

Foreign Reserves Management: The Case of Macao

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Abstract

Management of reserves is a complex business. It requires clear objectives, strong control systems and a realistic appreciation of the constraints faced. If conducted properly, it will greatly strengthen the public's respect for and confidence in official policy, and can make a material contribution to successful macro-economic management. The purpose of the paper is to explore the policy structure under which the Monetary Authority of Macau (AMCM) adopted for the official foreign reserves management. For many countries, the official foreign exchange reserves are both a major national asset and a crucial tool of monetary and exchange rate policy. It is therefore vital that this public resource is used and managed wisely and effectively.

* The author is grateful to Stanley Tang and Veronica Kuan, Monetary and Foreign Exchange Affairs Department of the AMCM, for their helpful comments and guidance during the preparation of this paper.

1. Introduction

Countries differ in a number of economic and social features, for example, the size of population, types of government system, state of development, wealth, openness to international trade, and borrowing requirements in domestic currency and foreign currencies. In almost every single case, however, they present a need for foreign reserves holding.

Official reserves are a major public asset. Even in well-developed economies, their value could be as high as some percentage points of gross domestic product (GDP). In some emerging countries, in particular, the corresponding figure is considerably higher. Merely from the standpoint of preserving this valuable public asset, the management of official reserves is an important task for most central banks.

The reasons for holding official reserves vary widely. The most common one is the use of reserves as a tool of exchange rate or monetary policy. This is most obviously the case for those countries, which are pursuing a *fixed* exchange rate policy, or which wish to influence the exchange values of their domestic currencies in the foreign exchange market. Meanwhile, reserves are in some cases held as formal backing for the issue of domestic currency, particularly under a *currency board arrangement* (CBA).

Macao SAR, for example, is operated under a CBA, under which the pataca is linked to the Hong Kong dollar at a rate of MOP1.03:HKD1.0. Under the CBA, the issuance of local currency must be adequately backed by foreign reserve assets. In fact, a credible currency board normally aims to hold a somewhat larger value of foreign assets than the value of their monetary liabilities in order to guard against the risk that the market value of their assets might diminish. On reserves management, a currency board tends to hold reserves in the form of low-risk, interest-bearing bonds or bank deposits denominated in foreign currencies.

In short, it is extremely important for a country to have sound reserve management practices in place, for ensuring the country's ability to cope with unexpected developments and exogenous financial shocks. Weak reserve management practices proved to have significant financial consequences to some Asian economies, in the Asian Financial Crisis of 1997/98.

This paper is organised as follows. Section 2 provides some background information on the theory of reserve management. Section 3 briefly discusses the present investment strategy and portfolio of foreign reserves in Macao, while Section 4 analyses current issues of reserve management facing Macao. Section 5 concludes.

2. A Brief Review of the Literature on Reserve Management

Reserve management is an important activity in most central banks as sound reserve management strategies support a broad range of policy objectives, such as:

- Maintaining confidence in the economy's monetary and exchange rate policies;
- Providing confidence to the international community that the economy is able to meet its external obligations;
- Maintaining foreign currency liquidity during periods of external shocks;
- Assisting the government in meeting foreign exchange obligations.

Given the above-mentioned objectives, the most commonly cited question is in the area of "what is an adequate level of reserves?" Individual countries' reserve holdings cannot be directly cross-compared or traced through time unless they are scaled in some way to reflect the difference in the size of the economy.

Grubel (1971) suggests that the choice of reserve adequacy is influenced by the quantity theory of money. Since private persons and governments require cash to even out

receipts and payments, and in the case of the private sector the volume of receipts and payments is measured by national income, the analogous measure for governments is thought to be **imports**. Even though the analogy might not be perfect, the reserve-to-import ratio¹ is still useful in today's discussion about reserve adequacy. For instance, Boorman and Ingves (2001) point out that reserves should be sufficient to pay for three or four months of imports. The **reserve-to-import ratio** or import coverage is thought to be a target of countries as part of their reserve management policies.

On the other hand, Heller (1966) in an oft-cited article first analyses the needed level of reserves in terms of a rational optimising decision. The optimal reserves level is defined at that point where **marginal utility equals marginal cost**. He also argues that his approach leads to a more reliable and consistent index of reserve adequacy than some simple reserve-to-import ratio.

The popular approach of import coverage focuses on the country's current-account flows. It has in fact recently been viewed sceptically as the sole measure for reserve adequacy. There has been a tremendous growth in capital flows and as a result, countries with open capital accounts should require more reserves and also look at their capital and financial accounts to determine an adequate reserve level. However, the rationale for this scaling variable has never been fully justified.

Meanwhile, the notion of reserve adequacy has changed with the onset of currency and financial crises in the late 1990s. Calvo (1996) suggests that a country's vulnerability to crisis should be measured, in part, by the size of its money supply, defined broadly, relative to its reserve holdings, since broad money reflects a country's potential exposure to the withdrawal of assets. Thus, broad money would be an appropriate scaling variable.

¹ Reserves in months of imports of goods and services have a straightforward interpretation: the number of months a country can continue to support its current level of imports if all other inflows and outflows cease. For further details, see International Monetary Fund (2000).

Alan Greenspan, the US Federal Reserve Chairman, has proposed using short-term debt (debt with less than one year to maturity) as a measure for reserve adequacy. It has been increasingly recognised that it is necessary to take into account the vastly increased importance of capital flows for emerging market economies, and to relate the size of reserves to a country's short-term external debt (Greenspan 1999). The argument Greenspan uses is that reserves must be sufficiently adequate to instil confidence in global creditors. He also suggests that the ratio of short-term external debts to reserves² is the best indicator of how a country's reserves will hold out during periods of international contagion and that this ratio should be used to determine an adequate reserve level.

Similarly, according to the experience of financial crises in East Asia, Fischer (2001) points out that countries holding very large reserves have coped better with the financial crises of recent years than others. He also expects that a lesson that countries will draw from these crises is that they should hold much larger reserves than before, and cites the case of Korea where a rapid build-up of reserves can be observed.

3. Macao's Foreign Reserves Management Strategy

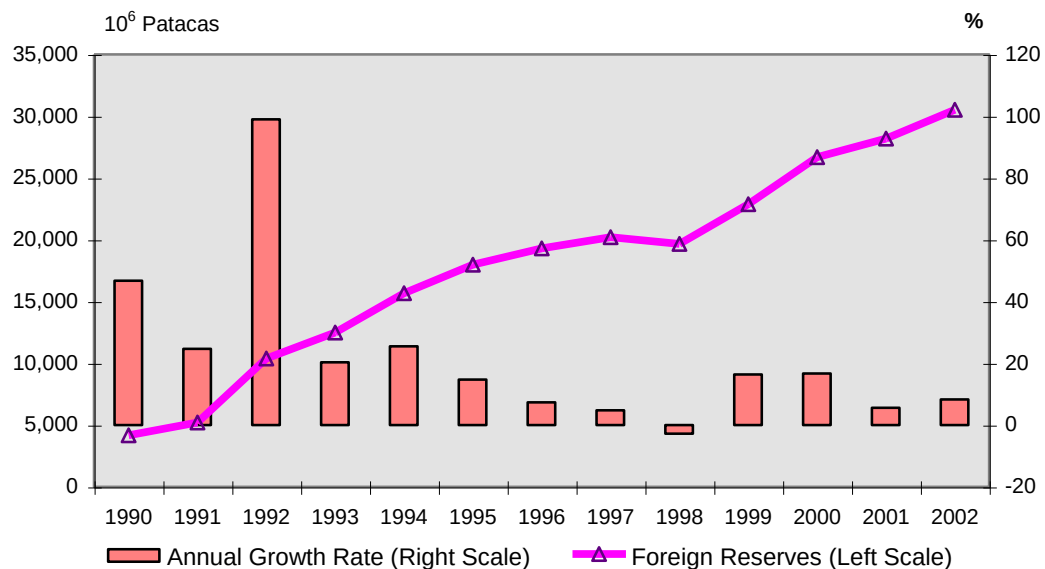
Setting objectives for the management of reserves is important as it provides broad guidelines on how reserves will be managed. The objectives of reserve management in Macao include *preservation of capital, liquidity and a reasonable return*. Preservation of capital is pursued through the management and control of risks to ensure that asset values are protected. Liquidity is maintained in such a way that it is possible to convert assets quickly into cash to meet commitments, at no significant cost. To minimise the carrying cost of reserve assets, a market-related return must be achieved within acceptable risk parameters. To meet these objectives, policy guidelines have been put in place

² The ratio is calculated by dividing 12-month debt service (both public and private sector debts) into the reserves. It is acceptable that the result is greater than one.

specifying the portfolio benchmarks against which the Monetary Authority of Macau (AMCM), the organisation entrusted the responsibility to manage the reserves, measures its performance and the portfolio structures.

After setting the benchmarks, the investment framework is established and securities are chosen for the relevant portfolios. Reserves are then managed using an enhanced index strategy, which is a low to medium risk strategy of asset management and is, therefore, suited to the AMCM's prudential objective.

Chart 1: Macao SAR's Foreign Exchange Reserves, 1990-2002



Note: Figures are referred to those at the end of each year.

As depicted in Chart 1, the highest growth rate of international reserves occurred in 1992, the year with remarkably high economic growth. Yet, this rise corresponded to the increases in major AMCM's pataca liabilities, including "monetary bills" and "deposits and current accounts". The positive development of these two items that reflected the AMCM's action to consolidate the role of the pataca allowed foreign exchange reserves to rise over MOP5 billion during 1992.

At the end of 2002, the gross value of the foreign exchange reserves of Macao SAR reached MOP30.5 billion, up 8.3% over the year 2001 with return on investment in foreign exchange reserves totalled MOP544 million, after deduction for interest expenses paid for monetary bills and deposits held by domestic banks. As shown in Tables 1 and 2, Macao's foreign reserves are equivalent to 30.8% of board money or 11 months of import cover, which are higher than those of most Asian economies.

Table 1: Macao's Foreign Exchange Reserves Backing Ratios, 1995-2002

	1995	1996	1997	1998	1999	2000	2001	2002
1. Foreign Reserves	17,972	19,299	20,215	19,651	22,873	26,696	28,177	30,527
2. M1	5,618	5,716	5,309	5,509	5,363	4,945	5,917	6,351
3. M2	69,444	74,333	78,183	80,628	86,096	84,918	91,550	98,960
4. Imports	25,291	24,252	25,139	24,188	26,142	29,236	30,660	32,700
5. M1 Coverage Ratio	319.9	337.6	380.8	356.7	426.5	539.8	476.2	480.7
6. M2 Coverage Ratio	25.9	26.0	25.9	24.4	26.6	31.4	30.8	30.8
7. Import Cover Ratio (Number of Months)	8.5	9.5	9.6	9.7	10.5	11.0	11.0	11.2

Unit: MOP Million for 1-4; % for 5-6
Source: AMCM.

Table 2: International Comparison in Reserves Backing Ratios, 2001

	M1 Coverage Ratio	M2 Coverage Ratio	Import Cover
P.R. China	28.9	11.4	9.5
Hong Kong SAR	411.0	29.0	6.0
Macao SAR	476.2	30.8	11.0
Japan	18.5	8.1	12.7
Malaysia	138.1	32.4	4.2
Indonesia	161.8	33.5	7.0
Singapore	384.0	76.6	6.9
South Korea	252.2	28.9	7.3
Chinese Taiwan	82.2	20.9	11.6
Thailand	223.6	27.0	5.6

Source: Underlying data from International Financial Statistics, December 2002 Issue, International Monetary Fund.

3.1 The benchmark setting

A benchmark is a neutral or passive investment strategy, which can be easily monitored to compare against actual performance. The benchmark portfolios are the crux of the reserves under the management of AMCM. The benchmark portfolios notionally give the highest expected return while respecting the credit, market risk and liquidity constraints.

In designing the benchmark portfolios, asset allocation approaches are used to analyse the risk and reward characteristics of different asset class compositions. The outcome of these approaches, however, relies heavily on assumptions regarding expected returns on broad asset classes and historical patterns of volatility and correlation. Because of the assumption-intensive nature of the approaches, the strategic asset allocation and benchmark exercise also require economic analysis and market experience. In the end, development of the benchmark portfolio is a combination of art and science where the simulation results are tempered by subjective judgement in the actual benchmark design.

The AMCM has developed investment guidelines for each portfolio manager. The benchmark portfolio represents long-term strategies, which would be modified in line with changes in the nature of the world economy. However, once the Board of Directors approves the benchmark portfolio, it is then deemed the “low-risk” portfolio.

3.2 Active management

Active management is the difference between actual returns and the returns to be achieved from a passive investment strategy. Like other central banks, the AMCM is adopting an active rather than a passive approach to reserve management, while adhering to three major principles. First, the reserves team must ensure that adequate reserves are available when they are needed to meet a specific range of objectives. Second, defined risks - in this case, liquidity, credit and operation risks - must be controlled within well-defined parameters, and third, a reasonable return should be generated from invested funds, subject to acceptable risk parameters.

Generating active management profits is not a matter of luck. It requires methodical and disciplined processes, the maintenance of good relationships and detailed analysis of the market. Active management involves taking on risk in order to obtain additional returns. Risk is therefore an integral and essential part of active management. However, the decision about which markets or currencies can be invested in is one for senior management, and will often be taken alongside other top-level decisions such as the design of benchmarks and the style of reserves management overall.

3.3 Risk management

Central banks are, by nature, prudent, and it comes as no surprise that they will have a very high preference for liquidity and a low tolerance for market and credit risks. Prudence suggests that the maximisation of return on reserves is rarely the first

priority in reserve management. Safety, which is the need for managing and controlling risks to ensure that the value of assets is protected, should receive the highest priority. However, the AMCM's risk management strategy, in the broadest sense, is to ensure that the exposure to both financial loss and loss of reputation is contained.

A summary of major kinds of risk and how the AMCM manages them is listed as follows:

- (i) Liquidity risk represents the risk that reserves could not be used as rapidly as needed for intervention purposes. To manage this risk, the AMCM holds very liquid assets, such as short-term Treasury bonds.
- (ii) Credit risk represents the risk of loss arising either from a change in the credit quality of a counterpart, perhaps following a ratings agency downgrade, or from an actual default. To manage this risk, the reserves team monitors on a daily basis any changes in credit ratings and, if necessary, adjusts the authorised limits accordingly after management approval.
- (iii) Operational risk is the risk of financial loss arising from inadequate or failed processes, people and system, or from external events. The AMCM has in place a comprehensive framework of controls to address operational risk. This embraces staff recruitment and training, work processes with built-in independent checks and reconciliation and segregation of duties such as capturing, verifying and authorising. Both the internal and external auditors also regularly monitor all processes.

In designing the risk allocation system, the reserves team has tried to capture the advantages of both a highly decentralised system, whereby there are many position-takers who are close to the market, with that of a more centralised system whereby a senior portfolio manager takes strategic positions based on more structural or systemic trends.

The AMCM's Board of Directors would determine the risk appetite when it approves the benchmarks and guidelines for the portfolios.

For portfolio managers, the daily performance regarding profit and loss, which measures the difference between the return on the benchmark and the return on the portfolio on a mark-to-market basis, is reported to the senior management. This report allows the senior management to see the risk at an aggregate level of investment portfolios to determine the specific sources of risk and performance. Yet, comprehensive monthly reports describe the monthly and cumulative performance, portfolio composition, tracking error and sources of exposure.

3.4 The decision to appoint external managers

Prior to the setting up of the AMCM, its predecessor, the Issuing Institute of Macau (IEM), tended to dictate a relatively conservative investment style towards the reserves resource. Neither the provision of staffing nor the level of management information was commensurate with an active trading strategy. The IEM started to exercise contractual arrangements with overseas fund managers in 1985.

The safeguards against the risks of appointing external managers by the IEM included the following mandatory requirements: security, liquidity and confidentiality. Like other central banks, the IEM required its assets to be absolutely secure and instantly available. Moreover, the IEM always placed very high emphasis on confidentiality. This remained a serious concern, and indeed some central banks would not even consider external fund managers for this very reason.

After its formation in 1989, the AMCM has had a more active style of reserves management. For example, it has relied on professional staff, economic analyses, portfolio evaluation and performance assessment methods to determine investment decisions. With these improvements, the AMCM now manages the bulk of the foreign

exchange reserves actively in-house. However, external managers still have a role to play in the management of a portion of foreign exchange reserves.

External management of reserves provides an alternative or a back-up position in the absence of relevant skills in the AMCM. Furthermore, the incremental benefits that accrue to the AMCM in terms of the training provided by external fund managers to AMCM staff over the years have had a positive impact. The return derived through external managers' investment activity has also added value to the portfolio. Lastly, the external portfolios have enabled the AMCM to invest outside the Asian business hours. The appointment of external managers has helped mitigate any price risk by placing funds with managers located in the time zones of the markets in which they trade, where liquidity is better.

The AMCM conducts regular reviews with its external managers over their performances. To ensure the managers following the guidelines, these meetings enable the AMCM to draw on the knowledge and experience of a diversified group of external opinions. The managers provide valuable and important sources of market information, judgement and technical expertise which complement the AMCM's internal analysis, and as a result the AMCM's management is better informed and less at risk of relying solely on the opinions of a comparatively small team of in-house staff.

For these reasons, the policy to appoint external managers has served the management of foreign reserves well. While the AMCM's in-house expertise has already been developed, the AMCM would not cease the effective policy of appointing external managers in managing a portion of the foreign reserves. The wide global dispersion of the managers helps upgrade the AMCM's ability to understand the markets, and the dialogue that has been established with the external managers, especially since the formation of the AMCM, provides an invaluable private-sector view and discipline to the AMCM's own operations.

4. Current Constraints

Macao is a small open economy, where the flows of external trade and capital assume a very important place. Besides, it has an exchange rate system dominated by the complete inflexibility of its relation with the Hong Kong dollar (HKD). Given this scenario it has a low degree of monetary autonomy as the monetary authorities must give up all the ideas of determining local interest rates or the level of money supply.

In the early 1980s, the banks operating in Macao were consistently facing a structural situation of excess liquidity. The excess liquidity if denominated in HKD was easy to handle, because the Hong Kong inter-bank market could absorb without difficulty the placements of Macao banks, resulting in the fact that the HKD inter-bank interest rates served as a ceiling for deposit interest rates in Macao. However, the situation was different regarding the liquidity in pataca since there was lack of private-sector demand for pataca funds. Without the intervention of the monetary authorities the excess patacas would be converted into Hong Kong dollars that would find their way to the Hong Kong market, or the Macao banks would offer lower interest rates for pataca deposits as compared to HKD deposits.

To avoid this development, the IEM created in 1987 a pataca-denominated monetary instrument – “monetary bills” – with short-term maturities, and started to sell the bills to banks. As monetary bills are an alternative to the placements in the Hong Kong inter-bank market, it is logical that they must be remunerated more or less at the same levels of interest rates of inter-bank deposits in Hong Kong. The success of the monetary instrument is clearly evident from its remarkable growth since its creation. At the end of 2002 the value of monetary bills outstanding, at almost MOP16 billion, is equivalent to 52% of foreign exchange reserves of Macao.

However, the application of monetary bills has created some constraints on reserves management. On one hand, monetary bills are short-term instruments, giving way to a schedule of redemptions almost continuously, implying the requirement for maintaining a high degree of liquidity for reserve assets. Although monetary bills are denominated in pataca, at maturity, banks might decide to convert them into Hong Kong dollars, if not extending their holdings of monetary bills. In the framework of free convertibility, the AMCM must be always ready to accept the currency conversion. In addition, the costs deriving from the remuneration of monetary bills must be supported by a regular stream of incomes from foreign exchange reserves.

As a result, the management of the reserves is inevitably constrained by the necessary operation of monetary bills programme, specifically in terms of liquidity and currency denomination, in addition to other typical limitations such as credit risk and market risk. However, the existence of such constraints on the management of foreign exchange reserves is nothing new or exclusive to Macao. It is almost universal for central banks all around the world.

5. Conclusion

The maintenance of financial-system stability is one of the AMCM's prime policy objectives. To fulfil this objective, the AMCM engages in supervision and regulation of the banking system, and has the authority to intervene in the financial system with financial resources in times of disruption. Similar consideration is also relevant to the maintenance of currency stability. In managing Macao's reserves, the AMCM strikes a balance between maintaining liquidity and minimising costs. The AMCM has been successful in finding ways to reduce holding costs by restructuring assets and utilising new instruments.

However, reserve management requires diligence in, among others, establishing investment policies, selecting investment currencies and designing appropriate mandates, investment guidelines and performance benchmarks. All of these require an appropriate operational infrastructure. There is no unique set of reserve management practices or institutional arrangements that is best for all countries or regions in different situations or circumstances. The best approach is to keep the operations in a simple and systematic sequence and to bear in mind that effective operational procedures and manuals are indispensable.

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