purposes.

MONEY MARKET FACTORS

3.8 Chart 3 provides a schematic illustration of the interactions among the key players and processes that affect fund flows and liquidity in the banking system in Singapore.

CHART3: SCHEMATIC ILLUSTRATION OF BANKING SYSTEM INFLOWS AND OUTFLOWS



3.9 **Currency Issuance:** The Currency Department of MAS is responsible for the issuance of currency notes and coins. MAS maintains a stock of currency notes and coins as a buffer to meet seasonal demand for currency by the public. When a bank needs currency to meet increased demand by customers (e.g. during the Lunar New Year and other festive periods), it goes through a process known as “encashment” of the claims in its current account with MAS. For example, when Bank A wants to encash its claims on MAS, MAS will debit the bank’s current account and, in return, pay Bank A an equivalent amount of currency out of its currency holding. The reverse happens when a bank wants to reduce its holding of excess currency—this process is known as “redemption”. Under the Currency Act, each Singapore dollar in circulation must be at least 100% backed by foreign assets. For this purpose, MAS maintains a Currency Fund to provide for the foreign asset backing of the currency.

3.10 **Central Provident Fund (CPF) Board Contributions and Withdrawals:** The CPF scheme is Singapore’s mandatory defined contribution pension fund scheme. The CPF Board administers the CPF scheme, and collects contributions from members and employers. It also dispenses funds to members under the various approved CPF withdrawal schemes. The CPF Board places the net proceeds as Advance Deposits with MAS for subsequent subscription to Special Issues of Singapore Government Securities (SSGS). SSGS have original maturities of 20 years and are non-marketable. They are issued specifically to the CPF Board to meet its investment requirements under the CPF Act and pay an interest equivalent to the interest the CPF Board pays to CPF members. Given the size of the transactions between the CPF Board’s agent banks and MAS, the CPF Board is a significant participant in the banking system.

3.11 **Government Fund Transfers:** MAS provides banking and financial services to the government. Given the significant role of the government in the economy, government fund transfers are also a significant autonomous factor in the domestic money market. The government derives its revenue from taxes, fees, levies, land sales and investment income, and spends on salaries of public sector employees and goods and services that it purchases

from the private sector. The Accountant-General's Department (AGD) is primarily responsible for managing the cash flows of the government. AGD maintains working balances in its accounts with the banks, and transfers funds to or from its account with MAS as the need arises.

3.12 **Intervention Operations:** The liquidity level in the banking system is also affected by MAS' intervention operations, which may increase or decrease the amount of Singapore dollars in the banking system. When MAS sells the Singapore dollar against the US dollar, there is an increase in foreign assets and a corresponding injection of Singapore dollars into the banking system. Conversely, a purchase of the Singapore dollar against the US dollar would result in a withdrawal of Singapore dollars from the banking system.

MONEY MARKET OPERATIONS

3.13 MAS carries out money market operations every morning at about 9.45am. The purpose of these operations is to ensure that there is an appropriate amount of liquidity in the banking system: sufficient to meet banks' demand for precautionary and settlement balances, but not excessive. The extent and size of money market operations will depend on the net liquidity impact on the banking system of the flows outlined in the previous section—currency issuance, CPF Board and government fund transfers, and intervention operations—as well as i) the maturity of past money market operations; and ii) net issuance of Singapore Government Securities (SGS).

3.14 Money market operations are carried out exclusively with Primary Dealers in recognition of their role as specialist intermediaries in the SGS and money markets. The instruments used are: i) direct borrowing or lending; ii) foreign exchange swaps; iii) repurchase agreements (repos) on SGS; and iv) MAS Bills. Box 2 elaborates on these instruments and illustrates their impact on MAS' balance sheet.

3.15 After deciding on the amount of liquidity to inject or withdraw from the system, as well as the instruments and the tenors to transact in, MAS conducts an auction and transacts with Primary Dealers based on the distribution of liquidity in the banking system and the competitiveness of their bids.

3.16 Depending on the economic climate and market conditions, MAS may at times supply less or more liquidity than is required to meet banks' demand for precautionary and settlement balances. For example, in mid-September 1985 when there was a speculative attack on the Singapore dollar, MAS intervened in the foreign exchange market to buy the Singapore dollar against the US dollar but did not offset the liquidity drain of the intervention through money market operations. The intervention operation was left unsterilised, so as to reduce banking system liquidity and make it costly for speculators to cover their short Singapore dollar positions (see Box 3 for information on the sterilisation of intervention operations and its impact on the economy). As a result, banks' cash balances with MAS fell to 5.4% of qualifying liabilities, below the then-statutory minimum of 6%. Overnight interest rates surged close to 100% per annum that day and hovered between 20-30% per annum for the following few days. This response is typical among central banks facing speculative attacks on their currency.

3.17 MAS has also left excess liquidity deliberately. On the morning of 12 September 2001, following the terrorist attacks on New York City the night before, MAS injected S\$2.5 billion into the banking system to bring banks' cash balances with MAS to 4.5%, above the statutory minimum of 3%, to calm market participants and ensure the smooth functioning of all Singapore dollar markets. It was only after some calm had been restored to the market that MAS withdrew some of the liquidity in the late afternoon. The banking system was left flush that day and for the few days thereafter.

3.18 More recently, during the onset of the global financial crisis in 2008, MAS left more liquidity in the domestic banking system to alleviate tightness in funding markets, and

subsequently withdrew some of the excess liquidity in FY 11/12 as global markets stabilised. Table 1 shows the net liquidity impact of MAS' monetary policy operations over this period.

BOX 2: MONEY MARKET OPERATIONS INSTRUMENTS AND IMPACT ON MAS' BALANCE SHEET

The four instruments used for money market operations are 1) direct borrowing or lending; 2) foreign exchange swaps; 3) repurchase agreements (repos) on SGS; and 4) MAS Bills.

1) Direct borrowing or lending

Direct borrowing refers to MAS borrowing Singapore dollars on an uncollateralised and interest-paying basis, and constitutes a withdrawal of Singapore dollar liquidity from the banking system. Direct lending refers to MAS lending Singapore dollars on an uncollateralised and interest-earning basis, and constitutes an injection of Singapore dollars into the banking system.

Example:

- i. Direct borrowing from banks

Assets	Liabilities
	Borrowings from Banks ↑
	Deposits of Banks ↓

- ii. Repayment to banks upon maturity

Assets	Liabilities
	Borrowings from Banks ↓
	Deposits of Banks ↑

2) Foreign exchange swaps

Foreign exchange swaps are contracts in which one party borrows currency from, and simultaneously lends another to, the second party. Foreign exchange swaps can be considered collateralised borrowing and lending transactions. To withdraw liquidity from the system, MAS transacts foreign exchange swaps where it buys the Singapore dollar against the US dollar in the first leg, and sells the Singapore dollar against the US dollar on the maturity date. Conversely, to inject liquidity into the system, MAS sells the Singapore dollar against the US dollar in the first leg, and buys the Singapore dollar against the US dollar on the maturity date.

Example:

- i. Purchase of SGD against USD

Assets	Liabilities
Foreign Assets ↓	Deposits of Banks ↓

- ii. Sale of SGD against USD upon maturity

Assets	Liabilities
Foreign Assets ↑	Deposits of Banks ↑

3) Repurchase agreements (repos)

MAS can also carry out collateralised borrowing or lending during money market operations using SGS, also known as repurchase agreements (repos). To withdraw liquidity from the banking system, MAS can borrow Singapore dollars against SGS today (on the maturity date, it would return Singapore dollars on an interest-paying basis and receive SGS). To inject liquidity into the banking system, MAS can lend Singapore dollars against SGS today.

Example:

- i. Borrowing from banks via SGS repo on value date

Assets	Liabilities
(1) SGS holdings ↓	(2) Borrowings under repo ↑
(1) Loan of SGS under repo ↑	(2) Deposits of Banks ↓

- ii. Repayment to banks on maturity date

Assets	Liabilities
(1) SGS holdings ↑	(2) Borrowings under repo ↓
(1) Loan of SGS under repo ↓	(2) Deposits of Banks ↑

4) MAS Bills

To facilitate banks in better managing their liquidity, and to increase the availability of high-quality liquid assets, MAS started issuing MAS Bills as part of money operations in April 2011. These bills are negotiable, so banks that need liquidity can sell or pledge them as collateral in the interbank repo markets and MAS' liquidity facilities. To withdraw liquidity, MAS can issue more MAS Bills than maturing (net issuance of MAS Bills). To inject liquidity, MAS can issue fewer MAS Bills than maturing (net redemption of MAS Bills).

Example:

- i. Issuance of MAS Bills

Assets	Liabilities
	MAS Bills ↑
	Deposits of Banks ↓

- ii. Maturity of MAS Bills

Assets	Liabilities
	MAS Bills ↓
	Deposits of Banks ↑

BOX 3: STERILISATION OF FOREIGN EXCHANGE INTERVENTION OPERATIONS

In the literature, sterilised intervention is defined as a foreign exchange transaction by a central bank that is accompanied by an offsetting sale or purchase of domestic assets that leaves the domestic monetary base unchanged. For example, in the event of a speculative attack on its domestic currency, a central bank will sell US dollars against the domestic currency (transaction (1)) and at the same time buy domestic bonds (transaction (2)) to offset the liquidity impact of its foreign exchange intervention. The effect of these two transactions on the central bank's balance sheet is shown below.

Central Bank Balance Sheet	
Assets	Liabilities
(1) Foreign Assets ↓	(1) Deposits of Banks ↓
(2) Domestic Assets ↑	(2) Deposits of banks ↑

On the liabilities side, the two transactions offset each other fully and do not affect the monetary base. On the asset side, one asset (domestic) is substituted for another (foreign), and the effects of intervention on the exchange rate depends on whether the private sector in the aggregate is indifferent to the corresponding changes in its financial portfolio.

In essence, if the private sector regards the domestic and foreign assets as perfect substitutes, the sterilised intervention operation will have no effect on the exchange rate. On the other hand, if the assets are not regarded as perfect substitutes, market pressures will generate an adjustment in their relative expected yields, entailing a change in the spot exchange rate relative to interest rates and the expected future spot rate, in order to induce the private sector to alter its financial portfolio in accordance with the intervention operation. In addition, sterilised intervention may have an influence on the exchange rate through the expectations or signaling channel.

In Singapore's context, MAS' intervention operations have an impact on liquidity in the banking system. In conducting money market operations, MAS takes into account the net liquidity impact of these intervention operations in conjunction with various autonomous and other money market factors. Depending on the magnitude and direction of these factors, MAS may be required to withdraw liquidity, or even inject additional liquidity into the banking system. As explained previously, instead of outright sale/purchase of SGS, short-term money market instruments of various tenors are used.

TABLE 1: NET IMPACT OF MONEY MARKET FACTORS AND MONETARY POLICY OPERATIONS ON THE DOMESTIC BANKING SYSTEM

	S\$ million per Financial Year				
	07/08	08/09	09/10	10/11	11/12
Money Market Factors					
Public sector operations (AGD, CPF)	- 40,008	-23,676	- 12,185	- 40,258	- 38,069
Currency in circulation	-1,111	-1,323	-908	- 962	- 1,793
SGS issuance, redemption, interest	- 11,063	2,643	-11,234	- 494	- 5,662
Sub-total	- 52,182	-22,356	-24,327	- 41,714	-45,524
MAS Foreign Exchange and Money Market Operations					
Foreign exchange operations, including swaps	65,983	8,881	52,977	62,052	25,749
SGS repos and reverse repos	-1,800	1,800	- 2,300	-500	-1,600
Direct borrowing and lending and net MAS Bills issuance and maturity	-11,800	13,000	- 23,800	-13,600	17,234
Sub-total	52,383	23,681	26,877	47,952	41,383
Net Cash Injected (+) or Withdrawn (-)	201	1,325	2550	6,238	-4,141
Less: Change in banks' required MCB	977	1,314	1230	1,352	1,710
Net Liquidity Impact:	-776	11	1,320	4,886	-5,851
Memo item: Change in banks' liabilities base	32,572	43,807	41,009	45,057	57,016

3.19 MAS also provides two liquidity facilities, the Intraday Liquidity Facility and the Standing Facility, to financial institutions in Singapore. While daily money market operations provide for broad liquidity management of the banking system, the liquidity facilities allow MAS to fine-tune the liquidity in the system as necessary and minimise intraday volatility in overnight interest rates.

INTRADAY LIQUIDITY FACILITY

3.20 The Intraday Liquidity Facility is open to all financial institutions that are participants in MEPS+, MAS' Real-Time Gross Settlement (RTGS) system. The facility allows eligible financial institutions that have signed the PSA-ISMA Global Master Repurchase Agreement (GMRA) with MAS to obtain Singapore dollar funds on an intraday basis through repo transactions involving SGS and MAS Bills, with appropriate haircuts applied. It provides market participants, some of which have large payments and receipts within the same day, with liquidity for settlement purposes and helps to smooth out their intraday funding needs. The facility is open from 9am to 5pm, with the automated reversal time set at 5.30pm. The intraday repo rate is based on prevailing market rates unless otherwise determined by MAS, and is broadcast on the MAS website³.

STANDING FACILITY

3.21 MAS also provides the Standing Facility, a two-sided discount window that allows MEPS+ participants to deposit Singapore dollar funds with or borrow Singapore dollar funds against eligible collateral from MAS on an overnight basis. Apart from minimising interest rate volatility, the facility bolsters market confidence by giving financial institutions the assurance that liquidity needs in the banking system would be met in times of stress.

3.22 As MAS does not have an interest rate target, the borrowing and lending rates for the Standing Facility are market-determined. The reference rate is the weighted average rate of successful bids by Primary Dealers for S\$500m of overnight deposits at the day's money market operations. To discourage financial institutions from tapping on the facility as a first resort, the facility's lending rate is 0.5% above the reference rate, while the deposit rate is 0.5% below the reference rate, subject to a floor of zero.

³ <http://www.mas.gov.sg/Monetary-Policy-and-Economics/Central-Bank-Operations-and-Liquidity-Management/MAS-Intraday-Liquidity-Facility.aspx>

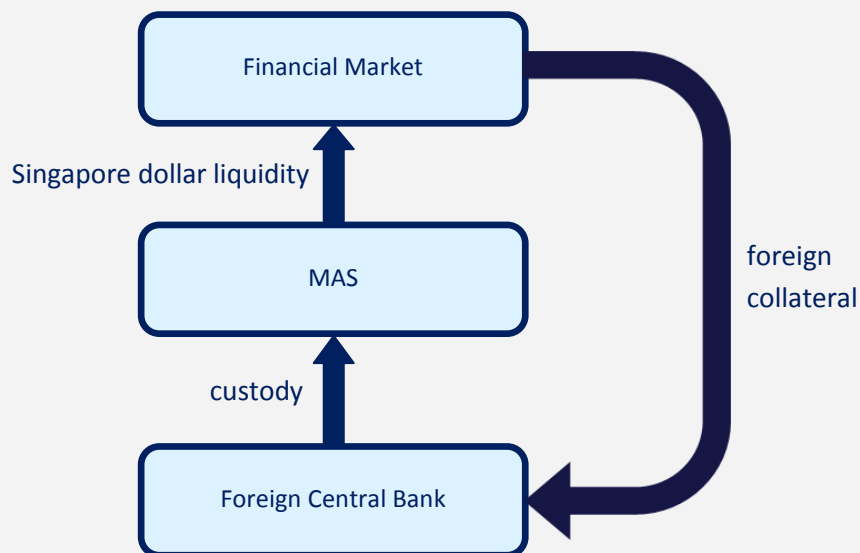
3.23 When MAS introduced the Standing Facility in 2006, only SGS were accepted as collateral for borrowing transactions. Over the years, as part of efforts to enhance the liquidity-provisioning framework, MAS has expanded the pool of eligible collateral to include MAS Bills, Singapore dollar sukuk issued by the Singapore Sukuk Pte Ltd (a wholly-owned subsidiary of MAS), Singapore dollar debt securities issued by certain AAA-rated entities, as well as foreign-currency denominated securities specified in Cross Border Collateral Arrangements (CBCAs) between MAS and foreign central banks. Box 4 elaborates on these CBCAs. Eligible collateral, along with the relevant haircuts, are listed in the Standing Facility terms and conditions published on the MAS website⁴.

3.24 For obtaining Singapore dollar funds via SGS or MAS Bills repo and for depositing Singapore dollar funds, the operating window of the Standing Facility is from 6.00pm to 6.25pm. For obtaining Singapore dollar funds via other types of collateral, the operating window is from 2.30pm to 3.30pm.

⁴ <http://www.mas.gov.sg/en/Monetary-Policy-and-Economics/Central-Bank-Operations-and-Liquidity-Management/MAS-Standing-Facility.aspx>

BOX 4: CROSS BORDER COLLATERAL ARRANGEMENTS (CBCAs)

Cross Border Collateral Arrangements (CBCAs) are agreements between central banks, under which one or both central banks agree to provide local currency liquidity to eligible financial institutions in exchange for foreign currency or foreign currency-denominated collateral. The diagram below illustrates MAS' arrangements with global central banks.



Prior to signing these arrangements, MAS accepted only securities issued by AAA-rated entities. By broadening the collateral pool to include foreign currency-denominated collateral, MAS now accepts certain kinds of collateral issued by entities with lower credit ratings. To ensure sufficient risk mitigation, MAS applies larger haircuts to such collateral.

As at March 2013, MAS has entered into CBCAs with Bank Negara Malaysia, Bank of Thailand, Bank of England, Banque de France, Bundesbank, De Nederlandsche Bank, and the Federal Reserve Bank.

BOX 5: ENHANCEMENTS TO MAS' LIQUIDITY FACILITIES

