Chapter 5
Domestic Liquidity Conditions and Monetary Policy in Singapore

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Abstract Singapore has an unusual exchange rate-centred monetary policy framework that has served the economy well over the past decades. Monetary policy operations are carried out by the central bank through the management of the Singapore dollar against a currency basket. As is well recognised, such foreign exchange interventions do have an impact on domestic liquidity conditions. However, in the case of Singapore, this tends to be counteracted by the liquidity impact of public sector operations related to the fiscal position and the national pension scheme. The central bank takes into account the net liquidity impact of these and other autonomous money market factors as well as banks' demand for funds when performing money market operations to regulate the amount of domestic liquidity in the financial system. We conclude with an explanation of the negligible liquidity impact of currency in circulation as reflecting Singapore's gradual transformation towards a cashless society.

5.1 Introduction

Singapore operated a currency board system when the Monetary Authority of Singapore (MAS) was first established in 1971. With the collapse of the Bretton Woods system in the early 1970s, instabilities in the world currencies led Singapore to develop its own exchange-rate policy framework. Since 1973, the Singapore dollar has officially been on a managed float. An exchange-rate centred monetary policy framework was formally adopted by 1981, reflecting the small and open nature of the economy. Singapore's high degree of openness to trade is captured by its trade to GDP ratio, which has been greater than three since the early 1970s. As a major financial centre, Singapore has free capital mobility. Almost all forms of capital restrictions and foreign exchange controls have been eradicated since 1978. Even the restrictions on the non-internationalisation of the Singapore dollar, imposed to deter currency speculation, have been progressively removed over the

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years in order to facilitate the development of Singapore's capital markets (Ong 2003).

Given Singapore's open capital account, it follows, from the open-economy trilemma,[1] that the central bank needs to choose between interest-rate targeting *vis-à-vis* exchange-rate targeting. The MAS has chosen to use the exchange rate as opposed to the more conventional benchmark policy of interest rate as its policy-operating tool since the early 1980s (MAS 2000). The rationale behind this decision is revealed when we consider the structure of the Singapore economy as well as its monetary transmission mechanism. Firstly, Singapore is highly dependent on external demand, notwithstanding the economy's gradual shift towards the services industry. Exportable services, including financial, information technology and professional services, along with externally-orientated manufacturing, account for more than half of the aggregate output in Singapore. Secondly, domestic consumption has a high import content—out of every Singapore dollar spent in Singapore, approximately 60 cents go to imports. Being a price-taker in international markets, Singapore is highly susceptible to imported inflation. Hence, the highly open and trade-dependent nature of the economy implies that the exchange rate is the most effective tool for controlling inflation.

By contrast, the Singapore economy is less interest-rate sensitive, notwithstanding its status as a financial hub. The MAS does not focus on the interest rate variable or a monetary aggregate in its conduct of monetary policy due to a lack of control over them—a reflection of Singapore's openness to capital flows and a very liberal policy towards foreign direct investment. As a result of the exchange rate-centred monetary policy framework and free capital mobility in Singapore, domestic short-term interest rates are significantly determined by foreign interest rates. Findings from a monetary VAR analysis in Chow (2005) suggest the exchange rate is, indeed, more influential than the interest rate as a source of macroeconomic fluctuations. With the support of flexible factor markets and strong institutions, the past track-record of low inflation[2] and prolonged economic growth attests to the effectiveness of using the exchange rate as a key monetary-policy instrument.

In the next section, we discuss the operation of Singapore's monetary policy framework. The implications of this framework on domestic liquidity conditions, and how this is counteracted by the liquidity impact of public sector operations related to the fiscal position and the national pension scheme is examined in Sect. 5.3. We conclude, in Sect. 5.4, with the evolution of one of the money market

[1] Obstfeld et al. (2004) summarises the open economy trilemma by saying that monetary policy can only achieve fully two of the following three dimensions: monetary policy independence, fixed exchange rates, and open capital accounts.

[2] Chow et al. (2014) showed, through a DSGE-VAR, model that export price shocks were a major source of output volatility in Singapore and, consequently, the exchange rate system at work had a comparative advantage over Taylor rule in terms of reducing inflation volatility. Indeed, CPI inflation in Singapore averaged around 2.3% since 1980, which is relatively lower than in the advanced countries.

factors, that of currency in circulation, which reflects Singapore's gradual transformation to a cashless society.

5.2 Singapore's Monetary Policy Framework

Monetary policy operations are carried out by the MAS through managing the Singapore dollar under a basket-band-crawl (BBC) system (Khor et al. 2004). Under this system, the MAS monitors the value of the domestic currency in terms of a currency basket (S$NEER: Singapore dollar nominal effective exchange rate) which is a trade-weighted average of the currencies of Singapore's major trading partners and competitors. These represent the various sources of imported inflation and competition in the export markets, with the periodically updated basket weights in order to reflect their degree of importance. Neither the constituent currencies nor their assigned weights in the basket are publicly disclosed. In view of Singapore's diversified trade pattern, targeting a currency basket, instead of a single foreign currency, results in a more stable effective exchange rate.

The MAS uses a prescribed policy band centred at a parity that is the target exchange rate for the S$NEER. The target rate reflects the long-run equilibrium exchange rate and is allowed to adjust gradually over time, keeping the policy band in tandem with Singapore's slowly changing long-term economic fundamentals. The crawl circumvents the emergence of a situation in which the currency becomes significantly misaligned. It thereby reduces the incentive for speculative attacks against the currency. The S$NEER is allowed to float within the prescribed policy band in order to allow for short-term fluctuations in the foreign exchange markets. The undisclosed policy band is sufficiently wide so that market participants cannot be sure of making a profit even when they correctly speculate on an impending change. Nevertheless, too wide a band is avoided in order to prevent the Singapore dollar from overshooting. The Singapore dollar is frequently used as a proxy for broader Asian currency risk, which means that changes in the fundamentals of other regional currencies could lead to the overshooting of the Singapore dollar.

The MAS can directly influence the value of the currency and defend the band by carrying out intervention operations in the foreign exchange markets. Sometimes, interventions are carried out within the band to smooth out short-term exchange rate volatility since the latter could impair confidence in the currency. In addition, when the S$NEER approaches or exceeds the boundaries of the policy band, the MAS may intervene to "lean against the wind", which means resisting the recent trend of the exchange rate thereby preventing the bounds from being breached. Such intervention operations resist misalignments and push the S$NEER towards its estimated equilibrium value.[3] The MAS monitors the S$NEER closely and

[3]MacDonald (2004) estimated the equilibrium level of Singapore's real effective exchange rate and found the Singapore dollar to be close to equilibrium in the early 2000s. Nonetheless, as

manages the currency upon a daily basis, even though it "refrains from intervening unnecessarily and allows market forces to determine the level of the Singapore dollar within the policy band" (MAS 2013).[4]

In comparison, monetary policy formulation takes place twice a year. In its semi-annual monetary policy formulation cycle, the MAS announces the exchange rate policy stance through a Monetary Policy Statement. Appropriate changes are made to the level, slope and width of the policy band if these are deemed necessary through an assessment of the prevailing economic and market conditions as well as their outlook. For instance, the MAS widened its policy bands with heightened volatility in the foreign exchange markets during the Asian crisis and subsequently narrowed them when a degree of calm had returned to the regional markets. In response to the global financial crisis (the direct effect of which was less severe), the MAS flattened its policy band and re-centred it at a lower level. Apart from being a counter-cyclical tool in the short term, the primary objective of monetary policy is to provide an environment of price stability over the medium term, one which is conducive for sustainable economic growth. To this end, the MAS guides the path of the exchange rate to ensure that it remains consistent with Singapore's economic fundamentals.

5.3 Currency Management and Domestic Liquidity Impact

Countries with an export-led growth strategy would typically maintain a low international value of their domestic currency to prevent a loss of competitiveness. However, despite its openness and reliance on export growth, Singapore maintains a strong Singapore dollar policy. Figure 5.1 depicts a time plot of Singapore's nominal and real effective exchange rate as compiled by the IMF, denoted by NEER and REER respectively.[5] The exchange rate variables NEER and REER have been defined so that a rise in their value signals an appreciation of the Singapore dollar.

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illustrated in Phillips et al. (2013), estimating the equilibrium exchange rate has become more complex. Apart from traditional fundamental variables, financial factors and policy variables have to be taken into consideration in determining the real exchange rate. The extent to which the central bank will intervene in the foreign exchange market in order to lean against misalignments will thus depend on how certain they are regarding their assessment of currency misalignment.

[4]Over the years, Singapore has maintained a conservative fiscal policy as well as a commitment to low inflation and a strong Singapore dollar, which has helped to build the central bank's credibility. Hence, market participants appear mostly convinced of the MAS' commitment to enforce the policy band, and they tend to keep within it. Such market discipline, in turn, alleviates the need for frequent central bank intervention operations in the foreign exchange markets (Krugman 1991).

[5]Due to the unavailability of more current data on the MAS' trade weighted index (S$NEER), we use the nominal exchange rate as computed by the IMF which is denoted by NEER. Both the NEER and REER time series are indexes whose values in 2010 are normalised to 100.

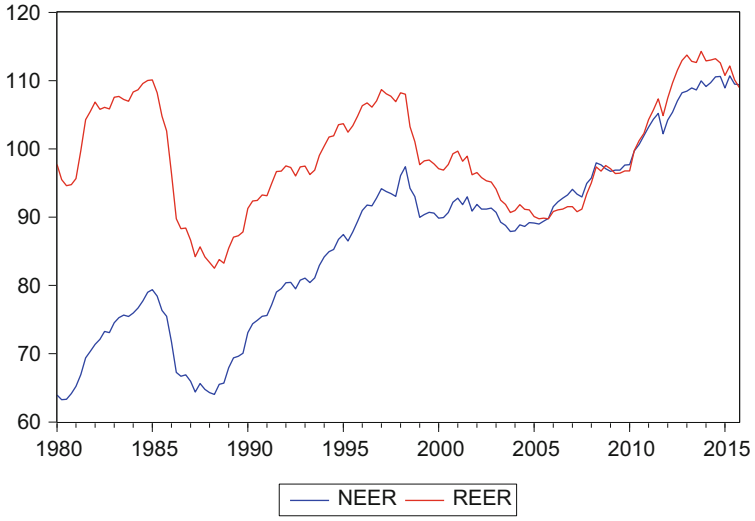

Fig. 5.1 Singapore's nominal and real effective exchange rates. Source: International Financial Statistics

It is clear from the secular upward trend of NEER in Fig. 5.1 that the Singapore dollar, in nominal terms, has been appreciating against its major trading partners over the past decades. We also note that REER remained strong, since the implementation of the exchange rate regime. The narrowing of the gap between NEER and REER after 1980 can be attributed to the relatively low inflationary environment in Singapore during this period. For instance, Singapore's consumer price index inflation averaged over the two periods of 1980–1989 and 1990–1999 are 2.8% and 1.9% respectively. These are lower than the corresponding numbers of 6.5% and 2.9% for the advanced countries; see Wilson (2015). Key considerations behind the strong Singapore dollar policy include the desire to maintain confidence in the domestic currency and to ensure price stability. After all, liberalised capital flows and a stable currency are important requirements for Singapore's role as an international financial sector and the development of a large offshore banking sector.

Although the exchange rate has not been used to safeguard competitiveness, Singapore's competitiveness does not seem to have been compromised by the strong Singapore dollar policy (Wilson 2015). In fact, Singapore has been registering recurrent current account surpluses over successive decades.[6] A plausible explanation for this is the appreciation of the Singapore dollar has been accompanied lower inflation, leaving Singapore's relative price competitiveness unaffected by the appreciation. Meanwhile, the secular appreciation of the domestic currency

[6]The overall balance of payments remained positive, except on rare occasions, in spite of the persistent export of capital abroad.

has the advantageous effect of pushing Singapore companies to move up the value chain to focus on higher value-added industries, thereby producing more technology-, skill- and capital-intensive exports. This, as well as its more moderate inflation, enables Singapore to maintain its international competitiveness despite the secular rise of its nominal exchange rate.

The upward trend in the domestic currency reflects the strong and improving fundamentals of the Singapore economy over the past decades. In particular, strong foreign capital inflows, consistent budget surpluses and high levels of domestic savings exert an upward pressure on the Singapore dollar to appreciate. Correspondingly, the foreign exchange intervention operations carried out by the MAS have mostly been to mitigate the appreciation of the domestic currency. Despite adopting a basket numeriare, it is not necessary to carry out intervention operations using all the component currencies of the basket. Not surprisingly, the MAS intervenes in the US dollar (USD) exchange market, as it is the most liquid (MAS 2013). When the MAS sells the Singapore dollar against the US dollar, there is an injection of Singapore dollars into the banking system which raises the level of domestic liquidity. There is a corresponding rise in foreign reserves and an increase in the monetary base.[7]

One macro-economic implication of defending appreciations is thus the increase in inflationary pressure, unless the MAS carries out sterilisation of its foreign exchange intervention. Nevertheless, there are domestic costs and risks associated with such sterilised intervention, especially when sterilisation is substantial and prolonged (Lavigne 2008). In the case of Singapore, the increase in the level of domestic liquidity due to foreign exchange intervention by the MAS tends to be offset by the withdrawal of liquidity due to the very high level of savings in the economy. Hence, the MAS does not necessarily have to sterilise its intervention operations if the banking system already has an appropriate level of liquidity.

Singapore's high level of savings is mainly due to the Central Provident Fund (CPF), which is a government administered compulsory savings scheme, and the government's strong fiscal position. As a result of prudent fiscal management, the government of Singapore has generally run persistent budget surpluses, averaging around 5% of GDP, since the early 1990s. Consequently, the Account-General Department (AGD) acting as the Government's accountant would normally transfer funds from its accounts with commercial banks to its deposit account with the MAS. The MAS, as the government's financial agent, is in receipt of deposits from the government. Such transfers are recorded as large sums in the item "Government Deposits" on the liabilities side of the MAS balance sheet, and they represent a liquidity drain from the domestic banking system.

[7]Foreign exchange reserves rose from 6.6 billion USD in 1980 to 248 billion USD in 2014 in Singapore. The high level foreign reserves, in turn, serve to deter currency speculators, as it grants the MAS the latitude to carry out intervention operations on a sufficiently large scale to defend the currency.

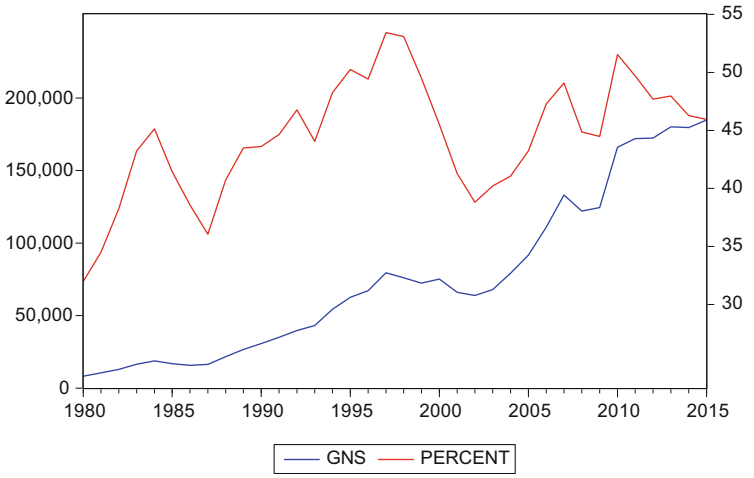

Fig. 5.2 Gross national savings rate (in millions of S$ and as % of GDP). Source: CEIC database

As for the CPF, this is a mandatory defined contribution pension fund scheme in which both employees and employers are required to contribute a certain percentage of the employees' income to the CPF.[8] Funds are disbursed to members by the CPF Board under various withdrawal schemes. As contributions tends to be in excess of withdrawals, the CPF Board usually transfers funds to the MAS by way of an advanced deposit with the MAS pending its purchase of special non-marketable Singapore Government Securities. These are issued specially to the CPF Board to meet its investment requirements and to mop up the surplus funds of the CPF. The net positive contributions to the CPF tend to be sizeable, and represent a withdrawal of funds from the banking system. Along with the fiscal surpluses, the CPF transactions contributed to a high gross national savings rate of above 40% for most of the past decades (see Fig. 5.2).

In summary, both the CPF Board and the Account-General Department tend to transfer funds to the MAS, which represents a drain on domestic liquidity. In order to overcome this liquidity drain, the MAS can conduct money market operations to ensure there is sufficient liquidity in the banking system. Other autonomous money market factors include the currency in circulation as well as the issuance, redemption and coupon payments of Singapore Government Securities (SGS) and Treasury Bills. The central bank takes the net liquidity impact of all these factors and the demand of banks for funds into account in order to assess the level of liquidity required in the banking system. The instruments used for money market operations include foreign exchange (reverse) swaps, direct lending to or borrowing from banks, and re-purchase agreements on SGS and MAS bills (MAS 2013). With the

[8]Employee and employer's CPF contribution rates are currently at 17% and 20% of gross salary for those earning above S$750 per month and below 56 years of age.

Table 5.1 Liquidity impact of money market factors and MAS' operations

	S$ million per Financial Year				
	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012
Money market factors					
Public sector operations (AGD, CPF)	−40,008	−23,676	−12,185	−40,258	−38,069
Currency in circulation	−1111	−1323	−908	−962	−1793
SGS issuance, redemption, interest	−11,063	2643	−11,234	−494	−5662
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	8881	52,977	62,052	25,749
SGS repos and reverse repos	−1800	1800	−2300	−500	−1600
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

Source: Monetary Authority of Singapore

use of market operations, the MAS has been able to regulate the amount of liquidity in the banking system.

While details of money market operations are made available in the Macroeconomic Review, time series data on public sector operations, MAS intervention operations, and MAS money market operations, are, in general, not publicly available. However, a monograph on money operations was published by the MAS in 2013, that showed a table of values on the various components of money market liquidity from 2007 to 2012. Part of this table is reproduced as Table 5.1, recording the liquidity impact of the various money market factors as well as that of monetary policy and money market operations.

Over this period, we can see from the table that public sector operations had a net negative impact on liquidity in the banking system and that the magnitude of the impact is larger than the other two money market factors, namely, currency in circulation as well as SGS issuance, redemption and coupon payment. In particular, we note from Table 5.1 that currency in circulation has a negligible impact on domestic liquidity. As recorded in the past issues of the MAS' Macroeconomic Review, public sector operations have consistently been the dominant negative money market factor over the successive years since 2003.

The item on foreign exchange operations in Table 5.1 combines direct foreign exchange interventions with money market operations using foreign exchange swaps. Although we are not able to distinguish monetary policy operations from money market operations, we can observe an injection of liquidity into the banking system through the combined foreign exchange operations in the various financial years. In terms of the distribution of the instruments used in money market operations, the MAS bills have gained importance since their introduction in 2011. As a share of the money market instruments used, they rose from 25% in

FY11/12 to 68% in FY14/15. There is a corresponding decline in the use of foreign exchange swaps from 73% to 43%.

Looking ahead, there are concerns that CPF net contributions could turn into net withdrawals as the population ages. After all, the CPF plays a key role as the fund for retirement income. In this event, the CPF transfers would be injecting, instead of removing, liquidity from the domestic banking system, which could potentially increase inflationary pressures (Yip 2005). Meanwhile, the Singapore economy is projected to experience a slower growth path associated with the decrease in its labour supply.[9] This suggests a likely fall in the tax revenue while government expenditure, especially on healthcare, rises. Such a scenario points to a decline in the government budget surplus, which also reduces the drain from domestic liquidity.

However, the attendant fall in the savings rate and the narrowing of current account surpluses implies that the Singapore dollar may no longer appreciate strongly upon a trend basis as in the past (Khor and Robinson 2005). This alleviates the need for intervention to moderate the strength of the Singapore dollar. In any case, when there is reduced offsetting liquidity impact from public sector operations, the central bank can still rely on the MAS bills in order to drain excess liquidity in the banking system. This way, the MAS could use money market operations to regulate the level of liquidity in the domestic economy in order to foster stable money market conditions and to keep the financial system functioning smoothly.

5.4 Cash in Circulation

As observed in the previous section, currency in circulation does not carry much weight as a money market factor in Singapore. Figure 5.3 displays the ratio of currency in circulation to M1 money supply in 1991–2016. It is evident from the figure that the ratio has been on a steady decline, falling from nearly 50% in 1991 to around 20% in 2011. The level seems to have stabilised at around 20% after 2011. The decline of currency in circulation can, in large part, be explained by policies undertaken in Singapore to move towards a cashless society.

In 1985, Singapore launched a National Campaign to Minimise Cash Trans actions to encourage Singaporeans to carry out their transactions electronically. The primary objective for reducing cash transactions was to save manpower costs, thereby increasing productivity. The three specific goals of the campaign were: (i) to urge receipt of wages through direct credit to the bank; (ii) to encourage the payment of bills electronically via General Interbank Recurring Order; and (iii) to promote payments through the Electronic Funds Transfer at Point of Sale system. In

[9]While the ageing workforce has been partially mitigated by immigration policies, the current political climate poses constraints on the intake of large numbers of foreign workers.

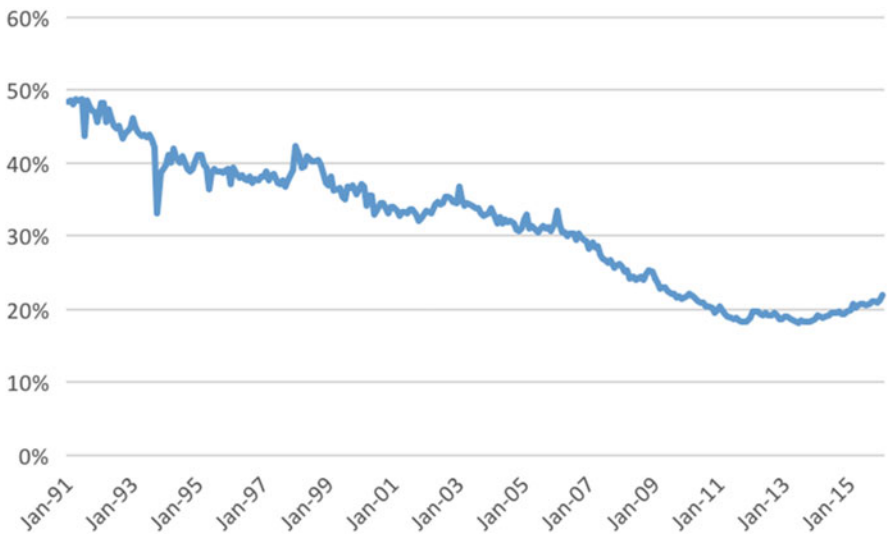

Fig. 5.3 Ratio of currency in circulation to M1 money supply (%). Source: Monetary Authority of Singapore

addition, steps were also taken to develop the related infrastructure, such as allowing commercial banks to place more Automated Teller Machines island-wide and the building of electronic networks. In particular, the setting up of the Network for Electronic Transfers in January 1986 was viewed as a milestone in Singapore's drive to become a cashless society. Efforts at transforming Singapore into a cashless society were gradual but effective.

Cashless transactions in Singapore started to become more commonplace from the mid-1990s with the expansion of the menu of electronic payment options. According to data from the Bank of International Settlements, transaction volumes in card-based electronic money shot up from 0.03 million to 2 billion between 1996 and 2010. The corresponding increase in the usage of debit cards, direct debits and credit transfers in the same period was 56 million to 203 million, 20 million to 57 million, and 14 million to 35 million, respectively. In terms of transaction value, there was a greater than four-fold increase for debit cards and direct debits to 25 billion SGD and 31 billion SGD in 2010, respectively. Meanwhile, the transaction value for credit transfers went up by 2.3 times to 179 billion SGD. Despite the surge in transaction volumes of card-based electronic money, the total value of transactions only went up to 2 billion SGD, suggesting that this form of cashless payment instrument was used mostly for payments in small transactions.

More recently, the advent of the digital revolution is transforming payment systems. For instance, physical wallets and credit cards are being replaced by payment solutions provided by non-financial players, such as Apple, Google, PayPal, Amazon and the like. Online payment is now a cheap and safe way of transferring funds, and can be effected through mobile devices such as smart phones

and tablets that have become ubiquitous. Singapore has various characteristics identified by Haddad and Hornuf (2016) that pre-disposes it to more financial technology (FinTech) innovations. These include well-developed capital markets that provide FinTech start-ups with better access to capital to fund their business, the availability of the latest technology that enables new practices and business models to emerge, high mobile phone subscriptions that facilitate retail point of sale and mobile wallet transactions, as well as immigration policies that attract foreign talent to join its financial sector workforce.

In view of the dynamism that FinTech could inject into Singapore's financial industry, the MAS[10] committed 225 million SGD to support, over a 5-year span, the creation of a vibrant FinTech ecosystem, wherein the adoption of new payments technologies is a key emphasis. For instance, the MAS is currently working towards greater inter-operability across payment systems for more seamless payments across different platforms. The FinTech initiative is part of the Smart Nation programme launched in Singapore in November 2014 that has the vision of enabling better living through the extensive and systematic use of info-comm technology. However, the advent of FinTech start-ups which provide many financial services do disrupt some traditional financial institutions. In response, financial Institutions in Singapore are setting up in-house FinTech units such as "innovation labs" in the banks and insurance companies.

As is generally recognised, financial innovation alters the risk profile of financial institutions and makes risk assessment more difficult. The MAS as the regulator of the financial sector has to tread carefully when managing risks, and must do so without stifling innovation. To avoid over-regulation, the MAS eschews a one-size-fits-all approach and adopts a risk-based approach. Since payment services through the Internet are typically small payments related to e-commerce, they may not attract regulation. However, more significant players will be regulated under the Payment Systems Oversight Act or the Remittance Agents Act. These are modular regulations customised to address the specific risks or concerns that these payment systems pose.[11] In the words of the managing director of MAS, Mr. Ravi Menon, "The aim is to make payments swift, simple and secure. The vision is less cash, less cheques, fewer cards".[12] Going forward, cash will become a less common means of payment in Singapore as it continues its efforts to transform itself into a cashless society.

[10]Apart from its role as a central bank, the MAS is also responsible for the supervision and development of the Singapore financial services sector.

[11]See panel remarks made by MAS Managing Director Ravi Menon on *FinTech – Harnessing its Power, Managing its Risks* at the Singapore Economic Policy Forum held on 2 April 2016.

[12]In a keynote address titled "A Smart Financial Centre" by the MAS managing director, Mr. Ravi Menon, at the Global Technology Law Conference 2015 on 29 Jun 2015.

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