



**COUNTRY CASE STUDIES**

# 1

## Australia

### Governance and Institutional Framework

#### Objectives of reserves management

156. Australia's foreign currency reserves are managed by the Reserve Bank of Australia (RBA). At the end of June 2002, the gross value of the reserves portfolio was US\$20 billion, representing around half of the central bank's assets. The primary role of the reserves portfolio is to fund foreign exchange market operations that arise as part of the Bank's broader monetary policy function. Reflecting this, the reserves are managed in a manner that gives priority to low levels of credit risk, limited exposure to market risk, and maintaining a high degree of liquidity. Subject to these objectives, the Bank also seeks to earn a positive return on the portfolio.

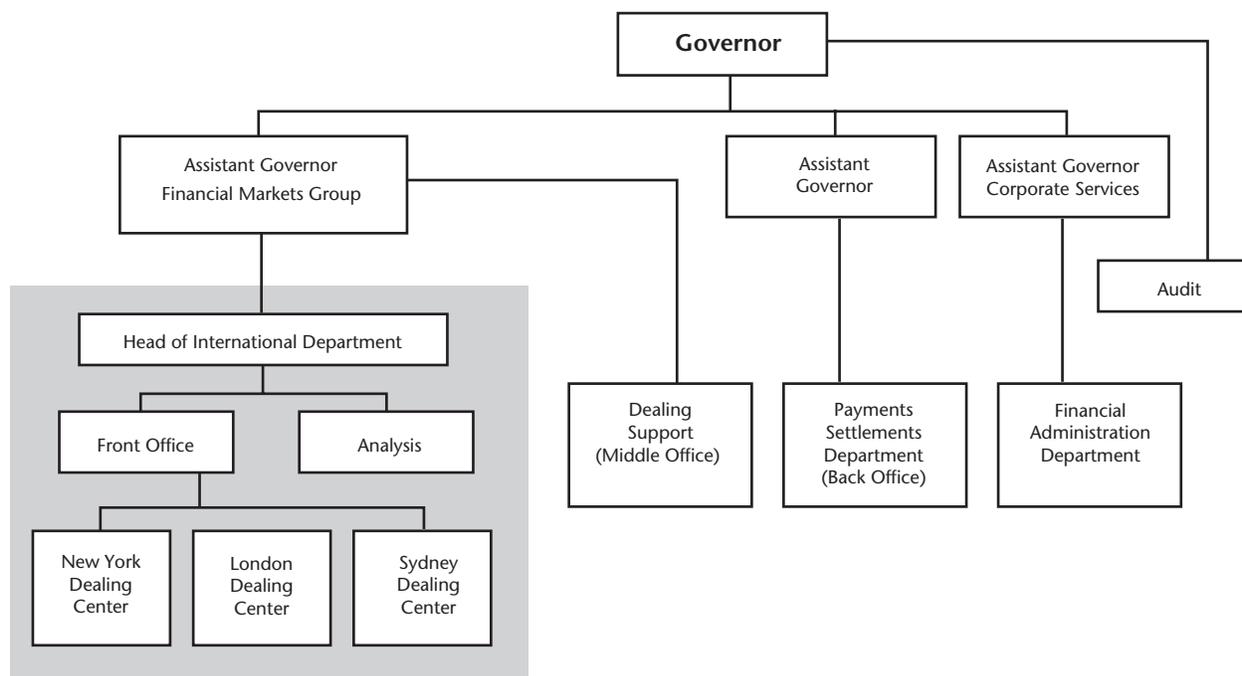
157. In 1990, the Bank undertook a formal review of its approach to foreign exchange reserves management. The outcome of the review was the establishment of a rigorously defined operational framework for managing risk and return. The centerpiece of the framework was the development and implementation of benchmark portfolios for currency and asset allocation, and for the duration of the asset portfolios. The benchmarks are intended to represent the optimal mix of risk and return for the RBA given its management objectives. The review also provided a greater role for active management to take advantage of expected

movements in exchange rates, relative returns in bond markets, and changes in the level and slope of yield curves. These changes were set in place in 1991.

158. Experience with active management was reviewed in 2000 after nine years of operation. The review highlighted the fact that short-term investment decisions designed to take advantage of market anomalies had consistently made positive returns, albeit small. In contrast, investment positions taken in anticipation of medium-term macroeconomic developments had made positive returns of reasonable size in some years, but these had been largely offset by negative returns in other years, leaving only a small positive return from this activity overall. The RBA decided that the low average, and high variability, of returns did not warrant taking investment positions of the same size and frequency as in the past. As a result, management discretion was curtailed, significantly reducing the importance of discretionary management as a source of return for the reserves portfolio.

#### Institutional framework

159. The RBA's responsibility to manage Australia's foreign exchange reserves is given through broad legislative powers that allow the Bank to buy, sell, and otherwise deal in foreign exchange (among other things) to achieve monetary policy objectives. Responsibility is not shared

**Figure 1. Organizational Structure**

with other government agencies, reflecting the role of reserves as a source of intervention capital. The RBA acts independently in its management decisions.

### Organizational and decision-making structure

160. The organizational structure of reserves management at the RBA is summarized in Figure 1. Responsibility for management of reserves is delegated by the Governor of the Bank to the Financial Markets Group (FMG). This group comprises two departments, International and Domestic Markets. The International Department is responsible for the Bank's front office operations in markets for foreign exchange, gold, and offshore assets.

161. The International Department front office manages the currency and asset allocation positions of the portfolio, and directs policy issues regarding investment of reserves, such as assessing investment instruments and the structure of the benchmarks. It is supported by three dealing centers: one each

in New York, London, and the Bank's Head Office in Sydney. These centers execute trades and have small discretion for position taking. The RBA has found considerable informational benefit in locating dealing staff in major offshore centers. The front office is also supported by an analytical group with responsibility to provide in-depth analysis of international financial and macroeconomic developments that may impact on the value of the reserves portfolio.

162. Also part of the Financial Markets Group, but not within the International Department, is a middle office function, known as Dealing Support. This unit is responsible for measuring risk and return and for maintaining front office systems. Valuation, performance, and risk information are provided to the front office operation and to senior management on a daily basis. The middle office reports directly to the Assistant Governor overseeing the Financial Markets Group.

163. There are several other areas outside of the Financial Markets Group that provide services

to, or scrutinize the actions of, the front office reserve management operation. These include the back office (Payments Settlements) and accounting (Financial Administration) functions. The back office provides standard settlement and communication services to the reserves management front office and is responsible for the final approval of all transactions—dealers in the front office cannot confirm trades. There are back office operations in each of the dealing centers, with Sydney having overall responsibility. The Audit Department is also outside of the Financial Markets Group. This department has a direct reporting line to the Governor.

164. The structure and delineation of responsibilities in reserves management have evolved over time as the nature of, and the RBA's approach to, reserves management has changed. Until the late 1980s, the International Department was responsible for both middle and front office functions. Indeed, front office staff performed many of the middle office responsibilities. Importantly, the back office was also located in the International Department, albeit with separate reporting lines to the Assistant Governor, Financial Markets Group, from those of the front office. This seemed to be a reasonable structure, given the conservative limits on risk and the lack of flexibility in the RBA's investment operations at the time. However, as the approach to reserves management changed in the early 1990s and the scale of the operation increased, the Bank set in place a number of changes to reduce operational risk and reflect best-practice in funds management.

165. Establishment of a middle office within the Financial Markets Group, which reports independently to the corresponding Assistant Governor, was a major change that occurred in the mid-1990s. Separation of the back office function was completed in 1998 when the back office was physically relocated to a different floor of the RBA's Head Office building and put under control of the Assistant Governor, Business Services.

166. Decision-making processes have also evolved. In the early 1980s, almost every transaction in reserves management had to be approved by higher management. While this maximized control over the management process, it made deci-

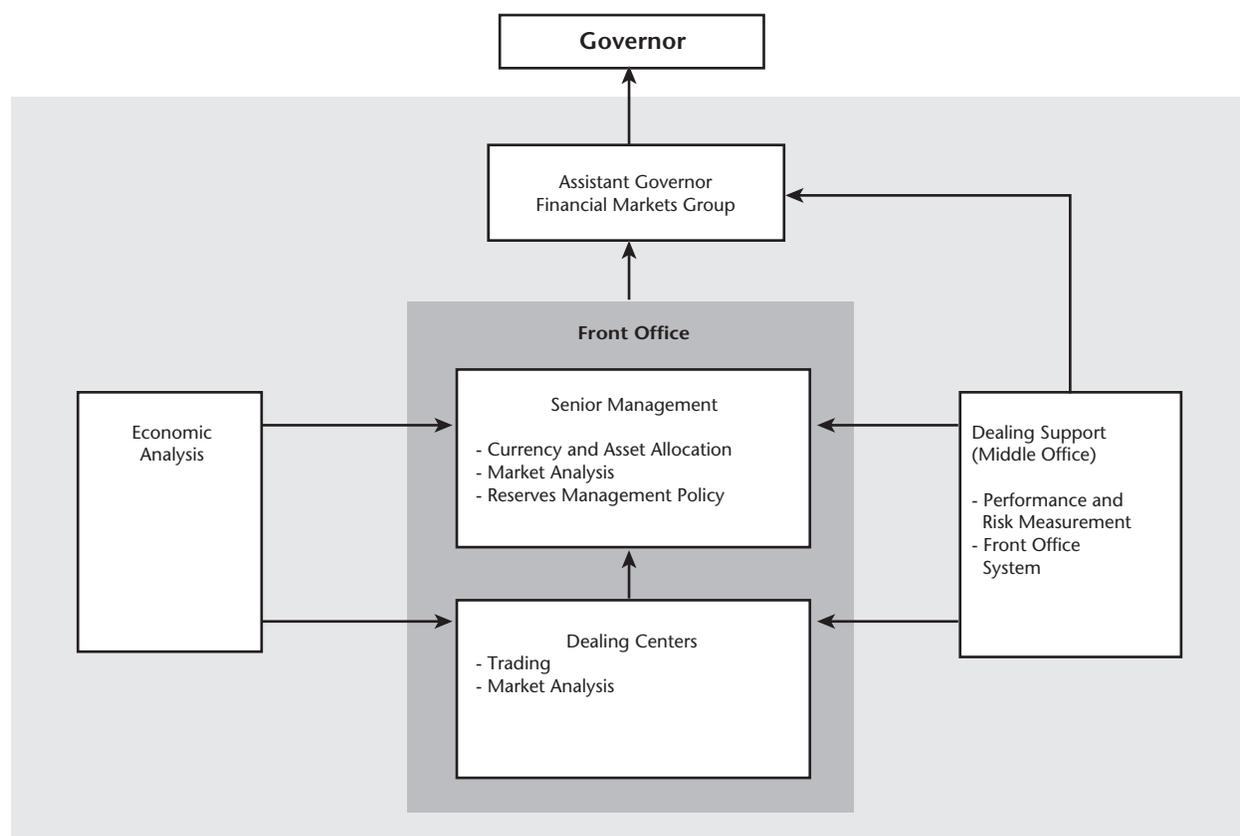
sion making unwieldy and, therefore, poorly suited to a more active risk management framework. It also constrained initiative at manager levels. With the move to more active management in the early 1990s, the Governor's discretion for day-to-day management of reserves was delegated to an Investment Committee within the Financial Markets Group. The Committee, made up of senior managers from units involved in reserves management, had discretion to take sizable positions in currency and asset allocation subject to limits approved by the Governor. The Investment Committee met regularly and took positions largely based on assessments of the medium-term macroeconomic outlook of countries in which the reserves were invested. A small and qualified amount of trading discretion was delegated to managers in the trading centers.

167. The Investment Committee's structure and its discretion to take positions changed following the review in 2000. Senior managers overseeing front office operations are now responsible for day-to-day management of currency and asset allocation, maintaining the portfolio close to benchmark. They report directly to the Assistant Governor of the Financial Markets Group. An outline of the decision-making structure is shown in Figure 2.

168. Reflecting the more passive trading environment, there are no longer any formal meetings to discuss investment strategy. In contrast, managers in the dealing centers have retained their small amount of discretion to set short-term tactical positions. These centers are also responsible for lending stock from the portfolio.

### Transparency and accountability

169. With the introduction of a more rigorous approach to reserves management, where decision making was delegated to a large extent, the RBA needed to be confident that an adequate level of control was being maintained and that its actions were properly accounted for in line with market best practice. This required a system where individuals and operational units were fully aware of their delegated authorities, the risks, and the value added from their decisions.

**Figure 2. Decision-Making Structure**

170. A key element in the control of operational risk has been the development of manuals detailing investment and risk management procedures. The manuals specify the kinds of instruments in which investments can be made, the risk parameters for each portfolio, and the responsibilities of various positions associated with reserves management. They also specify how risks and returns are calculated and how office systems should be used in specific circumstances. Procedures manuals also exist for middle and back office staff.

171. Staffing policy is another key element. The RBA has found considerable benefit in specialization of professional staff in operational areas. Frequently rotating staff in and out of these areas in order to provide a breadth of experience was felt to be a significant constraint on maintaining adequate levels of experience and knowledge.

Over the past ten years, efforts have been made to maintain a core of experience at senior levels within the operational areas while, at the same time, allowing rotation at junior levels in order to build a foundation of experience. Compensation is reviewed regularly to ensure competitiveness with other organizations and staff are encouraged to participate in a range of courses, both internal and external, relevant to their work. These measures have contributed to an average tenure over the operational areas of four years.

172. The Governor requires that reserves are accounted for in line with best practice and that the level of transparency is consistent with that in other parts of the RBA's monetary policy operations. To this end, the RBA publishes statistical information on its reserves and foreign currency transactions in its monthly Bulletin. Also, since 1992, the Bank has provided an overview of

reserves management operations and return relative to benchmark in its Annual Report. This has included in recent years an outline of the composition of the benchmark portfolios and a discussion of the RBA's approach to risk management.

173. The RBA's annual financial statements are prepared in accordance with Australian Accounting Standards and other mandatory reporting requirements contained in the Commonwealth Authorities and Companies Act. The statements are scrutinized by an external auditor, the Australian National Audit Office, to ensure that they comply with relevant standards.

174. Reserves management functions are audited internally each year in accordance with recommended control frameworks published by the Bank for International Settlements and requirements set out by the Australian Financial Markets Association. The internal audit reports on compliance with controls and seeks to strengthen management processes where it sees potential for loss through inadequate control. It reports to an Audit Committee, which is chaired by the Deputy Governor of the RBA and consists of a non-executive member of the RBA's Board and an external appointee.

## Capacity to Assess and Manage Risk<sup>15</sup>

### Benchmark portfolios

175. The composition of the currency and asset benchmarks, and the duration benchmark for each asset portfolio, are shown in Table 2. The benchmarks represent the risk-return trade-off acceptable to the RBA over the long term, given its management objectives and its primary objective for holding reserves. Statistical, practical, and judgmental factors relevant to the RBA are important in deciding the appropriate composition.

176. With the aim of maximizing the Bank's capacity to intervene, it was decided that a trade-weighted basket of currencies would be an appropriate currency and asset composition for the

**Table 2. Currency, Asset, and Duration Benchmarks**

	United States	Europe	Japan
Currency allocation (%)	45	45	10
Asset allocation (%)	45	45	10
Duration (months)	30	30	30

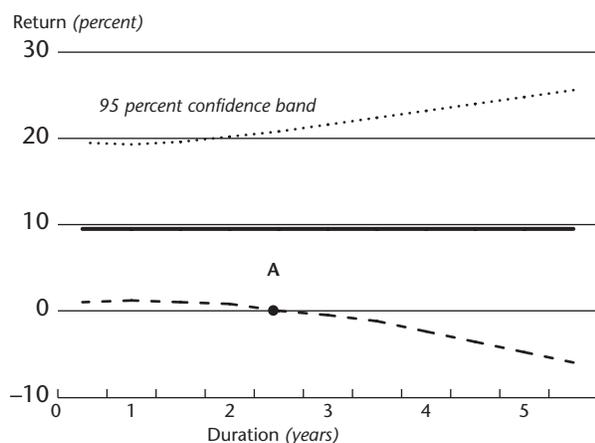
foreign currency portfolios. The decision was taken to spread the composition across the three major reserve currencies—the U.S. dollar, deutschmark (later the euro), and Japanese yen. This also provided a diversified portfolio and meant, too, that the RBA's assets would be invested in capital markets that are liquid and highly rated. From very early on, mean-variance analysis, in addition to judgmental factors, has played a major role in deciding on the weights assigned to the three currencies in the benchmark portfolio.

177. The choice of a duration benchmark of 30 months for each of the asset portfolios was made on the basis of factors specific to the RBA in its responsibility for managing reserves and analysis of risk and return for each asset. This duration represents the maximum price risk that the RBA will allow itself while keeping the probability of capital loss to an acceptable level over the Bank's investment horizon. An example of this analysis is given in Figure 3.

178. The RBA's investment horizon is twelve months. This is based on the Bank's investment objectives and the period in which it reports on its operations to the Australian Parliament. Over a twelve-month period, the RBA expects the return on the portfolio to fall within a 95 percent confidence band around the mean return, and will accept a negative return on only 2.5 percent of occasions. On this basis, return is maximized at point A in Figure 3, where the lower boundary of the confidence band crosses the horizontal axis.

179. In addition to the currency and asset benchmarks, the RBA has established benchmarks for the composition of each of the three asset portfolios. These benchmarks are set out in Table 3. Like the other benchmarks, practical and judg-

<sup>15</sup>An account of the RBA's approach to risk management is detailed in the Bank's 2000/01 Annual Report.

**Figure 3. Horizon Analysis**

mental factors, combined with the liquidity characteristics in each market, are important in deciding the appropriate asset structure of the portfolios.

180. The desire to maintain a liquid and secure portfolio led the RBA to limit its benchmark investments to government securities and cash instruments. Typically, some 75 to 80 percent of the RBA's benchmark foreign investment portfolios are held in government paper. This comprises Treasury bills and notes in the U.S. portfolio, and Japanese government bills and bonds in the yen portfolio. For the European portfolio, the RBA has decided on a combination of French and German government securities as the best structure to satisfy requirements for credit risk and liquidity. In order to limit exposure to price risk, the maximum maturity of securities holdings is restricted to 10½ years in each portfolio.

181. Cash invested under repurchase agreements (repo) and deposits with highly rated banks make up the balance of the asset benchmarks. Historically, the RBA has found the short duration offered by deposits to be attractive in markets where access to short-term government debt was limited. They have also been a good, immediate source of liquid funds during episodes of currency intervention. That said, the proportion of foreign exchange reserves invested in deposits has declined in recent years, reflecting tighter credit constraints and changes in cash management practices. The RBA now makes greater use of cash repo,

which has the security advantage of being collateralized with government securities.

182. The benchmarks are reviewed periodically to ensure that they continue to reflect the RBA's long-term management objectives. There have been relatively few changes. They have been made to take account of structural changes to markets or changes in the nature of the Bank's operations.

### Instruments

183. In addition to the assets held in the benchmark portfolios, the RBA's dealing centers have discretion to hold a small range of other highly rated instruments. These include the U.K. Gilts, Dutch and Swiss government paper, and deposits and medium-term notes issued by the Bank for International Settlements. With the exception of BIS deposits, these investments have accounted for a negligible share of total holdings. Discretion to hold U.K., Dutch, and Swiss paper is a remnant of a period in the 1980s when the composition of Australia's official foreign currency liabilities influenced the composition of the reserves portfolio. Discretion also exists to hold U.S. Federal Agency debt in the U.S. portfolio as a source of return enhancement. However, total holdings are restricted to a maximum of US\$500 million.

184. In 1994, the Bank began trading interest rate futures contracts. This decision was driven by a desire to improve management of market risk and, in particular, to provide a liquid hedging instrument to minimize the risk of capital losses when interest rates were rising. An additional attraction of using futures was the greater liquidity and flexibility they provide in some markets when implementing investment strategies. Some futures markets are more liquid than their underlying physical bond markets in that the bid-offer spread is usually much narrower. Futures trading has been concentrated in the European and Japanese portfolios. The RBA does not use any over-the-counter or exchange-traded options in its reserves management activities.

185. Stock lending is also an activity undertaken by the dealing centers. Over the past few years, stock lending, particularly from the U.S.

**Table 3. Composition of Individual Portfolio Benchmarks**

United States		Europe		Japan	
Asset class	Percent of total	Asset class	Percent of total	Asset class	Percent of total
RPs/Deposits	22	RPs/Deposits	30	RPs/Deposits	22
Treasury bills	21	Treasury bills	15	Treasury bills	33
Treasury notes	57	Bonds	55	Bonds	45

portfolio, has risen to be a major component of return enhancement. Though the back office workload associated with this activity can be large, the RBA sees this activity as relatively low risk.

### Risk and performance measurement

186. Market risk and return enhancement are measured relative to the benchmark portfolios. For currency and asset allocation, senior management in the operational areas of the RBA's International Department may allow the portfolio to vary by 1 percent either side of the benchmark weights.<sup>16</sup> Currency and asset positions are managed separately within the discretionary band through the use of foreign currency swaps. The cost/benefit of these swaps is taken into account when measuring the performance of the asset and currency positions relative to benchmark. Foreign exchange dealers in each of the three dealing centers have a small amount of discretion (set in terms of a maximum open position) that falls within the  $\pm 1$  percent discretionary limit on currency allocation.

187. Risk measurement and trading discretion around the duration benchmark for each asset portfolio are based on the concept of "dollars-at-risk." This is the change in portfolio value arising from a one basis point change in yield. Within each of the portfolios, the dealing centers are required to maintain dollars-at-risk to within US\$70,000 per basis point at all times. This limit applies to the aggregate position of the portfolio and to the position undertaken in each maturity bucket of the

portfolio in order to control the amount of curve risk. Breaches of the limit are reported to Assistant Governor on the day they occur. The dealing centers are also required to report daily losses that exceed US\$1 million to senior management in the Financial Markets Group.

188. The "dollars-at-risk" measure also forms the basis of the Value-at-Risk (VaR) methodology, which the RBA has used since 1995 to estimate the consolidated exposure of the Bank's foreign currency reserves to market risk. Though the overall limits to control market risk—i.e., the discretionary trading bands around the benchmark—are not defined in terms of VaR, the RBA has found that it nonetheless provides a useful tool for conveying information about the overall portfolio exposure to senior management and staff involved in reserves management.

189. The VaR number represents the portfolio loss the RBA could incur once every 20 business days in normal market conditions. Two VaR measures are calculated each day—one based on the correlation method and the other based on historical simulation methodology. The assumptions underlying these VaR methodologies are reviewed periodically and their performance is tested regularly. In accordance with best practice, the RBA also stress tests the portfolio. This involves simulating and evaluating the impact of extreme market movements on the value of the portfolio.

### Information system

190. All international transactions entered into by the RBA are processed through a main-frame electronic Global Trading and Settlement System (GTS). This system has been developed by an external software provider to our specifications, with functionality expanded as new products are

<sup>16</sup>Prior to the performance review in 2000, management had discretion to vary the portfolio as much as 20 percentage points either side of the benchmark.

# 2

## Botswana

### **Governance and Institutional Framework**

#### **Reserve management objectives and coordination**

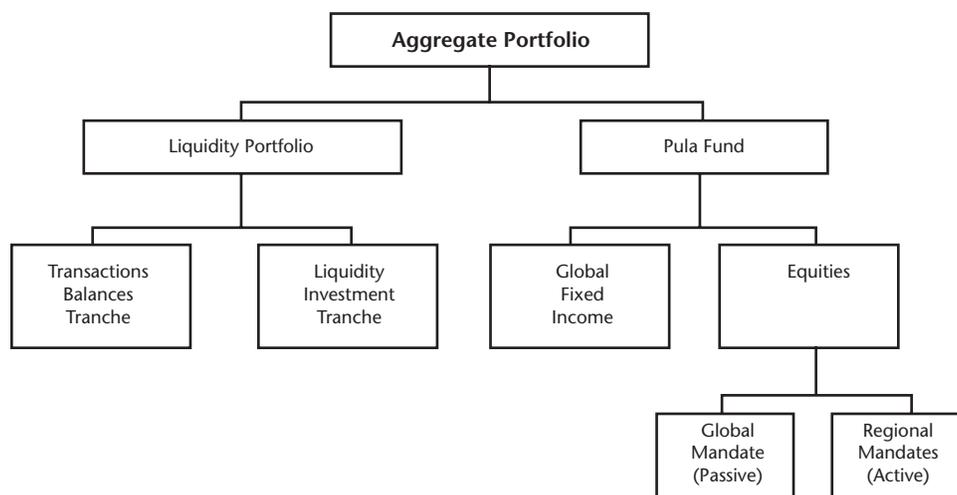
191. The major responsibilities of the Bank include the management of foreign exchange reserves on behalf of the government. The Bank ensures their safety and return by diversifying investments within a framework of acceptable risks. A major feature of the reserves management practice is to divide the reserves into sub-portfolios, namely, the Pula Fund (long-term) and the Liquidity Portfolio (short-term). The Bank's policies for the management of the foreign exchange reserves can be summarized in terms of three main principles. In order of importance, these are safety, liquidity, and return. With respect to the long-term portfolio, the Pula Fund, return takes priority over liquidity, while safety continues to have the highest priority for both the Liquidity Portfolio and the Pula Fund. As of the end of 2001, the split between the Pula Fund and Liquidity Portfolio was 80 percent and 20 percent, respectively.

192. The appropriate level for the Liquidity Portfolio is determined such that the portfolio acts as a buffer against short-term trade and capital account fluctuations, and as a cushion to finance unforeseen developments in the external payments situation. The Liquidity Portfolio is further subdivided into two tranches: the Transactions

Balances Tranche (TBT) and the Liquidity Investment Tranche (LIT). The TBT functions as a current/checking account to take care of inflows and outflows. The rest of the reserves are invested in the long-term Pula Fund. It is relevant to note that the government has not experienced a need to issue government securities for funding purposes, as budgetary surpluses have been a feature of the Botswana economy for a long time (Figure 4).

193. Relative to many other central banks in the region, the Bank of Botswana has for many years had a high level of external reserves, approximately 39 months of import cover as of December 31, 2001. As such, the maintenance of a minimum level of reserves has not been a concern to the Bank. Furthermore, the high level of reserves has permitted the Bank to create the long-term fund (Pula Fund).

194. One of the objectives of establishing the Pula Fund is to take advantage of the high level of the reserves and invest part of them in assets such as long-term bonds and equities, with the expectation of earning a higher return than could be achieved on conventionally managed foreign exchange reserves, thereby developing a long-term earner of foreign exchange for the country. Such earnings would allow sustained long-term income even if export revenues were to be adversely affected by factors over which Botswana has no control. Based on historical data and financial theory, long-term bonds and equities are expected to

**Figure 4. Portfolio Structure**

outperform short-term assets, such as cash and short-term bonds, which comprise the bulk of investments in the Liquidity Portfolio. Returns on long-term assets are, however, more volatile than returns on short-term assets. Therefore, it became necessary to have a longer investment horizon for the Pula Fund in order to benefit from the expected higher returns.

#### ***Coordination with monetary policy and external debt management***

195. To date, the external reserves have not been used as a mechanism for supporting the exchange rate in the context of the Bank's monetary policy objectives. The Bank of Botswana does not intervene in the foreign exchange market.

196. With regard to coordination with external debt management policy, the Bank had a Matched Asset Liquidity Portfolio (MALP), which was established for the purpose of separating a portion of the reserves and investing them in fixed income instruments that had the same maturity profile as external debt. It was considered that combined asset/liability management would lead to better risk management than when assets and liabilities are managed separately. While the reason behind establishing MALP was

considered to have merit, matched asset/liability management was later considered to be more useful for countries with more debt or very low reserves in terms of import cover and, accordingly, the assets held in MALP were transferred to the potentially higher yielding Pula Fund in the mid-1990s.

197. In Botswana, one of the key features of reserve management is the contribution that the income earned from the reserves makes to government funding. In this regard, over the past five years, income from external reserves has been the third most important constituent of budgetary revenues.

#### **Institutional framework**

198. The Bank of Botswana Act, 1996, outlines the primary functions of the Bank, which include, inter alia, the management of the foreign exchange reserves. In particular, the Act provides that the Bank shall be responsible for establishing and maintaining a Primary International Reserve (Liquidity Portfolio), which shall, in general, consist of liquid short-term assets. Furthermore, the Act provides for the establishment of the long-term investment fund (Pula Fund), subject to meeting the requirements of the primary reserve.

199. Within this enabling legislation, other parties in the reserve management process are the Board, Investment Committee, Financial Markets Department, and external fund managers.

### **Board**

200. The Board is composed of members from the public and private sectors as well as academia. The Board is responsible for governance and ultimately the investment results; it enunciates the mission, goals, and policies, as well as designs the structure with appropriate accountability. Consequently, the Board sets the overall strategy for the management of reserves by approving investment guidelines, size of portfolios, asset allocation, strategic benchmarks, and exposure limits.

### **Investment Committee**

201. The Investment Committee is responsible for strategic decisions against the benchmarks as well as the rebalancing of the portfolios. In doing this, the Investment Committee receives and acts on the recommendations of in-house analysts, who maintain close contacts with the Bank's counterparties in major markets. The Investment Committee meets periodically about 12 times a year to discuss developments in the international financial and capital markets, based on background papers prepared by the implementing Department. At the Investment Committee meetings, broad decisions are made for the Bank-managed portfolios on currency composition and modified duration within each market. The decisions made by the Investment Committee are subsequently implemented by the Department responsible for reserve management. The Investment Committee is composed of the Governor as Chairman, Deputy Governor responsible for the Financial Markets Department, Director of that department, analysts for respective markets (including the Chief Dealer), and the Director of the Research Department.

### **Financial Markets Department**

202. The Financial Markets Department is responsible for the implementation of the deci-

sions of the Investment Committee. In addition, the Financial Markets Department is responsible for monitoring external fund managers and other external relationships. The Department is structured as follows:

#### *Dealing and Strategy Unit*

203. The Dealing and Strategy Unit is responsible for research and analysis of various financial and capital markets and for the compilation of the background paper for the Investment Committee. The Unit implements the decisions of the Investment Committee by trading in bonds and foreign exchange.

#### *Risk Management Unit*

204. The Risk Management Unit focuses on the risk associated with all the investment portfolios. The Unit coordinates the risk management process and advises on all aspects of risk, performance, and compliance with the investment guidelines for the externally and internally managed portfolios.

#### *Open Market Operations Unit*

205. The Open Market Operations Unit is not directly involved in the management of the foreign exchange reserves; it is complementary to that function. The Unit is responsible for the provision of foreign exchange to the Bank's customers, dealing in Bank of Botswana Certificates (BoBCs), and the management of daily liquidity in the domestic money market.

#### *Settlement Unit*

206. The Settlement Unit's primary responsibility is to ensure that the Bank meets its obligations to pay and receive correct value for transactions as contracted with counterparties, and to execute foreign currency payments for the government and other customers.

#### *Verification Unit*

207. The Verification Unit provides the necessary "checks and balances" to ensure that the Settlement Unit pays out and receives the correct amount of funds on due dates and at the right places. In the event that any of these factors are incorrect, the necessary steps are immediately taken

to restore the position, and this includes, in the main, communication with foreign counterparties and banks. The Verification Unit is also responsible for following up on issues raised by the Reconciliation Unit of the Accounting Department.

### ***Fund managers***

208. A cardinal feature of the Bank's operational strategy for managing the reserves is the use of external fund managers. The Bank has had contractual arrangements with overseas fund managers since 1981. External management of reserves provides an alternative or a fallback position in the absence of specific relevant skills in the Bank (e.g., equity management) and in case of a possible brain drain of the Bank's scarce manpower resources. Furthermore, the incremental benefits that accrue to the Bank in terms of the training provided by the fund managers to Bank staff over the years have made a positive impact. The fund managers also provide the Bank with a means of performance comparison, given that both the fund managers and the Bank's performance are measured against common benchmarks.

209. The Bank manages approximately 50 percent of the foreign exchange reserves internally. The intention is for the Bank to eventually manage a higher proportion of the fixed income portfolios internally in line with development of relevant skills. A small proportion of reserves would be managed externally for the purpose of performance comparison. In pursuing this objective, the Bank would obviously have to be cognizant of local manpower constraints in reserve management.

### ***Specialist advisory support***

210. Since its establishment, the Department responsible for managing the reserves has benefited from the services of a number of advisors. At present, there is one advisor for the reserve management function. Consistent with past practice, the advisor is also engaged in in-house training of citizen staff. Furthermore, the Bank has retained the services of an offshore investment consulting firm that advises the Bank in three main areas,

namely, asset allocation, manager search, and performance measurement.

### **Transparency and accountability**

211. The Bank of Botswana has recognized that accountability and transparency must be built into the reserves management process. The Board has given decision rights and delegated authority to the Governor, with the actions of the latter being measurable in terms of performance against the Board-issued benchmarks. The following are other mechanisms that are built into the reserve management process:

#### ***Investment guidelines***

212. These are a strategic set of rules that defines the means of achieving the Board's investment policy. They address issues such as currency risk, equity risk, interest rate risk, credit risk, and instruments and liquidity.

#### ***Procedures manuals***

213. The front, middle, and back office operations are guided by operations manuals, which are specific to respective functions. The responsibilities and functions are defined such that there is clear separation of duties between the front and back office. The middle office acts as a policeman to ensure the proper implementation of the written procedures.

#### ***Auditing***

214. The reserves management procedures and processes are subject to regular audits by both the internal and external auditors.

#### ***Regular reporting***

215. Regular reports to the Board and Audit Committee are produced outlining the reserves levels, trends, and performance as measured against the benchmarks. The reserves are also marked to market with currency and market gains and/or losses disclosed to the Board and Audit Committee as part of the financial statements.

## Capacity to Assess and Manage Risk

### Risk management

216. The objective of tranching the foreign exchange reserves is to reflect the different roles of reserves in the Botswana economy. The Liquidity Portfolio is maintained at the equivalent of nine months of import cover and is invested in short-term money and bond market instruments. On the other hand, the Pula Fund is invested in long-term instruments, such as long-term bonds and equities. The Liquidity Investment Tranche (LIT) serves to insulate the Pula Fund from frequent drawdowns, which could undermine the latter's investment objectives.

217. In determining the adequate level of the Liquidity Portfolio, the Bank undertook a comprehensive analysis of factors that impact on the foreign exchange reserves. Based on these factors, a framework for the determination of an appropriate level of liquid assets was derived. For each factor, an estimate of monthly import cover is used to arrive at a total of an equivalent of nine months of import cover.

218. Risk is controlled at various levels of the reserve management process by different entities in accordance with the broad strategy of risk management, investment guidelines, and procedures manuals.

### Asset allocation

219. This is a key decision in the investment process as it seeks to balance return with risk as well as recognize correlation of asset classes. With regard to the Pula Fund, 40 percent of assets are allocated to equities and 60 percent to long-term fixed income assets. The appropriate asset classes for the Liquidity Portfolio are a combination of short-term income and money market instruments. The underlying objective in asset allocation is to diversify across the main asset classes and geographic regions in order to achieve a low correlation coefficient.

220. Using the currently allowed asset classes, a portfolio optimization process is undertaken every three to four years to determine the Pula Fund asset mix. This process is complemented by "what if" scenario analysis to assure the Management and

Board about the risk/reward profile at the aggregate portfolio level.

### Currency risk

221. The Bank follows conventional policies in establishing an appropriate currency mix. Eligible currencies must be convertible, relatively less susceptible to frequent and sharp exchange rate fluctuations, generally free from restrictions on their use, and products of well-developed financial markets. Accordingly, the Bank has established a minimum credit rating of a country's sovereign debt to be Aa2/AA for its currency to be eligible, except for the G-7 member countries, whose minimum rating is Baa3/BBB-.

### Currency benchmarks

222. The underlying philosophy for currency exposure is that it is not appropriate to modify currency weights in response to short-term exchange rate fluctuations. The Bank mainly invests in the U.S. dollar, euro, pound sterling, and yen. The other eligible currencies are for purposes of diversification. In determining the appropriate currency weights, the following approaches were considered: the SDR-based currency allocation, relative size of the economy, relative use of the currency, market capitalization, equal weighting, and optimal currency allocation. The Bank has adopted a combination of the "SDR-based currency allocation," the "optimal currency allocation," and a market capitalization approach.

223. The TBT currency benchmark is constructed in such a way that it matches the international trade flows affecting the domestic currency.

224. The Pula Fund fixed income currency benchmark replicates the SDR weights. The rationale for this choice is the neutral and unbiased character of the SDR currency basket as a representation of world economic activity and SDR use as a reserve currency. The currency benchmark for LIT is SDR-based and the portfolio is invested in fixed income instruments with a shorter duration (currently around 1.5 years).

**Interest rate risk**

225. Modified duration is used to control interest rate risk. Overall interest rate risk is a function of three factors—the size of the portfolio, modified duration, and the actual or expected change in bond yields. The Bank has adopted mainstream and market-based benchmarks to facilitate risk management and attribution of performance to various decision levels. Customized versions of the JPMorgan and Salomon Smith-Barney Government Bond Indices have been adopted for the Pula Fund and Liquidity Investment Tranche, respectively.

226. Liquidity and the safety of the funds are paramount in the TBT. For this reason, no specific duration benchmark is specified other than a maximum maturity period of four months.

**Credit risk**

227. The Bank is exposed mainly to three kinds of credit risk, that is, bank risk, sovereign/supranational risk, and corporate risk. Additional risks relating to the use of counterparties, fund managers, and the global custodian are also addressed. The Bank subscribes to Fitch/IBCA in order to monitor bank risk and utilizes rating reports of Standard and Poor's and Moody's Investor Services to monitor sovereign/supranational and corporate risk.

228. Credit risk is low for the TBT because of the strict limit on counterparties' credit ratings. In the Pula Fund, corporate risk is allowed but constrained to top-quality issuers and to a small portion of the portfolio.

**Fund management styles**

229. A combination of active and passive fund management styles is adopted for diversification purposes. In addition, the award of a management contract takes into consideration the firm's technical expertise with regard to global or regional mandate. Fund management styles are also diversified, for instance, U.S. equity value, growth, or broad market styles.

**Global/regional equity mandates**

230. Specialist fund managers are appointed to manage various equity components. The por-

tion allocated to each equity market is determined by MSCI country weights. Generally accepted restrictions are detailed in the investment guidelines.

**Risk management at portfolio level**

231. Once the portfolio is constructed, the actual portfolio management brings a different level of risk, as the portfolios are allowed to deviate from the neutral position in order to outperform the benchmark. The main risks incurred in portfolio management are of three types—operational, liquidity, and market risk.

232. The Bank manages operational risk by using generally accepted practices, including segregation of duties. The internal and external audit work add a level of oversight to the initial strong emphasis on control risk self-assessment. Straight-through-processing will be achieved shortly, thus reducing manual intervention and its inherent risk.

233. The liquidity risk is addressed mainly by the layering<sup>17</sup> of the portfolio into different tranches that take into account the recognized norm of three months of import cover as well as the "Greenspan rule"—the importance of taking into account capital flows in the whole economy.

234. Market risk includes currency risk, interest rate risk, and credit risk. The currency risk is controlled in a more traditional way by defining ranges around the neutral positions. For example, U.S. dollar exposure can be in the range of 35–55 percent of the portfolio—plus/minus 10 percent deviation from the benchmark.

235. The interest rate risk is monitored in a similar way to the currency risk. A range of plus/minus 1.5 years is allowed around the aggregate portfolio duration. This currently translates into allowing duration to fluctuate between zero and three years for the LIT portfolio.

236. As mentioned earlier, the fixed income benchmark is 100 percent government bonds. It is, nonetheless, allowed to hold spread products in

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<sup>17</sup>First, the TBT is virtually all cash. Then LIT invests only in short-term bonds and money market instruments. Finally, the Pula Fund is fully diversified.

the actively managed portfolios. The permitted risk taking is offset by the need to diversify by country, industry, and issuer as well as a very high minimum credit rating.

237. The Bank of Botswana is gradually evolving toward quantitative risk management methodologies that will allow the portfolio risk to be managed at an aggregate level.

# 3

## Brazil

### Governance and Institutional Framework

#### Reserve management objectives and coordination

238. The objectives of reserves management are subordinated to Banco Central do Brasil's monetary and foreign exchange policies. Brazil has a floating currency regime and interventions are infrequent with no sizable changes in reserve holdings.

239. The main objectives in holding external reserves are to:

- Support monetary policy.
- Control excessive volatility of the foreign exchange market.
- Guarantee payment of foreign exchange debt.

240. Based on these objectives, reserves are managed to ensure safety, liquidity, and profitability.

#### Institutional framework and decision-making structure

241. Banco Central do Brasil (BCB) is the sole authority empowered by the Constitution to manage Brazilian foreign exchange reserves. No other government agency can hold foreign currencies. Regarding the allocation of roles, the BCB Board of Governors is responsible for the reserves strate-

gic allocation and defining the investment policies. Therefore, they have established a detailed benchmark and guidelines and opted for an active management of the reserves. The Vice Governor responsible for the monetary policy—Dipom—is responsible for the active management, as decided by the Board. The International Reserves Operations Department—Depin—executes the necessary transactions to follow up the benchmark and Dipom's active strategies. Depin is also responsible for suggesting modifications in the benchmark according to changes in long-term market conditions and/or other factors, and for providing Dipom with market updates and strategy proposals. An Investment Policy Committee for active management meets monthly to analyze the market scenarios and to propose active strategies.

242. The Investment Policy Committee was created by a board decision, while the investment process was defined by a formal document signed by the Vice Governor of Monetary Policy. The following officers participate at the meetings as voting members:

- Vice Governor responsible for Monetary Policy (retains veto power);
- Head of International Reserves Department;
- Deputy Head of International Reserves Department;
- Head of International Reserves Investment Division;
- Head of Foreign Exchange Division;

- Interest Rate Portfolio Managers (1 joint vote);
- Foreign Exchange Portfolio Manager;
- Interest Rate Strategists (1 joint vote); and
- Foreign Exchange Strategist.

243. Active management positions may be taken at strategic and tactical levels. Strategic positions have an investment horizon of 1 to 3 months and are subject to discussion and decision at the Investment Policy Committee.

244. Depin is organized in three distinct areas: front office (trade desks), middle office (compliance, risk management, performance evaluation, pricing, and IT), and back office (accounting and settlement).

245. In the middle office, a compliance area checks all guidelines defined by the Board on a daily basis and is responsible for standardizing procedure manuals. This area is also responsible for checking transaction prices against market prices in order to identify any kind of mismatching. A new area was recently created to ensure correct asset pricing and to verify data integrity and correctness by performing checks of other numerical variables such as VaR, returns, etc.

246. An Ethics Code, which outlines standards for the conduct of civil servants, was implemented in 2001. In addition to this, all civil servants must present their annual income tax returns.

247. The BCB Board of Governors defined that the investment strategy should match reserves with sovereign external liabilities in terms of currency exposure. In this way, we have an integrated Asset/Liability Management (ALM) in terms of foreign exchange exposure. The main benefit of this strategy is to prevent a short-term loss of reserves caused by a mismatch in currencies between reserves and short-term obligations.

248. Improper tracking of external liabilities and lack of a formal ALM long-term strategy may cause inefficiencies. Efforts are being made in the direction of unifying strategies and coordinating all sovereign external debt with reserves management.

### Transparency and accountability

249. In recent years, Banco Central do Brasil has promoted increased transparency and account-

ability in managing reserves and reporting results. The main procedures taken to follow these objectives were:

- Definition of a detailed and replicable benchmark with clear guidelines and unambiguous sharing of responsibilities within Banco Central do Brasil's hierarchy;
- Public disclosure of reserve management parameters and procedures;
- Quarterly performance reports to the Board of Governors;
- Hiring of an independent auditing firm;
- Adherence to the IMF's SDDS—Special Data Dissemination Standard.

250. In terms of auditing, there are four separate inspections, which are conducted by the Internal Auditing Department of BCB (Deaud), an external independent auditing firm, the Ministry of Finance, and the Brazilian Court of Accounts (TCU). All these auditing inspections are periodic and have the objective of verifying compliance procedures, accounting systems, IT systems, limits, controls, etc.

251. Banco Central do Brasil's training program for the reserves management area is made up basically of courses offered by the external managers<sup>18</sup> and periodic visits to other central banks and premier commercial banks. In order to obtain qualified staff, the International Reserve Operations Department of BCB—Depin—selects personnel from within the Bank, based on their market experience/skills and quantitative background. In some cases, a deep knowledge of computer systems is required. To retain the staff, Banco Central do Brasil has a defined professional career track and incentives for employees to pursue graduate degrees in Brazil or abroad. However, there is no specific wage/bonus incentive related to market operations or to performance.

<sup>18</sup>The External Asset Management Program was implemented in October of 2000 with two main objectives: to keep Depin's team updated with the best investment practices available in the market and to be used as a reference for the performance evaluation of the internal active portfolio.

252. Banco Central do Brasil has made huge investments in system information resources updating. In fact, technical areas have access to the most sophisticated mathematical and statistical engines available in the market. This policy has been very important to allow financial model improvements and also to retain research-oriented employees.

## Capacity to Assess and Manage Risk

### Risk management

253. Banco Central do Brasil investment policy for foreign exchange reserves is based on three pillars—the reference portfolio, investment guidelines, and performance measurement. The first one, also known as the benchmark, is replicable and details unmistakably the included assets. This portfolio reflects the Board of Governors' risk/return preferences for the international reserves. The second pillar is the list of guidelines that define operational limits, allowed investment instruments, risk methodologies, and deviation limits for the active management.

254. The third pillar is a quarterly performance measurement report for the Board, which states the results of passive (reference portfolio) and active management. The Association for Investment Management and Research (AIMR) standards, when applicable, are followed for presenting results of benchmark and active strategies policies.

255. The complexity of the benchmark framework imposed the use of information technology tools. Considering the existence of appropriate human and IT resources for the development of a software system, Depin opted for an in-house software solution. The system includes several management tools such as market risk (VaR), credit risk (expected and unexpected default), performance evaluation, performance attribution, reference and active portfolio management, operational risk, and compliance. Besides that, the system gives the possibility of executing stress tests for active strategies. These tests can be based on historical data or stress scenarios defined by the user. Depin is now beginning to perform stress tests for the reserves as a whole on a regular basis.

256. Banco Central do Brasil takes into account market, credit, liquidity, operational, and legal risks. In terms of market risk, the Board has defined a VaR limit for the active management relative to the benchmark, i.e., a differential VaR. This limit is calculated on a daily basis, using RiskMetrics' methodology with 95 percent confidence level and one-day time horizon. The VaR is back-tested and the results of the methodology adequacy are presented in the quarterly performance reports. The Board defined a VaR limit for the active management, and it is up to the Investment Policy Committee to approve a risk budget among its sub-portfolios, as suggested by portfolio strategists. The VaR limit can be considered small in the sense that returns come basically from the reference portfolio, with active management giving a marginal result.

257. Credit risk is managed using two distinct approaches for the money market portfolio. The first one is for the portfolio as a whole. In this case, a proprietary model was developed based on Creditmetrics and the Merton model. This model uses expected and unexpected default probabilities, and the Board stated limits for these two variables. The main objective of this approach is to impose geographical and counterparty diversification, not to calculate VaR exposure. The second approach is transaction oriented, for which the Board has approved minimum counterparty ratings (short-term and long-term), maximum volume, and maturity exposure based on the counterparty total assets and ratings. For the fixed income portfolio, BCB accepts only federal government, agencies, and supranationals issues restricted to minimum rating. In terms of liquidity risk, the Board approved additional constraints related to the permitted range of investment instruments and maximum exposure in each asset.

258. Operational risk losses in reserves management are tracked with the objective of getting statistics about internal procedures and the relationship with counterparties.

259. The BCB's legal department analyzes and approves contracts, and together with audit entities ensures that each transaction has the necessary legal support.

260. Regarding external managers' portfolios, the operational guidelines are basically the same as

the ones defined for the self-managed portfolio, except for the VaR limit. Since external managers are restricted to fixed income investments and do not have a money market tranche, they have a larger VaR limit. Banco Central do Brasil receives daily transaction reports and monthly performance reports from the external managers and from the global custody agent and has periodic portfolio reviews with the managers.

### Reference portfolio

261. The reference portfolio, as approved by the Board, is divided into three tranches: gold, emerging markets, and core reserves. The core reserves tranche represents the large majority of the reserves, as the position in gold and emerging markets debt is less than 3 percent of total reserves. This tranche is denominated in three base currencies: the U.S. dollar, euro, and Japanese yen and is divided between money market and fixed income portfolios. Allocation is 60 percent in the fixed income market and 40 percent in the money market.

262. The gold portfolio is divided into two portfolios: one located in Brazil and the other invested in short-term gold deposits in the international market.

263. The emerging markets portfolio is managed using the “EMBI Brazil +” index as a reference. Banco Central do Brasil is restricted to investing in Brazilian sovereign external debt bonds.

264. The money market portfolio has four tranches. A small working capital tranche is fully invested in U.S. dollar overnight deposits. It has the purpose of controlling excessive volatility and providing liquidity for a sustainable domestic foreign exchange regime eventually. The other three portfolios are for each one of our benchmark currencies (U.S. dollar, euro, and Japanese yen). The term of the deposits can go as long as 6 months, but the total duration of the money market portfolio is about 1 month. Eurodeposit is the reference instrument and LIBID is used as the reference index.

265. The fixed income portfolio is divided into two subportfolios, one based in U.S. dollars and the other in euros. J.P. Morgan’s “1–3 years

Government Bond Index” is the reference for each respective currency. Minimizing the probability of capital loss over a certain time horizon was one important aspect considered when choosing the 1–3 year index. The fixed income portfolio denominated in Japanese yen is, in fact, allocated in the euro and U.S. dollar portfolios, with currency hedge to Japanese yen.

266. Six external asset managers manage a small part of the reserves, about 3 percent. They have the same benchmark as our fixed income portfolio and similar guidelines. The main purpose of the program is know-how transfer.

267. Market indexes were chosen as references because they represent the industry standard, are replicable, and contain sufficiently liquid assets. In terms of performance, they make the comparison with other managers possible. Regarding maturity, the decision of using the 1–3 year index was made taking into account the risk/return trade-off, since it has a small probability of quarterly negative return.

268. All portfolios, except money market, are closed portfolios, that is, they have no inflows or outflows, except for coupon and amortization payments. In a normal situation, the money market portfolio absorbs all changes in the size of the external reserves. Portfolios are rebalanced on an annual basis to maintain the proportion between the fixed income and the money market portfolios and also the size of the emerging market portfolio.

269. Regarding the currency hedge, the core reserve replicates the currency distribution of the short-term sovereign external debt up to the amount of the core reserves. In order to implement this strategy, Banco Central do Brasil follows up the external debt currency composition on a daily basis. However, to avoid excessive turnover, the benchmark is rebalanced every time the external debt currency proportion differs by more than 2 percent from the reference portfolio.

### Investment guidelines

270. Investment guidelines have been established for each aspect of risk management. To control market risk, a daily VaR limit is in place for deviations from the benchmark. It is enforced for

the active strategies of the whole reserves. Intraday VaR calculation has not been implemented yet. Banco Central do Brasil does not use automatic stop-loss techniques in monitoring market risk limits. In case of any breach of VaR limit, the Investment Policy Committee will meet to decide whether the positions should be kept or not. If the decision is that it is in order to maintain the positions, it must be submitted to the Board of Governors for approval.

271. In terms of liquidity and credit risk, there are different approaches to money market and fixed income portfolios. For the money market portfolio, the Board of Governors has established the following investment guidelines:

- Maximum expected and unexpected default probabilities for the actual portfolio deviation from the benchmark;
- Minimum rating limits of “A” and “P-1” for each counterpart, according to Moody’s;
- Maximum allocation per counterpart calculated as a percentage of the counterpart’s total assets, limited to a certain maximum amount per counterpart; and
- Three to six months’ maximum maturity depending on the institution’s rating.

272. For the fixed income portfolio, the restrictions are:

- List of permissible countries for investment in terms of sovereign debt. All of them must have a minimum rating of “A” according to Moody’s.
- Bonds issued by any country in a currency other than its own are submitted to additional restrictions in terms of rating; and
- Investments in “AAA” government-sponsored agencies and in supranational debt are restricted to a maximum percentage of the fixed income portfolio.

273. There are also the following asset concentration limits:

- Maximum percentage of the total outstanding amount of any issue; and
- Maximum percentage of a single asset contribution to the total fixed income portfolio.

274. There are other limits, such as:

- Permissible financial instruments;
- Breakdown of gold reserves in Brazil and abroad;
- Size of the gold portfolio; and
- Size of the emerging market portfolio.

275. Options investments are not allowed, but currency forwards and futures, interest rates and gold futures and swaps, commercial papers issued by financial institutions, CDs, CPs, repos, and reverse repos can be used.

276. Risk and compliance areas are independent from the front office but not independent from active management decisions in the hierarchical structure; we overcome this problem by using a software function that automatically informs the Board of Governors of any breach of limit, at the same time that the compliance area receives the alarm. Afterward a confirmation is delivered to guarantee that it was not a system or a human failure. On the same day, the portfolio managers have to explain the reasons for the occurrence to the Board.

### Information system

277. Banco Central do Brasil uses a mainframe and a PC-based network system based on Windows NT/2000. The software was entirely developed in-house, except for database management software. The mathematical and financial models were developed based on publicly available technical documentation, so there is no use of financial “turnkey systems.” The only inputs of the system are price data from data providers and transactions put into the system by traders. The software provides tools for:

- Risk management;
- Technical documentation;
- Performance measurement (including performance attribution models);
- Simulations;
- Compliance (comprising automatic limit controls);

- Back-office operations;
- SWIFT communication;
- Accounting; and
- Trade desk support.

278. The software was developed considering operational and research purposes using both the actual transactions database and the historical database to test new models. A large quantity of documentation, such as BIS and IMF papers, research papers in general, system technical documents, etc., is available online. The software was also designed with audit in mind, having a full revisions control, auditable numbering sequences, and a back-up procedure.

### Implementing a new approach in reserves management

279. Reserves management in Banco Central do Brasil has changed dramatically over the past five years. Before 2000, the head of Depin and the trade desks could decide the overall profile of the reserves, since guidelines established by the Board were generic, with no specific rules for performance measurement and an unclear role of each player in the decision-making process.

280. With the incidence of international financial scandals in the nineties, central banks in general became more aware of some risks that they were incurring and so, in 1997, Banco Central do Brasil introduced market risk calculations of the reserves based on the VaR concept (US\$). However, there was no type of operational limit. In the following years, the importance of risk management and a detailed benchmark to manage the reserves became increasingly clearer to Banco Central do Brasil. Studies were made considering common market management procedures and, as a consequence, a proposal was developed for a new framework in the time span of about one year.

281. In 2000, Banco Central do Brasil's Board of Governors approved a benchmark with clear guidelines and performance measurement procedures.

282. The main problems faced during the design and the implementation of the new reserves management concept and their solutions were:

- Natural resistance to changes in policy;
  - Time to absorb new concepts and to understand the advantages that would come from the new environment, like a clear performance evaluation procedure. From initial ideas to final development, the process took about five years. The main factors that contributed to this delay were international crises and changes of the Banco Central do Brasil executive direction.
- Understanding the new roles in each part of the hierarchical structure;
  - It took several months of meetings, discussions, and presentations to explain the role of each part of the hierarchy to overcome this problem.
- Steep learning curve for the staff to understand risk management, performance, and performance attribution models;
  - Well-structured and intensive training program. The program is continuous and started back in 1996.
- Lack of an integrated computer platform;
  - Acquisition of a new networked hardware and basic software system (operational systems and other support software).
- Modifications of the compliance system with the new guidelines;
  - Adapt procedures to the new environment.
- Changes in accounting system related to the new kind of instruments allowed;
  - Adapt accounting system to the new instruments.
- Authorization and support to develop a software solution in-house;
  - Develop a sound design environment and full documentation of the proposal.
- Difficulties in getting consistent asset pricing data, which is fundamental for the robustness of VaR calculations and performance measurement.

- Creation of a new workgroup (area) to check and guarantee asset pricing consistency and new data providers.

283. However, there were some aspects that were essential for the successful design and implementation of the new framework for reserves management:

- Human resources with deep knowledge of finance, mathematics, and computer science and previous experience in developing and managing software with large databases;
- Existence of an IT area in the International Operations Department—Depin;
- Necessary infrastructure resources to implement the system, such as computers, communication lines, data sources, etc.; and
- Emphasis on training, including periodic visits to premier financial institutions and other central banks. In this case, our external asset management program was an invaluable tool.

284. The software architecture was structured in independent modules and it is fully upgrad-

able. This approach allowed a modular-based development, i.e., each application module (e.g., market risk, credit risk, reference portfolio, performance attribution, etc.) was developed independently and connected to the system in a later phase. The kernel that was developed initially supported basic portfolio management and had the main software functions encapsulated in a procedural environment.

285. The kernel and the modules of market risk, credit risk, reference portfolios, and compliance were designed and developed in nine months, and another three-month period was necessary for tests. The operations began in July 2001. Afterward, other modules such as operational risk, documentation, and stress testing were included.

286. Improving the software system and the reserves management framework is an endless and continuous task as market practice keeps evolving in time.

287. Nowadays, Depin is focusing on improving stress test procedures, performance attribution models, operational risks statistics, and reference portfolio.

# 4

## Canada

### Introduction

288. In Canada, foreign reserves are owned by the government and managed by both the Bank of Canada and the Department of Finance. As of December 31, 2001, Canada held about US\$34 billion in total international reserves. Of that amount, about US\$30 billion (89 percent of total reserves) was held in liquid assets.<sup>19</sup>

289. These liquid reserves are held in a special account called the Exchange Fund Account (EFA) under the Minister of Finance's name at the Bank of Canada. The EFA is financed with foreign-currency-denominated liabilities issued by the Government of Canada. Liquid reserves and gold are actively managed by the Bank unlike other components of the reserves such as Special Drawing Rights (SDRs) and the reserve position at the IMF. This report will focus on the liquid assets of the reserves.

### Governance and Institutional Framework

#### Reserve management objectives and scope

290. The objectives of reserve management are:

- to provide general foreign-currency liquidity for the government; and
- to provide funds to help promote orderly conditions in the Canadian dollar in the foreign exchange market.

291. The management of reserves has changed over the past 25 years, reflecting developments in financial markets. The government has increased the level of foreign reserves in recent years to reflect increased flows in foreign exchange markets and to bring its level of reserves more in line with other comparable sovereigns. This increase in turn has required the reserve managers to focus on asset-liability and risk management, and on reducing the cost-of-carry of these reserves while maintaining a high degree of liquidity and capital safety.

292. In order to meet these objectives, the liquid reserves are subdivided:

- A proportion of reserves is held in highly liquid U.S. dollar-denominated assets to fund immediate foreign currency liquidity requirements and intervention activity.
- The remainder is held in a diversified portfolio of high-quality assets, denominated in U.S. dollars, euros, and yen.

293. Reserve management activities consist of the management of foreign currency assets and liabilities, which includes the use of derivative financial instruments. Reserve management follows a well-

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<sup>19</sup>Liquid reserves consist of marketable securities and deposits denominated in U.S. dollars, euros, and yen.

coordinated Asset-Liability Management framework described later in the paper, while at the same time focusing on cost-of-carry minimization.

## Institutional framework

### Legal foundation

294. Canada's reserve assets are governed by the Currency Act, which serves as the legal framework for EFA asset management and investment operations. The Minister of Finance approves policies for managing the EFA, mainly through a set of investment guidelines. The liabilities that fund the EFA are governed by the Financial Administration Act.

### Internal governance

295. The responsibility for the management of the EFA is jointly shared by the Department of Finance and the Bank of Canada while the management policies are set by the Minister of Finance. The Bank of Canada, acting as a fiscal agent, administers and effects transactions for the Account on behalf of the Minister of Finance.

296. The Director of the Financial Markets Division at the Department of Finance and the Chief of the Financial Markets Department at the Bank of Canada are responsible for the ongoing management of the EFA. A Policy Committee, which is composed of senior officials from the Department of Finance and the Bank of Canada, meets semiannually to review developments and major policy initiatives, and provide guidance and accountability on the management of the Account. The Risk Management Committee (RMC), which consists of managers from the Department of Finance and the Bank of Canada, including two members with no connection to the operations of the EFA, meets quarterly to advise on the management of risk related to the government's debt program, including the foreign exchange reserves.

297. The responsibilities for the day-to-day portfolio management and strategy implementation of the EFA rests with the staff of the Foreign Reserves Management Team at the Bank. The Risk Management Unit (RMU) at the Bank oversees and manages the risks associated with the EFA.

## Transparency and accountability of reserve management and benchmarking

298. *Reporting* in a regular and timely manner is a key element of Canada's reserve management policy. The Minister of Finance provides an Annual Report<sup>20</sup> to Parliament on the operations of the EFA for each calendar year within five months after the expiration of that calendar year, and this report is available publicly. The EFA Annual Report also includes the result of *annual audit* of the EFA conducted by the Auditor General of Canada. In addition, periodic review by external third-party experts is undertaken, and the results of such reviews are shared with the government.

299. The EFA's current asset management *benchmark*, in the context of *asset-liability management* detailed later in the paper, is the government's foreign currency liabilities. The cost-of-carry is currently used as a performance measure for the EFA, and is disclosed in the EFA Annual Report. Additional benchmarking approaches are also currently under study.

300. Internally, the RMU provides daily reports on the EFA risk position to trading staff, and monthly and quarterly reports to the RMC and the Bank's senior management.

301. Since July 1999, Canada has reported its disaggregated reserves position on a weekly basis.<sup>21</sup> This *disclosure* of reserve positions is achieved by means of the Bank's website on the first business day following the 8th, 15th, and 23rd of each month. On the third business day following month-end, a more comprehensive breakdown of Canada's reserve position is published by the Department of Finance.

302. In addition, *documentation* of the chain of authority, decision making, and delegation in reserve management has been made public through Bank of Canada Review articles.<sup>22</sup>

<sup>20</sup>In addition, the Department of Finance publishes an annual Debt Management Report and Debt Management Strategy Report, which provide an overview of foreign reserve management operations.

<sup>21</sup>Canada was one of the first countries to fully meet the requirements of the IMF's and G-10's new format for presentation of international reserves data.

<sup>22</sup>See De Leon, J., 2000-2001, "The Bank of Canada's Management of Foreign Currency Reserves," *Bank of Canada Review*; and Rochette, M., 2001-2002, "Risk Management in the Exchange Fund Account," *Bank of Canada Review*.

## Establishing a Capacity to Assess and Manage Risk

### Risk management

303. The goal of risk management is to balance risk and return. In 1997, the Bank and the Department of Finance jointly established an RMU to oversee the risk position of the government of Canada.

### Strategy for managing risks

304. The EFA is exposed to various types of risk, such as credit risk, market risk, liquidity risk, operational risk, and legal risk. The government's risk management strategy is to recognize, measure, and manage each type of risk individually as well as collectively.

305. The RMU manages EFA risk in three steps:

- Identifies, analyzes, evaluates, and models the risks;
- Advises on guidelines to limit the risks; and
- Ensures day-to-day adherence to the guidelines, while periodically proposing new risk control mechanisms.

### Credit risk

306. To control credit risk, the RMU currently uses an approach based on the BIS 1988 Basel Accord and subsequent amendments, whereby all exposures are risk-weighted according to entity type. In addition, the RMU has adopted the BIS Accord "add on" approach to calculating potential exposure on derivative transactions. Credit risk is managed through diversification of the EFA asset portfolio, with appropriate use of credit ratings, counterparty limits, netting agreements, and collateral support.

### Market risk

307. To limit market risk, the government follows an asset-liability management framework whereby foreign reserves are managed so that assets match liabilities in currency and duration.

Over the long run, EFA assets and liabilities are expected to be held in approximately equal market values, thus keeping the account balanced. Assets match liabilities for the euro- and Japanese yen-denominated reserves. At present, U.S. dollar liabilities exceed U.S. dollar assets, largely due to foreign exchange intervention and commitments made to the IMF in 1998. This imbalance has been reduced through a program of U.S. dollar acquisition in foreign exchange markets, and the plan is to eliminate the mismatch over the next year. In order to minimize the impact of any mismatches, the "excess" U.S. dollar liabilities are concentrated at the short end of the yield curve.

308. In addition, two types of forward-looking techniques, namely "*stress test scenario analysis*" and "*sensitivity stress testing*," are conducted. Stress test scenario analysis is based on a potential market event, such as a stock market crash. Sensitivity stress testing is based on standardized moves in closely linked market risk factors, such as a parallel yield curve shift.<sup>23</sup> These scenarios are explicitly defined and reported on a monthly basis.

### Liquidity risk

309. Various policies are implemented to limit liquidity risks. These policies require that no more than 10 percent of any single issue be held in the EFA, and that the issue size be a minimum of US\$500 million. Furthermore, the securities of any one issuer cannot exceed 10 percent of EFA liquid assets, except for "home currency" bonds issued by AAA sovereigns and their directly guaranteed agencies. As well, no more than 15 percent of the EFA's liquid assets can be in investments that cannot be sold or redeemed prior to maturity (i.e., non-marketable securities and fixed-term deposits).

310. In addition, to limit rollover risk, EFA liabilities that mature within any 12-month period cannot exceed one-third of EFA assets. Finally, other means of raising liquidity include a short-term U.S. dollar commercial paper program (Canada Bills) and holdings of highly liquid U.S. dollar, euro, and yen securities.

<sup>23</sup>Bank for International Settlements, 2001, *A survey of stress tests and current practice at major financial institutions* (April).

**Operational risk**

311. To control operational risk, the RMU uses a “bottom-up” method that is consistent with the concept of total quality management. It starts from examining the different aspects of operations performed by the organization and then maps the process.

312. Sound operational risk management also requires *qualified staff* and *adequate management information systems*. In the case of the EFA, the RMU analyzes operational processes and establishes controls that are regularly reviewed. Although the RMU is not directly involved in personnel management, the bank has a human resources strategy to maintain a competitive compensation structure with abundant training and learning opportunities. It also offers various flexible working hour agreements. The Bank is also currently improving its operational processes and implementing relevant technological applications such as a new integrated straight-through processing system.

**Legal risk**

313. The government’s Department of Justice has the responsibility of advising on legal risk, and the preparation of an annual legal risk report for the Risk Management Committee and senior management. The report identifies any potential legal risk issues with respect to existing documentation.

**Currency composition and eligible investment instruments**

314. There are restrictions on the *EFA’s currency composition* and the *types of eligible investment instruments* to control overall risk. The EFA’s eligible currencies are the U.S. dollar, euro, and yen. The EFA portfolio must be composed of a minimum of 50 percent U.S. dollars with the rest allocated in euros, and Japanese yen, according to the funding and investment opportunities in each currency. This currency composition reflects the important role of the U.S. dollar as a reserve currency, and the fact that intervention in support of the Canadian dollar has been historically undertaken through the U.S. dollar.

315. The Currency Act allows the EFA to transact in foreign exchange on a spot and forward basis, and to invest in deposits of supranational organizations and financial institutions, and in securities issued by sovereigns and their agencies. It also allows the EFA to lend any of the eligible instruments, and enter into derivative transactions based on any of the eligible instruments. In addition, the government is moving toward more extensive use of collateral in its reserve management operations to protect against current and potential credit exposure.

**Use of derivatives**

316. Among the eligible derivatives mentioned earlier, the government of Canada has made extensive use of long-term interest rate and currency swaps since 1984–85. The government uses these swap agreements to obtain cost-effective financing, to fund the foreign exchange reserves, and to permit flexibility in managing liabilities. For example, cross-currency swaps are currently used to convert Canadian-dollar-denominated fixed-rate debt into euro and U.S. dollar fixed-rate liabilities. In addition, short-term currency forwards and gold options have been used by the EFA.

**External managers**

317. The government uses external securities lending managers to manage a securities lending program for a portion of its U.S. dollar-denominated securities. Formal agreements are signed between Canada and the external managers. The external managers must follow the policies and guidelines provided by the government. To manage the risks, there are restrictions as to the securities allowed to be lent, the types of borrowers, eligible collateral, and investment of cash collateral. The external managers are required to submit reports, on a monthly basis and upon request, describing details of the loans and investments. Currently, there are two external managers.

**Recent trend with respect to reserve management**

318. Consistent with best practices in risk management in recent years, the government has been

moving toward making more extensive use of collateral to reduce credit risk exposure in its foreign reserve operations.

319. This year, the government has put in place a collateral management framework for the government's derivative counterparties. Canada's collateral management system requires counterparties to put up collateral to the government when credit exposure on swaps and forwards exceeds given levels. An external firm is being used to manage securities posted as collateral to the government. In 2002, the government will also be moving a large proportion of its uncollateralized short-term U.S. dollar deposit investments to collateralized repurchase agreements.

### **Reserve Management Operations in Deep and Liquid Markets**

320. Canada's reserve management operations are undertaken in the most efficient and liquid markets in the world, i.e., the U.S., Japanese, and European markets. Foreign currency borrowing that finances the EFA's reserves is also conducted so as to maintain Canada's reputation as a "successful borrower" in international capital markets.

321. Continued access to these capital markets is facilitated by ensuring that Canada has the necessary legal documentation in place to allow reserve managers to raise funds in a variety of markets and jurisdictions.

# 5

## Chile

### Developing a Sound Governance and Institutional Framework

#### Reserve management objectives and coordination

322. The mission of the Central Bank of Chile (CBCh) is to safeguard the stability of the local currency and the normal functioning of internal and external payments. International reserves provide the CBCh with one of the policy instruments that it has in order to attain its mission. Within the monetary policy framework, based on inflation targeting and a floating exchange rate that it has embraced, the CBCh intervenes in the foreign exchange market in exceptional and qualified circumstances. In addition, the Treasury and private banks are allowed to maintain foreign currency deposits at the central bank.

323. In this context, the basic goals of reserve management are to maintain an appropriate level of liquidity in foreign currency and to protect the value and safety of investments. Subject to constraints derived from the above goals, reserves are managed to obtain maximum return.

324. For liquidity purposes, the CBCh holds a Cash Portfolio in order to meet any intervention needs and also to handle deposits and withdrawals from foreign currency accounts held by the Government Treasury, other public institutions (like Codelco and Banco Estado de Chile), and private banks at the central bank. Regarding

foreign exchange interventions, on September 2, 1999, the CBCh announced a free float of its currency.

325. For the remaining balance of reserves not directly devoted to meeting liquidity needs, the following factors are taken into account in determining the way they are managed:

- The CBCh's foreign debt composition. The CBCh aims to replicate the currency composition and duration of its debt. In this category, any debt denominated in local currency but linked to a foreign currency is also considered.
- The currency composition of liabilities (private and public), in order to back the payment of capital and interest of debt due within twelve months.
- The currency composition of trade imbalances, in order to finance any trade deficits in the event that access to the international credit markets is limited.
- Risks and financial considerations.

326. In considering all of the above aspects, the reserves of the CBCh, from an asset management perspective, can be defined as a multicurrency portfolio invested in products ranging from overnight deposits to bullet bonds with maturities up to thirty years, issued by prime rated countries, agencies, and financial institutions.

327. A small percentage of the reserves are held under the management of external asset managers. This program was started in 1996 as a way to have an additional and real benchmark for comparison and to gain further knowledge of markets and instruments. The asset management program will probably be extended during 2003 to create an externally managed portfolio of mortgage-backed securities.

328. The CBCh manages its international reserves and foreign exchange rate policy, and does not take responsibility for the management of other public funds. Other public institutions are able, nevertheless, to establish time deposits with the CBCh and to maintain current accounts with the Bank as previously mentioned. No special coordination efforts between the CBCh and such public institutions are needed to service said accounts. In fact they are treated as normal liabilities of the CBCh, just as the ones held by commercial banks.

### **Institutional framework**

329. The Constitutional Organic Act of The Central Bank of Chile, Law No. 18,840 of October 10, 1989, establishes that the Central Bank of Chile is an autonomous entity, in terms of the decisions it makes and in terms of the ownership of its capital. The Law establishes explicitly its ability to manage, hold, and dispose of its international reserves.

330. At the central bank, there is a clear setup and separation of responsibilities, which is reflected in the organizational chart attached in Annex I.

331. The decision-making process at different levels of the organization is also clearly defined.

### **Board level**

332. The CBCh's Board defines the main reserve management objectives and approves the investment parameters articulated in the investment policy guidelines of the central bank.

### **Division level**

333. Acting on behalf of the CBCh's Board, and under a scheme of delegated responsibilities, the Director of the International Division reviews and

approves the quarterly investment strategies with a medium- to long-term perspective, and monitors tactical and strategic decisions made at lower levels of the organization.

### **Management level**

334. The Investment Manager reviews the strategies designed by the front desk and proposes, to the Director of the International Division, the optimal way to implement them. Additionally, the Investment Manager and the front desk may develop and implement tactics that could deviate from the original plan and/or the benchmark, in order to extract value with short-term views on market developments.

### **Operational level**

335. The International Money Desk Department (the front desk): Here the Head of the Money Desk and Portfolio Managers design the quarterly investment strategies and implement the decisions approved at the upper levels of the organization. Using financial tools and techniques, they decide the timing and the security selection in order to achieve the strategic and, at times, tactical allocations.

336. International Treasury Department (the back office): The Treasury Department completes and processes the transactions made by the portfolio managers. This department interacts with the internal accounting systems and sends confirmation messages to all the parties involved. It should be noted that no single transaction can be completed without the authorized signatures of both a portfolio manager and a senior member of the Treasury Department. This department, among other things, also ensures that the Front Desk's operations comply with internal investment guidelines. This task is carried out by the Operation and Control Unit of the department.

337. Performance and Risk Measurement Department (middle office): This department reports directly to the Director of the International Division. The middle office calculates risk parameters and measures the performance of the portfolio in absolute terms and relative to the benchmark.

### **Transparency and accountability**

338. The Law clearly states the CBCh's mandate, powers, and accountability. At least three times a year, the CBCh's Board meets with the Finance Committee of the Senate, and once a year with the plenary of the Senate, to present the state and prospects of the economy and the actions taken by the CBCh to achieve its main objectives. It also prepares audited annual reports, which are available to the public.

339. The CBCh releases periodic disclosures of the reserves' accounting value on a biweekly basis. It also adheres to the Special Data Dissemination Standard of the IMF. Therefore on a monthly basis (with a time lag), the central bank reports the level of international reserves and foreign currency liquidity, and discloses the end-of-year value of the reserves in its annual report. In the annual report, an accounting measure of the absolute return of the investments is presented and measured in local currency terms. There is also analysis of the composition of returns, i.e., those derived from interest and capital gains and those attributed to variations in the value of the local currency vis-à-vis foreign currencies.

340. The information disclosed about reserve management, such as internal governance procedures and specific investment policies, is regularly under review. In the 2001 Annual Report, new paragraphs were added that describe the way the CBCh achieves the liquidity goal of reserve management. These paragraphs list the types of financial instruments in which reserves are invested and the composition of reserves at year-end (showing the percentage of reserves allocated to two broad categories: bank (time deposits) and fixed income instruments). In the same section of the Report, there is also a discussion of how the CBCh controls credit, market, and operational risks and protects the value and safety of the investments. In order to control credit risk, minimum credit ratings for countries and counterparties are specified. Market risk is managed by diversifying the portfolio of investments among different currencies, instruments, and terms to maturity. Market risk is also measured and controlled by calculating the duration and Value-at-Risk (VaR) of the reserves (the year-end duration and VaR are presented), and operational risks are con-

trolled by a clear separation of functions, responsibilities, and internal controls.

341. The central bank also fully discloses reserve management goals and counterparty transaction rules to market participants. The selection criteria, for both the countries and the counterparties, are objective:

- **Country Criteria:** Long-term credit risk rating, debt level of the country, and the relative size of the country measured by its Gross Domestic Product.
- **Commercial Banks:** Long-term credit risk rating and size of the institution measured by its equity.
- **Counterparties:** Primary dealers and brokerage houses that have their own credit rating within the ranges required by the central bank, or those that are at least 90 percent owned by approved commercial banks.

### ***Internal reporting***

342. There are different levels of reporting at the CBCh:

- On a monthly basis, the International Division reports to the Board the absolute and relative performance of the internally and externally managed portfolios compared to their benchmark. These reports also contain different risk measurements, such as duration and Value-at-Risk.
- On a semiannual basis, the International Division reports to the Board the list of issuers and counterparties used in the management of reserves during the reporting period.
- Annually, the International Division reviews the soundness of the current benchmark, and proposes changes if deemed appropriate.
- The Front Desk and the Investment Manager report their operations to the Division Manager in a weekly meeting. This meeting is also used to report credit risk news that may affect margins and eligibility of either countries and/or counterparties (reported

by the middle office) and to decide on specific issues related to the implementation of the investment strategies. For example, there may be a decision to change the timing for a certain investment allocation, or if there are new market developments, there may be a decision to make a tactical deviation from the original plan and/or benchmark.

### **Auditing**

343. Different agents constantly audit the management of the reserves:

- On an annual basis, there is an audit by an established independent auditing company, whose observations are included in the central bank's annual report.
- Internal independent auditors, who do not report to the Director of the International Division, conduct internal audits at least three times a year. The audit process covers all aspects of reserve management, from compliance with the guidelines to broad recommendations about different aspects of the investment process and operations, such as the auditing of the securities lending programs, the physical security inside the dealing room and the treasury department, etc.
- Independent internal auditors, who report directly to the central bank's Board, also continuously monitor compliance with investment guidelines and the nature of accounting profits and losses. This monitoring process is done on a remote basis through the use of the central bank's accounting system, which is managed by a separate group, the Management and Development Division.

344. The Operation and Control Unit is part of the Treasury Department and reports to the Head of the Department and to the Investment Manager. This unit is responsible for checking the portfolio managers' daily compliance with investment guidelines. These checks look for compliance on standard procedures related to financial transactions (such as ensuring that the obtained prices were in line with market levels), issuers, counterparts, and

margins. This unit is also responsible for monitoring external asset managers, the securities lending programs, and custodian services.

## **Establishing a Capacity to Assess and Manage Risk**

### **Policy guidelines**

345. Risk management forms an integral part of the CBCh's broad policy guidelines for investments. For instance, one of the main objectives of the policy guidelines is to first define the playing field for the investment decisions. The central bank's Board defines these guidelines and then delegates the responsibility for implementing them to the International Division. These guidelines implicitly incorporate the main objectives of the reserve management and therefore represent the investment philosophy of the fund. This overriding philosophy takes form in the ranges and limits imposed on different types of investments.

346. The policy guidelines can be categorized into the following groups:

#### ***Foreign currency exposure/composition***

347. There are guidelines governing which foreign currencies can be held, their amounts (expressed as a percent of the total portfolio), and margins of deviation from these amounts. The criteria for choosing the currency composition, which was previously presented, takes into account the hedging needs for covering the liabilities of the CBCh, the country's trade deficit, any short-term external debt servicing needs, and financial considerations derived from the use of financial optimization models. The reserve portfolio has four main currency blocs (U.S. dollar, euro, pound sterling, and Japanese yen) and minor currencies, subject to additional holding restrictions, i.e., exposure limits, which are associated with the main currencies. The process of association of the minor currencies to the main ones rests on the correlation of the historical returns.

#### ***Credit exposure***

348. We define three main sources of credit exposure:

*Bank risk*

349. Bank exposure, which takes the form of time deposits, current accounts, certificates of deposit, and foreign exchange operations, is managed in two ways:

- The maximum authorized amount of global bank risk is limited to a specific percentage of total reserve assets.
- There are also limits on the time to maturity and amount of investment exposure the Bank can have with any single banking institution. To meet the criteria for counterparty eligibility, banks also must comply with minimum size requirements (measured by their equity) and have a certain long-term debt credit rating.

*Sovereign and supranational*

350. As previously mentioned, the country risk eligibility depends on the relative size of the country, the level of public debt, and its long-term debt credit rating. Individual maximum exposures are assigned to each country. The supranational exposure is subject to a global maximum limit, while the individual amounts depend on the credit rating of each agency and its size measured by its equity.

*Counterparty risk*

351. The eligibility of counterparties is also subject to objective parameters. Primary dealers, as well as brokerage houses with approved credit ratings and 90 percent owned subsidiaries of eligible banking institutions, are eligible to be the central bank's counterparties.

**Definition of sub-portfolios**

352. According to the degree of immediacy that the funds may be needed, i.e., depending on how transitory or permanent the funds are,<sup>24</sup> we have defined three sub-portfolios:

- **The Cash Management or Liquidity Portfolio:**

It consists of overnight and weekend deposits, and is the preferred source of liquidity to face daily demand stemming from withdrawals from accounts held by public and/or commercial banks. The liquidity portfolio can receive/transfer funds from and to a second portfolio (short-term investment portfolio) when its balance is too low or too high.

- **The Short-Term Investment Portfolio (Buffer Portfolio):**

Acting as a buffer for liquidity purposes, this portfolio may receive/transfer funds from and to the liquidity portfolio. It is invested in bank deposits and money market instruments, ranging from a week to twelve-month maturity.

- **The Long-Term Investment Portfolio:**

Invested in medium- to long-term instruments, including nominal bullet bonds and inflation-protected securities (U.S. TIPs) with maturities ranging from one year to thirty years. Transfers of funds from the long-term portfolio to the short-term one (and vice versa) are mainly due to financial considerations, although at times it has to absorb excess liquidity or meet liquidity shortages.

353. In general, the strategic investments in and between short- and long-term portfolios are subject to an investment review, which is done at least on a quarterly basis. The resulting investment strategy is based on external forecasts and our expectations of future domestic and foreign financial market developments. The general macroeconomic scenario is provided by the International Analysis Department while the International Money Desk (front desk) forecasts future yield curves and rates of return (the financial scenario). These scenarios and expected values are presented and discussed at meetings chaired by the Director of the International Division and attended by senior staff of the area, in order to achieve a consensus view at the Division level.

354. The expected rates of returns for three- and twelve-month horizons are fed into an optimization model; the results are analyzed and then adjusted according to the market experience of

<sup>24</sup>Johnson-Calari, Jennifer, "Risk Management Practices at the World Bank: Global Liquidity Portfolios," *Risk Management for Central Bankers* (London: Central Banking Publications), defines the liquidity requirements as stable, discretionary, and operational.

our officials. That is particularly the case when using standard, although imperfect, mathematical models that do not take into account the costs of adjustments, and may recommend allocations that are too aggressive or too concentrated in a limited number of assets.

355. The composition of the benchmark for comparison purposes comes from the output of a historical standard mean-variance optimization model, which is subject to a number of ad hoc constraints reflecting the risk-return profile of the central bank. For example, there is a constraint limiting the percentage of assets allocated to maturities greater than three years. This constraint is designed to limit the duration or the market sensitivity of the overall portfolio, thereby preserving the capital of the fund.

356. The reserve benchmark is a tailor-made combination of internationally known indices. For example, we use BIS's six-month Fix Bis index for the short-term portfolio associated with the short-term sovereign and supranational investments, a Libid index for the banking investments, and sector indices of the JPMorgan Chase global index for the bond portfolios. There is a similar index for each main currency of the portfolio.

357. As mentioned, investment and allocation strategies for the portfolio are reviewed at least on a quarterly basis, but sudden market moves can make the portfolio managers take a position that goes in a different direction than the one recommended by the current strategy. These actions are previously approved by the Investment Manager and communicated to the Director of the Division. By how much can portfolio managers deviate, and what is the net effect of those particular actions are issues that the Division is currently addressing. The Division is also making efforts to better identify the attribution and composition of returns of the overall portfolio.

### **Risk management framework**

358. Risk management is approached in four different ways or instances:

#### ***Financial risks (Ex ante measurement)***

359. The primary indicator of financial risk is the portfolio's duration. For the short- and long-

term portfolios, as well as for the overall portfolio (excluding the liquidity portfolio), there are duration benchmarks and predefined margins of deviation from these benchmarks. On an ex ante basis and as unofficial calculations, the portfolio managers calculate the duration, VaR, and tracking errors associated with the strategy for the investment of the reserves. All day-to-day operations and reports of the front and back office are prepared using internally developed systems that are able to interact with the general accounting system of the central bank and with the SWIFT system for international messages. From the moment a portfolio manager closes a trade, approximately 90 percent of the steps needed to complete the transaction are automated. There are still some activities that can be automated. For example, the manual entering of each transaction by back office personnel could be replaced by an automated system, where the portfolio managers directly enter trades into the system. This system upgrade would save time and lower the risk of clerical mistakes. The financial calculations are done using mainly Bloomberg and RiskMetrics.

#### ***Financial risks (Ex post measurement)***

360. The official calculation of different portfolios' durations is the responsibility of the middle office. This calculation is presented to the investment officials twice a month, at the time of the weekly meetings chaired by the Division Manager. As a recent development, the middle office is also calculating the VaR (absolute and relative) of the portfolio, which is analyzed every week at the weekly meetings. An internally developed system is used for the calculation of the duration of the portfolio, and RiskMetrics is used to compute the VaR parameter.

#### ***Credit risk***

361. The middle office is responsible for monitoring this type of risk. This unit monitors changes in credit ratings and names due to the ever-evolving processes of mergers and acquisitions of banks. According to the changes, the list of approved banking institutions varies, incorporating new

names, taking out others, and changing the maximum individual amounts and maturity of investments with each bank.

### ***Operational risks***

362. The Operation and Control Unit, which is part of the International Treasury Department, monitors operational risk by checking compliance with the guidelines, in terms of exposure to institutions, approved names and locations of subsidiaries, margins, and internal operational procedures established for financial transactions. The control conducted by this unit is mainly manual and done on a spot check basis over a random sample of operations. Because no software system has been developed yet and because these activities also apply to the external asset managers, there is a considerable workload in regard to the management of operational risk, and a related need for automated processes.

### **Performance evaluation**

363. The official performance calculation done for internal purposes is the responsibility of the middle office. It issues a monthly report with a time lag that contains the accounting and marked-to-market returns of the investment portfolios managed internally and externally. An extensive effort has been made to reduce the time lag between the reporting date and the month that is being reported. The performance report includes the monthly return and rolling twelve-month returns for all the portfolios and managers (internal and external asset managers), and ranks managers by their performance. There is also a discussion of other topics, such as the duration of the portfolio, VaR, and financial developments during the reporting period.

### **Recent developments**

364. In this section we highlight the most relevant developments and actions taken by the area:

### ***Range of products***

365. In an effort to increase the returns on reserves, the CBCh is about to expand the range of products eligible for investment. This project specifically is considering the incorporation of U.S. Agencies (GSEs), German Pfandbriefs, and mortgage-backed securities.

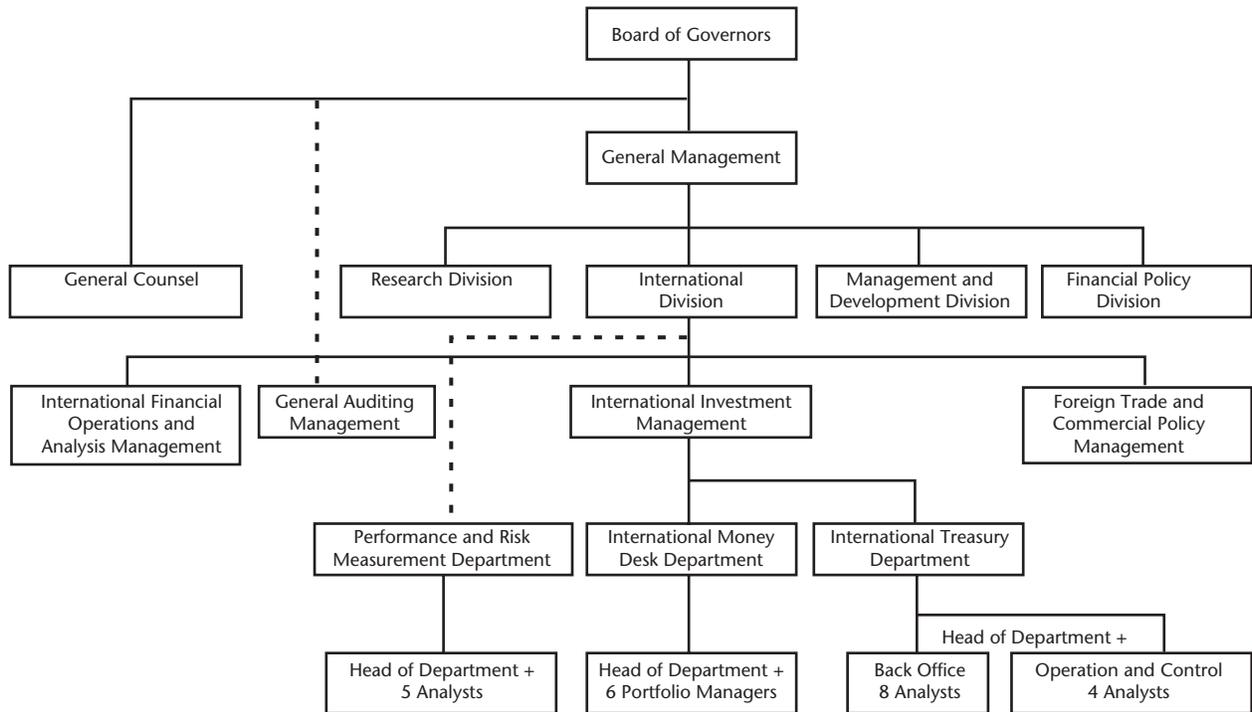
### ***Securities lending***

366. Yield-enhancing activities such as a U.S. dollar securities lending program have been in place since July 20, 1998. The program was subsequently extended to euro-denominated notes and bonds on May 10, 2000, to the portfolios held by the external asset managers on April 9, 2001, and to the portfolio of assets held in pounds sterling on October 26, 2001.

### ***External consulting***

367. Another interesting initiative that we recently began was to rely on external consultants for advice and recommendations to the entire investment area. This is a requirement of the CBCh's Board, and so far, two external consultancies have been used in the last four years. They have been helpful in ensuring soundness of actual procedures within the area and identifying areas where improvements could be made. The creation of the Operation and Control Unit in 1999 is one of the results of these external consultancies, as well as some of the current observations to our area that are actually included in this document. The external consultants were senior staff members of prestigious institutions in the reserve management arena. Through these exchanges the investment area has the opportunity to learn from the experience of more developed operations, and from central bank partners (or supranational institutions) that do not view consulting as a business, but rather as a collaborative effort aimed at developing institutions with similar goals and levels of capacity.

Annex I: Organizational Chart: Central Bank of Chile and the International Division Area



# 6

## Colombia

### Introduction

368. In 1997 the Banco de la República (BR), Colombia's central bank, developed a long-term strategic project designed to manage the international foreign exchange reserves of the country in the most efficient manner, given the stated objectives for holding reserves in line with the highest international standards and practices. This ambitious project, which is reviewed periodically, has led to significant changes in the organizational structure, the decision-making process, the human resource policy, the technological platform, the risk control procedures, as well as the reserve management policies.

### Governance and Institutional Framework

#### Reserve management objectives, scope, and coordination

##### *Objectives*

369. Reserve management seeks to maintain an adequate level of assets denominated in convertible foreign currencies readily available to meet a defined range of objectives for holding reserves in the most efficient manner. In order to understand reserve management policy in the case of the BR, it is important to first identify its objectives for holding reserves.

370. There are three reasons for holding reserves: (i) for transactional purposes, to support trade in an open economy; (ii) for precautionary motives, associated with potential balance of payments crises; and (iii) as collateral, to improve a country's access to the international capital markets via maintaining sound foreign exchange liquidity policies. The first two motives have traditionally had strong theoretical support, whereas the last motive has been referred to in the literature only recently.

371. Before the 1990s, the main objective of reserves was the transactional motive, for which reserve adequacy was set in terms of the months of imports required to support its trade-related operations. The reserve adequacy objective also took into account the fact that the country was under a crawling peg foreign exchange system and had a low exposure to capital outflows due to restrictive regulation. During recent years, the BR has reviewed its reserve adequacy objective in light of the following: (i) the deregulation that has taken place during the last decade; (ii) empirical evidence of the growing impact of contagion in developing nations; and (iii) a review of the relative importance of sound liquidity policies in the country's overall creditworthiness.

372. On the domestic front, three main developments had an important impact on the reserve adequacy objective. In 1991, Congress approved Law 09, by which the foreign exchange market was

deregulated in order to encourage foreign direct investment and facilitate trade-related operations. In the same year, the crawling peg was gradually replaced by a currency band system, and in 1999, a free float exchange regime was introduced.<sup>25</sup> Finally, the traditional sources of funding for public debt in the international markets via syndicated loans were replaced by the issuance of bonds in the international capital markets, and the private sector's exposure to external indebtedness increased.

373. During the same time period, the Mexican, Asian, and Russian/LTCM crises highlighted the vulnerability of developing countries to contagion. Based on empirical evidence of the impact of such crises in developing nations with sufficient but limited access to the international capital markets, Bussiere and Mulder (1999) concluded that countries that maintained during this period a ratio of at least 1 in the reserves/short-term debt indicator were less vulnerable to contagion, even in conditions of slight misalignments in their current account and real exchange rates.<sup>26</sup> For larger misalignments in these variables, the authors recommended a higher reserve adequacy objective.

374. Furthermore, the motive for holding reserves as collateral is emphasized by the fact that the international capital markets use the Bussiere and Mulder indicator as a yardstick to measure appropriate liquidity levels, an important variable in the country risk models that determine a country's creditworthiness and the cost of its access to international capital markets.

375. As a result of this evaluation, the central bank adopted as the minimum reserve adequacy objective the expected value of one year's public and private residual debt payments and amortizations due, plus a provision for current account deficits that can range from zero to the standard deviation of the long-term component of the current account, given that the country has a tendency

to run current account deficits.<sup>27</sup> The inclusion in the reserve adequacy objective of real exchange rate misalignments is under study.

### *Implications on reserve management*

376. The changes that took place in the determination of the reserve adequacy objective of the BR had three important implications on reserve management policy.

377. The amount of reserves invested to cover immediate liquidity requirements in a Working Capital liquidity bucket was significantly lowered from almost 90 percent of total reserves before 1994 to 5 percent, given that under a free float exchange rate regime the probability of recurrent intervention decreased.

378. In order to lower the opportunity cost of maintaining reserves for precautionary and collateral purposes, two additional liquidity buckets were defined with investment guidelines that are consistent with their expected investment horizon. These were the Intermediate Liquidity bucket to cover potential intervention requirements over a one-year period and the Stable Liquidity bucket for such funds with the lowest probability of being used over a one-year period.

379. As the higher return objectives for the new liquidity buckets implied additional risks, the central bank committed resources for the enhancement of its risk control capabilities and delegated the management of the Stable Liquidity bucket to specialized asset managers.

380. A more detailed description of the criteria used by the BR to determine the size of each liquidity bucket, its liquidity policies, its investment guidelines, and its risk management capabilities is provided later in this chapter.

### *Scope*

381. The scope of reserve management is limited to those assets denominated in convertible currencies that are readily available and are under the

<sup>25</sup>In 1991, the central bank defined target zones within which the market determined the exchange rate, at first through the issuance of exchange certificates until 1994.

<sup>26</sup>Bussiere, Matthieu, and Christian Mulder, 1999, "External Vulnerability in Emerging Market Economies: How High Liquidity Can Offset Weak Fundamentals and the Effects of Contagion," IMF Working Paper 99/88.

<sup>27</sup>The Economic Research Department, using the Hodrick-Prescott methodology, estimated long-term component of the current account and volatility.

control of the central bank to meet its objectives, including claims in the derivatives market used to hedge currency and interest rate exposures. The BR also manages the liabilities it acquires for the sole purpose of supporting the liquidity of reserves. However, it does not manage the liabilities of the central government, which are under the control of the Ministry of Finance (MOF).

### ***Coordination and strategy***

382. The key elements that influence current reserve management policy are the country's transition to a free float exchange system, characterized by a rapid process of deregulation in its exchange/capital controls, and its increasing dependency on the international capital markets for financing. The maintenance of a high level of foreign exchange reserves in order to reduce the impact on the country of contagion is also deemed to be a very important element in setting reserve management policy.

383. The BR does not use the purchase or sale of reserve assets against domestic currency as an instrument of monetary policy. It determines the value of reserves in accordance with the desired reserve adequacy level, for which monetary effects that are derived from changes in the level of reserves are sterilized, if necessary through open market operations, in order to keep the monetary base within the ranges defined by the BR's Board of Governors.

384. On exchange rate policy, the central bank is committed not to influence the exchange rate, unless it is to maintain an orderly market in extreme volatility conditions for which it auctions volatility options to the market whenever the exchange rate is above or below 4 percent of its 20-day moving average. The BR at its discretion may also tender options to accumulate or sell reserves to adjust its reserve adequacy objectives. Any changes in the policy of intervention trigger a review of the central bank's liquidity and investment policies.

385. On the fiscal front, there is no clear link between reserve management and debt management as each pursues different investment objectives. Nevertheless, at a macro level there is a close coordination between the MOF and the central

bank Board of Governors in order to ensure the sustainability of fiscal policy and the maintenance of adequate liquidity levels.

### **Transparency and accountability**

386. The BR's mandate that supports its management of the country's foreign exchange reserves is defined in the political constitution of Colombia and in Law 31 of 1992.

387. Chapter 6, Article 371, of the political constitution of Colombia determines that the central bank "...will be organized as a public legal body with administrative, patrimonial and technical autonomy, subject to its own legal regime." Among the functions that the Constitution assigns to the central bank is the administration of the foreign exchange reserves and the requirement that it should inform Congress periodically on the performance of its different responsibilities, including reserve management.

388. Law 31 of 1992 Chapter IV further elaborates on the mandate the central bank has in the management of the foreign exchange reserves in the following way: "The Board of Directors of Banco de la República will administer the foreign exchange reserves in conformity with public interest, to benefit the national economy and with the objective of facilitating the external payments of the country. Its administration involves the management, investment, custody and disposition of reserve assets. Reserve assets will be invested subject to criteria of security, liquidity and return in assets denominated in freely convertible currencies or gold." Furthermore, the Law permits the BR to set up capital subscriptions with international multilateral institutions, so long as such subscriptions can also be considered reserve assets; it cannot grant loans on account of the international reserves; it is allowed to open margin accounts to enable it to execute operations in the derivatives markets for hedging purposes; and it allows it to contract credits to support the balance of payments as long as the product does not affect the monetary base. The law establishes the immunity of the foreign exchange reserves against seizure.

389. Insofar as the IMF Code of Good Practices on Transparency in Monetary and Financial

Policies section 2.1 refers to operations of the central bank in the domestic markets, the BR has defined rules and procedures for the implementation of its monetary and exchange rate policy. These rules and procedures clearly define the conditions, obligations, and rights a counterparty should meet in order to participate in open market and foreign exchange operations with the central bank. The rules and procedures are publicly disclosed in regulation that is easily accessible to the public, for example, at the BR's website.

390. For the management of the foreign exchange reserves, in which the BR does not act as a market maker, it selects its trading counterparties through internal formal processes of selection where the relevant criteria are established at the highest levels of decision-making hierarchy depending on the type of service required, restricted to counterparties that are members of well-established trading associations such as the Bond Market Association (BMA), the International Securities Market Association (ISMA), or the Commodities Futures Trading Commission (CFTC). In certain cases, standard legal contracts are entered into with counterparties to strengthen the procedures of trading in addition to market practices established by the relevant trading association.

391. The BR is fully compliant with the Special Data Dissemination Standard (SDDS), and its associated data template on international reserves and foreign currency liquidity position, which is published according to specified schedules. Additional information on foreign exchange reserves is disclosed to the public on a preannounced schedule through the central bank's website as follows:

- Position and foreign exchange liquidity on a weekly basis.
- Monthly and quarterly audited accounting balances are delivered to the Superintendency of Banks and the General Public Accounting Office of Colombia. At the beginning of every year, the annual balance sheet as of December 31 of the previous year is published in a widely distributed national financial newspaper.

392. The semiannual report to the Congress provides an overview of the Central Bank's activi-

ties and includes a summary of the level, composition, investment criteria, and performance on reserve management during the previous period.

### **Auditing**

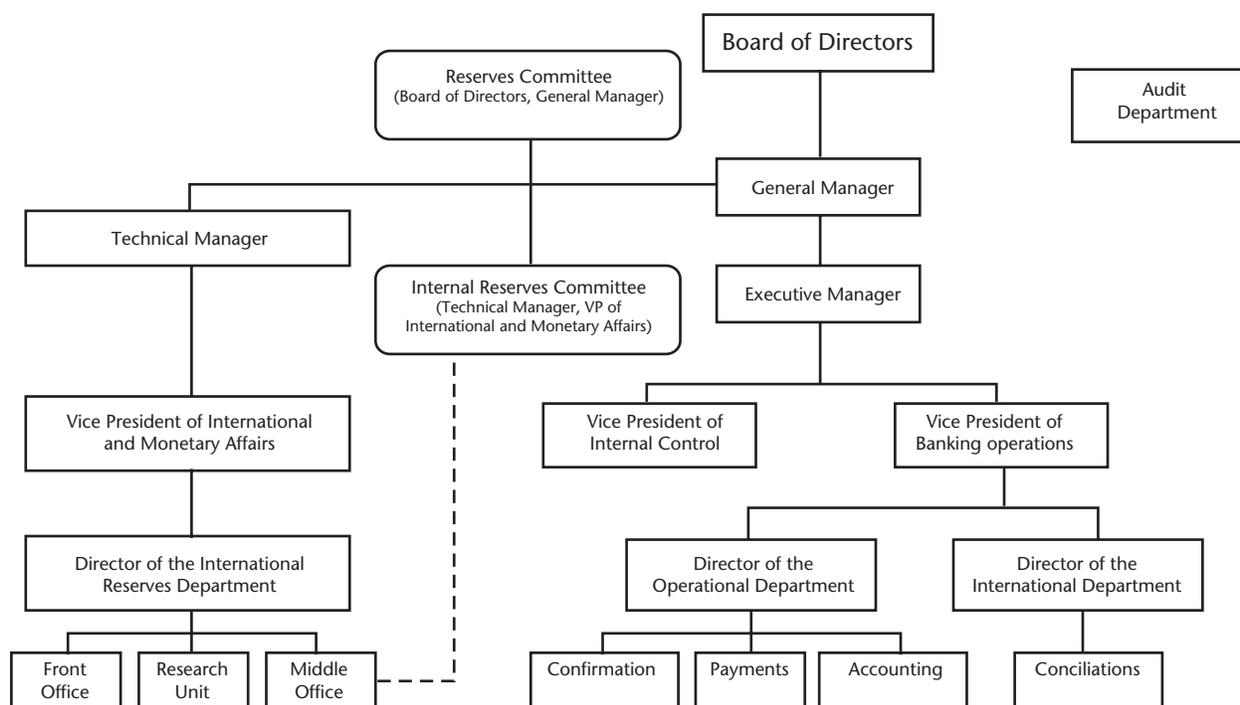
393. The political constitution of Colombia establishes that the President of the Republic exercises the control of the central bank. Law 31 of 1992 establishes that the President delegates the function of control of the central bank to an external auditor, appointed by him, for the purpose of "certifying the Bank's financial statements, comply with the functions that the code of Commerce of Colombia assigns to the agent responsible for fiscal supervision, and exercise the control over the activities and performance of the entity," including its management of the foreign exchange reserves. As such, the auditing process has an autonomous budget from any other department within the BR and is conducted by an auditor who is independent of the central bank.

394. The auditor's notes on the central bank's financial statements, which constitute the end result of its functions, include commentaries on the management and performance of the international reserves that are publicly available at the Bank's website and widely disseminated through national newspapers. The auditor certifies that the accounting of reserve assets is conducted in conformity with accounting principles determined by the Superintendency of Banks of Colombia and presents quarterly evaluations on the different aspects of the management of the foreign exchange reserves to the President, the Superintendency of Banks, and the Board of Governors.

395. This year, apart from the external auditor appointed by the President of Colombia, the BR engaged the services of an international auditing firm, Deloitte & Touche, to audit its financial statements.

### **Accounting**

396. The accounting procedures for reserve management follow the guidelines set by the Financial Accounting Standards Board (FASB), insofar that they are not in conflict with the

**Figure 5. Organizational Structure**

accounting regulations of the Superintendency of Banks of Colombia.<sup>28</sup> The reserve's portfolio is marked to market on a daily basis, with the P/L affected by both realized and unrealized profits and losses. However, it must be highlighted that there are distinctive characteristics to the distribution of P/L results over a financial year. In the case of profits due to interest rate exposure, including hedging, these are distributed to the government within the first three months after the end of each financial year. Profits on the foreign exchange exposure to non-U.S. currencies in terms of the U.S. dollar may be registered in a special reserve to cover future losses. Finally, the results of the valuation of the reserves in local currency terms do not

affect the P/L but are reflected in changes in equity in the balance sheet of the institution.

## Institutional framework

### *Legal foundation*

397. As mentioned earlier, the BR's mandate to manage the international foreign exchange reserve of the country is established in the political constitution of Colombia and Law 31 of 1992.

### *Internal governance*

398. The organizational structure of reserve management is described in Figure 5.

399. The Reserves Committee and the Internal Reserves Committee were created by an internal resolution approved by the Board of Directors that establishes the objectives, functions, and responsibilities of each Committee, updated last year in accordance with the recommendations contained

<sup>28</sup>The main difference between FASB rules and the Colombian Superintendency of Banks has to do with the procedure involved with the valuation of derivative products, resulting in marginal differences.

in the “Guidelines for Foreign Exchange Reserve Management” approved by the Executive Board of the IMF in September 2001.

400. The Reserves Committee meets every two months, and is presided over by the Governor of the central bank and integrated by the Board of Directors. It is responsible for the determination of the objectives, principles, and general policies for reserve management.

401. The Internal Reserves Committee was created last year in order to define the operational procedures for reserve management, in accordance with the objectives, principles, and general policies determined by the Reserves Committee. It meets monthly, and it is presided over by the Technical Manager of the central bank (not a member of the Board of Directors) and integrated by the Executive Vice President of the Monetary Affairs and Foreign Reserves Department and the Director of the Reserves Department.

402. The Director of the Reserves Department is responsible for ensuring that the investment policies set by both the Reserves Committee and the Internal Reserves Committee are observed. Within the Reserves Department, the front office is responsible for the trades of the portfolio managed internally. The middle office is in charge of compliance, risk management, and performance attribution for both the internally and externally managed portfolios, reporting directly to the Internal Reserves Committee to guarantee transparency and independence. A Research Unit was created to support the Department’s training, development, and research requirements.

403. The Operational Department is in charge of accounting, confirmation, and settlement of operations carried out by the Reserves Department in a highly automated environment. Additionally, it keeps track of operational issues with the custodians, counterparties, correspondent banks, and asset managers. Reserve assets are reconciled on a daily basis by a separate Department.

404. The Internal Control Department was created in accordance with Law 87 of 1993, by which the procedures that regulate the exercise of internal controls of public entities were stipulated, in order to evaluate independently from the areas in charge of implementing reserve management pol-

icy, their procedures, and practices on a recurrent basis.

### *Human resource policy*

405. The Bank’s human resource management strategy includes specialized selection, training, remuneration, evaluation, and promotion policies. Selection of the staff involves recruiting the top 10 percent of graduates in different disciplines from the top-tier universities in the country, out of which personnel are selected on the basis of an evaluation process that includes their level of technical expertise, their proficiency in English/computer skills, and an evaluation of their personal characteristics.

406. The training program is structured in three levels, as described in Table 4.

407. In order to reduce the risk of staff’s rotation, a special remuneration scheme is used based on the HAY GROUP methodology. Under this system a salary/benefit curve is established for the bank based on a comparison with that of its peer group within the country for each area.<sup>29</sup> Each position is evaluated and graded according to the required know-how, responsibility, and problem-solving skills, for which the attainment of each level of CFA by the employee is crucial in order to establish the salary and benefits within the Bank’s overall salary curve.

408. In 1999, a five-year human resource management plan was deployed with the support of external specialized consultants. This plan included the definition of technical and personal competencies required for the bank’s employees, annual performance indicators, and development plans to promote these competencies. The Reserves Department uses this framework to determine the different types of training and salary base for employees with basic, intermediate, and advanced proficiency levels.

409. All employees are subject to both Colombia’s Disciplinary Code for public servants established by Law 200 of 1995 (later modified by

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<sup>29</sup>After five years the employee receives a salary increase that gradually reaches a level equivalent to 20 percent of the average salary paid by the industry.

**Table 4. Training Programs**

Level	Objectives and Activities
Basic	Learning specific procedures/manuals of the area and an overall knowledge of the Bank, reserve management theory, and basic financial and economic concepts.
Intermediate	Sponsorship of three levels of Chartered Financial Analyst (CFA) certificates to all front and middle office personnel (as of this year, replacing the ISMA General Certification Program). Internships with external managers. Management skills programs are given to senior members of the group to ensure the continuity of the department's development.
Advanced	This level includes the sponsorship of postgraduate studies at top international universities in fields such as financial engineering, international economics, and business administration, with a strong emphasis in finance; this step implies a long-term commitment between the employee and the Bank.

Law 734 of 2000) and the Bank's general code of employment conditions that establishes their rights and obligations, including the appropriate code of conduct that every employee must observe. Employees of the Reserves Department are also subject to a special internal code of conduct that concerns the nature of the operations on reserve management. The institution that regulates Public Service in Colombia requires that every year, all employees declare their assets and liabilities for the period.

## Establishing a Capacity to Assess and Manage Risk

### Risk management

410. The overall framework for risk management at the BR seeks to enable it to comply with its reserve management objective at all times; that is, to ensure that an adequate level of foreign exchange reserves is maintained readily available to meet intervention requirements in the most efficient manner. It must be highlighted, however, that some of the policies described below are in a transition phase due to be fully implemented at the end of this year.

### Liquidity risk

411. The financial risk management framework of the central bank is based initially on the

assessment of its liquidity requirements that are determined largely by the fact that under a floating exchange rate regime the probability of recurrent intervention has fallen and, at the same time, the level of reserve adequacy has increased. As such, in order to cover intervention requirements in the most efficient manner, total reserves have been segregated into three liquidity buckets as follows:

- **Working Capital** to cover immediate liquidity requirements, composed mostly of overnight investments at the Federal Reserve Bank. This bucket may fluctuate within a range defined by the Reserves Committee, according to current intervention policy, and is managed internally by the Bank.
- **Intermediate Liquidity Bucket** to cover up to one year's liquidity requirements, which are estimated to be equivalent to the annual volatility of historical percentage changes in foreign exchange reserves with a 99 percent confidence level.<sup>30</sup> These funds are managed internally by the BR under an indexation

<sup>30</sup>The central bank is at present working on a dynamic stress test model for the balance of payments in order to determine more precisely its liquidity requirements over a one-year period. Under the current procedure liquidity requirements over a one-year period may be overestimated given that the historical volatility of the reserves reflects the prolonged period in which the country was under a crawling peg and a managed float exchange regime.

mandate to a benchmark that reflects the currency composition of the balance of payments consisting of a combination of money market instruments referenced to LIBID and highly liquid government bonds with a modified duration of 1.45 years. As such, its main source of added value over the Working Capital is its higher exposure to short-term credit risk, duration exposure, and currency diversification.

- **Stable Liquidity Bucket**, composed of the excess of reserves over the value of the first two buckets, which by definition have the lowest probability of being used for intervention purposes over a one-year period. At a benchmark level these funds reflect the currency composition of the balance of payments, invested in a combination of money market instruments referenced to LIBID and highly liquid government bonds with a modified duration of 2. Furthermore, this bucket is delegated almost in its entirety to specialized external managers under non-indexation mandates that permit the possibility to invest in a range of nongovernment asset classes, credit risk, non-benchmark currencies, and active duration strategies.

412. The rationale behind the construction of such liquidity buckets is to allow the central bank sufficient time to liquidate the Stable Liquidity Bucket to cover unexpected intervention requirements under extreme market conditions, in order to minimize the risk of either assuming higher than normal transactions costs in liquidating less-liquid nongovernment asset classes or being unable to meet such needs in a timely manner. As such, a formal liquidity policy was devised in order to reduce further this risk.

413. The value of the Working Capital and the Intermediate Liquidity Bucket together can fluctuate within a sufficiently ample range (the equivalent of the historical volatility of reserves changes with a 90 percent, minimum, and 99 percent, maximum, confidence level) before liquidating the Stable Liquidity Bucket.

- A policy on the use of repos to attend to unexpected liquidity requirements on a

temporary basis when the cost of such arrangements, collateralized by securities traded as “specials,” which are part of the Intermediate Liquidity Bucket, is lower than the cost of liquidating a particular security in the Stable Liquidity Bucket in abnormal market conditions.

- A policy on the use of contingency lines available through multilateral institutions.

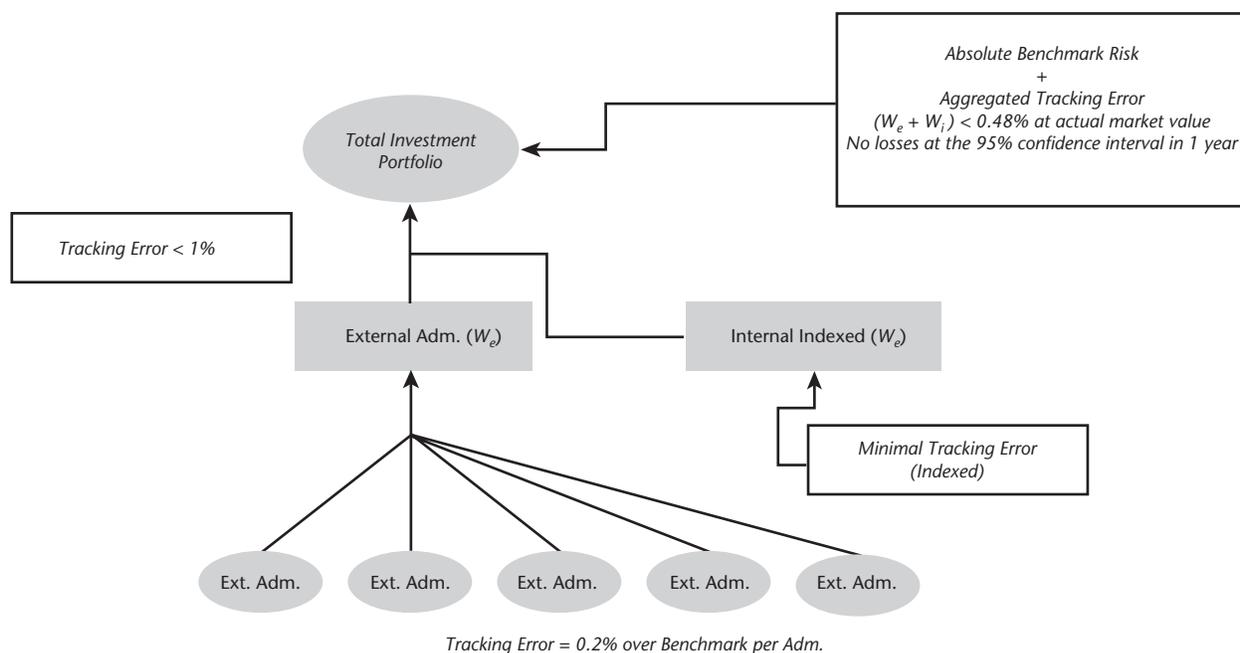
414. Furthermore, periodically the Internal Reserves Committee reviews the liquidity requirements in light of the changes in the intervention policy and/or changes in the underlying assumptions that support the value of each bucket.

415. To determine the investment guidelines and risk management policies of the Intermediate and Stable Liquidity Buckets, the Reserves Committee drew on the international standards and practices documented by the IMF, the Bank for International Settlements (BIS), the Group of Thirty, and the Colombian Superintendency of Banks. As a result, the bank defined a risk management policy framed in a five-step dynamic process: identification, measurement, monitoring, limits/control, and validation, to be fully implemented by December 31, 2002. The overall risk management framework is depicted in Figure 6.

### **Benchmark risk**

416. The benchmark approved by the Reserves Committee represents the most efficient long-term strategy to accomplish the reserve management objectives of the BR for its investment portfolio (both the Intermediate and Stable Liquidity Buckets), constrained to assets with the highest liquidity characteristics. The benchmark embodies the following two objectives:

- The currency composition of the benchmark of the total investment tranche, both the Intermediate and Stable Liquidity Buckets, must reflect the moving average of three years of the currency composition of the outflows of the balance of payments, in order to maintain the capacity of reserves to respond

**Figure 6. Overall Framework for Risk Management**

to external pressures.<sup>31</sup> As such, in order to measure this risk, an in-house model was developed in order to determine the currency composition of the outflows of the balance of payments.

- The interest rate exposure of the benchmark of the total investment tranche, both the Intermediate and Stable Liquidity Buckets, is limited to a 95 percent confidence level that it will not register negative returns in any given year. This limit is set so as not to hinder the desired reserve adequacy level with adverse price movements and/or to expose the central bank to criticism for its handling of reserve management. The exposure of the benchmark to interest rate risk is determined

by its sensitivity to parallel, twist, and curvature changes in the term structure of interest rates for a given modified duration/convexity, using an exponentially time-weighted VaR associated with these factors and a variance-covariance matrix to estimate the correlation between different index components. In addition, historical stress tests are conducted to evaluate the consistency of the model and determine worst-case scenarios.

417. The composition of the benchmark that complies with these two objectives is described later in this chapter. At the end of each financial year the Reserve Committee reviews both the currency composition and interest rate exposure of the benchmark in light of the changes in the underlying assumptions in the models that support these decisions to determine adjustments, if any, in its currency composition and modified duration to comply with these investment objectives over the next financial year. Normally, such adjustments on the total investment tranche are applied to the

<sup>31</sup>Since this is a reserve adequacy objective, a reserve account was created in the balance sheet of the institution composed of the foreign exchange profits resulting from the non-U.S. dollar exposure of the portfolio in terms of the U.S. dollar. In the case of losses this reserve account is used.

Intermediate Liquidity Bucket only, in order not to incur unnecessary transaction costs implicit in the types of assets in which external managers invest the Stable Liquidity Bucket.

### **Portfolio risk**

418. The overall annual tracking error the portfolio managers may take against the benchmark is limited to 0.50 percent of the total value of the investment portfolio (both Intermediate and Stable Buckets). The Intermediate Bucket is managed internally under an indexation mandate to the benchmark, as a result of which its contribution to overall tracking error is minimum. Most of the authorized tracking error is allotted to the Stable Bucket that is managed exclusively by external asset managers. The allowed tracking error, currently around 1 percent available for external managers, is as a result higher than for the overall portfolio, depending on the weight of the Intermediate Bucket with respect to the Stable Bucket at any given moment in time. The Reserves Committee also limits the amount of tracking error allotted to any individual mandate to a tracking error of around 1 percent, so long as it does not exceed 0.125 percent of the value of the total investment portfolio, to ensure manager type diversification.

419. The measurement of the concurrent tracking error of the portfolios is based on a multi-factor model based on two regressions. In the first regression, it determines the exposure of the portfolios with respect to the benchmark to parallel, twist, and curvature changes in the term structure of interest rates. In the second regression, it estimates three additional sources of risk: economic sector risk, issuer credit risk, and prepayment risk. Foreign exchange risk is calculated as a separate component. Overall tracking error is estimated using a variance-covariance matrix.

420. At the beginning of each financial year the Reserves Committee reviews the limits on tracking error in order to maintain a 95 percent confidence level so that in addition to benchmark risk, portfolio risk is not inconsistent with either the currency or the interest rate objectives.

421. In addition to the constraints on tracking error, the Reserves Committee also limits exposure

to the different specific types of risks that can be taken by the portfolio managers as presented in Table 5. The investment guidelines of the portfolio are presented later in this chapter.

### **Operational risk**

422. Operational risk arises from inadequacies, failures, or nonobservance of internal controls and procedures, which threaten the reliability and operation of business systems. The Director of the Reserves Department is responsible for identifying and establishing the controls or procedures to mitigate these risks. In addition, the Internal Control Department and the Audit Department evaluate the procedures to control this risk, and make recommendations in this respect, based on their own independent risk analyses that are supported by international standard methodologies of audit and control like the Committee of Sponsoring Organizations of the Treadway Commission (COSO) and the AS/NZS 4360:1999 (Australian and New Zealand Risk Management Standards).

423. The key operational risks identified in reserves management are the following: fraud risk, dealing risk, settlement risk, custodial risk, financial error or misstatement risk, loss of potential income, information technology risk, contingency events, and legal risk. The Reserves Department and Operations Department rely upon a series of tools to mitigate these risks, of which the most important is a well-established culture of auto-control, where the personnel are aware of the importance of the management of operational risk and are encouraged to verify every task and process. The specific approach to control each of the operational risks is as follows:

424. **Fraud risk:** Frauds or thefts are prevented through strict control of the reserves operations through manuals of procedures, the assignment of key responsibilities according to levels of hierarchy, and an appropriate segregation of duties within the organization.

425. **Information technology risk:** The assessment of this risk responds to the failure of the information systems and guarantees the security and maintenance of critical information. The network infrastructure, distributed in two nodes, uses

Table 5. Decomposition of Portfolio Risk

ID	Measurement	Monitoring/Validation	Limits
Asset class liquidity risk	Qualitative drivers of liquidity Inclusion in global indices	Review of asset classes included in global indices	Eligible asset classes must be part of at least two published global indices
	Market microstructure Heterogeneity of investor's base	Periodic market survey	Eligible asset classes must maintain a broad investor base
	Number of market makers	Periodic market survey	Eligible asset classes must be traded by at least five recognized market makers
	Standardized market practices	Review of trading associations and regulators	Practices must be regulated by at least one recognized entity
	Security-specific structure Outstanding issue size	Average outstanding issue size according to global indices	Minimum issue size of eligible securities is \$500 million; maximum exposure per issue is limited to 10 percent
	Ease of hedge	Existence of future contracts/substitutions	Availability of liquid futures markets or substitute instruments for hedging
	Age	Issue date of each security	Recently issued are preferred
	Quantitative drivers of liquidity Tightness	Periodic surveys to principal market makers for each asset class	Average spread against governments must cover average transaction costs within 4 months
	Average bid/offer spread	Periodic surveys to principal market makers for each asset class	Limits on maximum transaction size according to asset class
	Depth	Recovery time of the performance of eligible assets against government bonds after a crisis	Eligible asset classes' cumulative total return must exceed that of the risk-free asset within six months after a crisis
	Transaction sizes that do not affect bid/offer spreads or market prices	In-house model back-tested for ex post return mismatch	Maximum net key rate duration in each node of underlying and hedging derivative is limited
	Resiliency	Analysis of corresponding index returns—reviewed periodically to check required eligibility criteria	The quantification of degree/type of non-linearity of historical return distribution of index returns for each rating category determines eligibility. Exposure to each eligible credit rating is limited so that the maximum shortfall against government bonds complies with an annual cap of 50 basis points with a 99 percent confidence level.
	Recovery time to normal market conditions after an external shock		
Derivative risk	Estimated VaR resultant of difference in key rate duration of underlying asset and hedging instrument calculated daily to minimize basis risk		
Credit risk	Systematic risk eligibility criteria Historical return/risk profile of representative indices for each rating category against a duration-matched government index		

Systematic risk control Spread duration* historical volatility of spreads at each rating category/ economic sector. Nonsystematic risk Average and worst-case transition matrices/recovery rates coupled with simulations.	Multifactor model, back-tested.	Maximum percentage exposure to each credit rating within each asset class and economic sector.
Issuer risk Issuer selection risk is delegated to external managers with outstanding capabilities for specific issuer credit risk analysis.	Follow-up of transition events informed by international rating agencies and changed in index composition. Review of transition events that affect securities held by each manager.	Maximum percentage limits per issuer based on the minimum number of issuers required to post index returns with a low tracking error under stress scenarios of transition. N.A.
Interest rate risk Duration to parallel (D1), twist (D2), and curvature movements (D3) of the term structure of interest rates* historical volatility of each factor with respect to index. Scenario analysis and historical stress tests are applied.	Multifactor model, back-tested.	Limits to portfolio's effective and spread duration against the index, and maximum exposure to mortgages.
Mortgage risk Effective spread and duration calculated based on a prepayment model.	Prepayment model, back-tested.	Limits to portfolio's effective and spread duration against the index, and maximum exposure to mortgages.
F/X risk Tracking error based on historical volatilities and correlations against benchmark positions. Scenario analyses and stress tests are applied.	Currency risk model, back-tested.	Maximum 5 percent of unhedged currency positions against the benchmark in eligible currencies.

**Table 6. Information Systems**

Application	Platform	Function	Vendor
Bloomberg, Reuters, and Datastream	Workstation NT	Information services for news, prices, exchange rates, and analytics.	Bloomberg Monitor Trading and Thompson Financial
DEALING 2000	Proprietary	Front-end trading system for Forex and time deposit trades.	Monitor Trading
OPICS	Client/server: NT/NT Oracle 8i	Back office application, trade entry system, settlement (SWIFT), credit risk, pricing, cash flows, and accounting.	Frustum
ABACUS	Client/server: NT/W2000 DB2	Performance measurement system.	Wilshire Associates
AXIOM	Client/server: NT/W2000 C-tree	Multifactor risk and performance attribution system, investment guideline compliance, and portfolio analysis.	Wilshire Associates
SWIFT	Client/server: NT/UNIX	Payment system.	SWIFT

a cluster architecture that allows load balancing and redundancy for disaster recovery of the most critical services on just one node. Disaster recovery is possible using online mirroring of data on top of a fiber-optic interconnection. From a security perspective, passwords and access controls are required to access computers and applications, and all data transmissions of sensitive information over the extranet and Internet use regular security features. The portal Servicios Electronicos del Banco de la Republica (SEBRA) handles authentication, encryption, and firewall functions. The management of the international reserves is based on eight principal applications systems that are described in Table 6.

426. **Dealing risk:** OPICS is a straight-through processing system with a single point of entry of trade operations restricted to authorized traders, limited by the system to the type of operations each trader is allowed to enter; limits on transaction size; authorized counterparties; the observance of credit risk limits; and a price tolerance check of the operations to ascertain that trades were transacted at current market levels. Once entered, the system generates a confirmation message of each trade that matches automatically to the trade details of the confirmation received from the counterpart, including a verification of the standard settlement instructions that a counterpart must provide as a

requisite to be allowed to trade with the Bank, after which it generates the appropriate payment instruction via SWIFT.

427. **Settlement risk:** Trading counterparties are reviewed and approved by the Internal Reserves Committee. Standard settlement instructions are required for each counterpart and, in the case of disputes such as late settlement claims, these are conducted based on the laws, rules, and recommendations of ISMA or any other internationally recognized trading association.

428. **Custodial risk:** The prevention of a possible failure by the custodian is done at the selection process, which focuses on selecting professional and globally recognized entities for its custodial operations. Specific requirements include: experience, size (measured by the volume of assets under custody), the maintenance of sound technological resources to carry out its operations, the robustness of its contingency plans, its sub-custodian network, its reporting capabilities, and its management of fail trades. Once the custodian has been selected, its responsibilities are defined in a contract, and its performance is monitored through the daily reconciliation of portfolios with the central bank and external managers.

429. **Financial error or misstatement risk:** The definition of reserve assets or liabilities follows the Balance of Payments methodology from the

International Monetary Fund. All components of reserves must be registered in the balance sheet, and the International Exchange Department calculates the total value of reserves on a daily basis, with the support of the Accounting and Economic Information Departments, to evaluate the consistency of this information.

430. **Loss of potential income:** The control of the ledger accounts of the BR is executed through the Cash Management Systems provided by its correspondents, which control in real time both debits and credits on the account, represent an alternative to SWIFT to execute payments in a contingency, and permit investment of excess funds throughout the day in different overnight alternatives. In addition to the above, the BR is in the process of contracting with its correspondents' overnight repo facilities to generate liquidity collateralized by government bonds as part of its general liquidity policy. The cash flow module in the OPICS processing system is used in addition to the Cash Management System to determine the required balances of the ledger accounts, a process that the Bank intends to automate via an interface between the two systems, and a separate Department from the Reserves Department, which is in charge of the control of treasury operations, conducts daily reconciliation of the ledger accounts using the nostro conciliation system provided by SWIFT.

431. **Contingency events:** Based on the methodology documented by the Disaster Recovery Institute International, the Reserves and the IT Department have established contingency plans to guarantee the continuity of reserves operations at different levels of contingency. Important aspects of the contingency plan include a daily backup system with an updated copy of all vital information and an off-site contingency location that fulfills all trading and system requirements.

432. **Legal risk:** The management of legal risk is under the responsibility of the Reserves Department and the Legal Department of the BR, with the support of an external advisory firm. The process focuses on the administration of contracts and legal documents associated with the reserves operations; that is, external management, securities lending, futures trading, custody, etc. These contracts specify each party's right and obligations,

fees, investment guidelines, warranties, the sovereign immunity of the reserves, and the applicable legislation and jurisdiction. They also involve the establishment of new contracts, as well as the maintenance of the current contracts in accordance with the central bank's internal regulations and international market regulations.

### External management program

433. The objective of the external management program is to add value to the benchmark through the specialized management of risks that the Bank cannot manage internally. The framework for the external asset management program includes:

- Program size: The Stable Investment Bucket is allocated to external managers, with the exception of a small portfolio managed internally under a non-indexation mandate.
- Tracking error: 0.50 percent of the value of the total investment portfolio (which equates currently to 1 percent of the value of the Stable Liquidity Bucket), of which 0.125 percent can be allocated to one single external manager to ensure manager type diversification (currently around 1 percent per mandate).
- Benchmark and investment guidelines: The total program shares the benchmark and investment guidelines described in Section D.
- Types of managers: Manager diversification is promoted through the selection of global managers and U.S. sector rotation managers, with appropriate benchmarks and specialized investment guidelines for each that together reflect the overall desired exposure to the different specific types of risk.
- Selection process: The selection of the managers is based on a Request for Proposal (RFP) that evaluates the company, organization, investment philosophy, historical performance, risk management capabilities, back-office processes/reporting, and additional services provided, such as research facilities. Finalists in the RFP process are vis-

ited on-site and asked to provide an economic offer.

- **Fee structure:** A performance fee structure based on percentages of the normal fixed fee charged by each manager for a given market value of the mandate, tailored in such a manner that at the expected long-term excess return of each type of mandate (Global or U.S. Asset Rotation) the normal fixed fee and the performance fee are equal.
- **Performance evaluation:** A three-year horizon is used to measure the performance of each mandate.

434. Managers for each mandate are classified as outstanding when excess return is above the long-term expected average, acceptable when it is in a range between the normal fixed fee of the manager and the long-term expected average, and low when performance is below the normal fixed fee.

435. Each category is reclassified according to the information ratio obtained by each manager.

436. Guideline compliance and operative errors are also evaluated in terms of both the numbers of errors and potential cost.

437. On the basis of this evaluation the Reserves Committee adjusts the mandates of external managers. The Internal Reserves Committee reviews the performance of the asset managers on a monthly basis, as well as any breaches of the guidelines or operative errors. The middle office in the Reserves Department is responsible for the day-to-day control of the asset managers who have to report their operations daily to both the OPICS processing system for accounting purposes and Axiom for risk, performance, and compliance control.

### Performance measurement and attribution

438. Performance measurement is based on a daily mark-to-market valuation of the portfolios calculated by the Abacus system from Wilshire Associates Inc., which complies with the AIMR (Association for Investment Management and Research) and GIPS (Global Investment Performance Standards). A daily time-weighted rate of return that is geometrically linked is used to calculate a monthly figure. Performance is measured for

time horizons such as monthly, year to date, yearly, rolling three years, and since inception, using U.S. dollars as the base currency. This is applied to both the benchmark and the portfolios and therefore returns can be measured on an absolute and a relative basis. Both gross and net returns are calculated for the portfolios, deducting operating costs such as fees, custody, and administrative expenses. In addition, risk-adjusted returns are also calculated through the use of the following measures:<sup>32</sup>

- The information ratio that measures average excess return over the benchmark per unit of observed risk. This indicator evaluates the efficiency with which the managers have utilized risk.
- The risk ratio that measures average excess return over the benchmark per unit of tracking error ex ante. This indicator evaluates the success of managers' use of allowed tracking error.
- The efficiency ratio measures the consistency of the risk models used by the managers by comparing observed tracking error with ex ante tracking error.

439. Attribution analysis is performed by Axiom using its multifactor model for each of the risk factors at the following levels: security, asset classes, countries, currencies, portfolio, and composites. This model offers an attribution measurement that goes beyond the traditional approach<sup>33</sup> since it allows an integrated analysis of return and risk factors, which determines the efficiency of the overall investment strategy.

### The role of efficient markets

440. As explained later in this chapter, the BR is extremely sensitive to liquidity risk. On the one hand, it constrains its reserve management activities to markets that have sufficient liquidity as measured through qualitative and quantitative factors

<sup>32</sup>These risk-adjusted measures are implemented following the RiskMetrics methodology.

<sup>33</sup>The Brinson-Fachler model measures attribution in terms of asset allocation, security selection, and an interaction effect.

that determine the quality of the liquidity of a particular market, factors that are reviewed periodically. Furthermore, the central bank sets limits on its exposure to a specific market, asset class, and individual issuer/issue in accordance with the quality of the liquidity of each investment alternative in order not to affect the relevant market through its own operations. Finally, the BR is also sensitive to trading in abnormal market conditions for which it has set rules to buy time to liquidate less-liquid assets at such times. It also must be highlighted that the central bank delegates to external managers the management of non-government asset classes since they have the necessary capabilities to liquidate them more efficiently in any market environment.

## General Investment Guidelines

### Working Capital

**Reference rate:** Fed funds.

**Size:** Range from US\$390 to US\$750 million.

**Currency denomination:** U.S. dollar-denominated assets.

**Investment guidelines:** Up to \$390 million may be invested in overnight facilities provided by the Federal Reserve Bank of New York, of which up to \$180 million may be invested in the overnight facilities provided by other treasury correspondents. No limit is imposed on U.S. Treasury Bills and Fixbis. A limit of \$80 million each is imposed on money market instruments issued by the World Bank, Fannie Mae, Freddie Mac, and Federal Home Loan Banks.

**Maximum maturity of investments:** Three months.

### Investment portfolio

441. The investment portfolio is segregated into two liquidity buckets: the Intermediate Liquidity Bucket and the Stable Liquidity Bucket.

442. The size of the Intermediate Liquidity Bucket, including investments in Working Capital, can range between \$2,120 million (the volatility of the percentage changes in the foreign exchange reserves with a 90 percent confidence level) and \$4,378 million (the volatility of the percentage

changes in the foreign exchange reserves with a 99 percent confidence level).

443. Excess funds over \$4,378 million may be invested in the Stable Liquidity Bucket.

444. In the case of a reduction in the foreign exchange reserves, the Working Capital Bucket and then the Intermediate Liquidity Bucket will be used until the sum of the two buckets reaches the minimum authorized level. After such level is reached, reserve reductions will be covered proportionally by the Intermediate and Stable Liquidity Buckets. In order to delay further the liquidation of the Stable Liquidity Bucket, repos and contingency lines may be used.

### 1. Aggregate Benchmark

445. The Money Market portion (MM) is referenced to the iMoneyNet First Tier Institutional index and the bond portion is referenced to the Salomon Smith Barney Government bond index weighted by country and sector as described in Table 7. Benchmark weights in each currency must be adjusted over time to reflect the three-year rolling average composition of the outflows of the Balance of Payments of Colombia. The overall average effective duration of the aggregate benchmark (Intermediate and Stable Liquidity Bucket) must be consistent with a 95 percent probability that its exposure to interest rate risk will not register negative returns over any given year.

### 2. Investment Guidelines for the Money Market Portion of the Benchmark (applicable to both Intermediate and Stable Liquidity Buckets)

### 3. Investment Guidelines: Intermediate Liquidity Bucket

446. The objective of the mandate is to replicate the risk/return characteristics of the benchmark of the Intermediate Liquidity Bucket depicted in paragraph 445, with the lowest possible tracking error, following the Investment Guidelines for the Money Market Portion described in Table 8, and matching the composition of the bond portion of the benchmark.

**Table 7. Benchmark Composition**  
(In percent)

Sector	Intermediate Liquidity Bucket			Stable Liquidity Bucket		
	Market			Market		
	USD	EUR	JPY	USD	EUR	JPY
MM	40	0	0	15	0	0
1–5 years	46	11	3	71	11	3
Total	86	11	3	86	11	3

**Table 8. Investment Guidelines for the Money Market Portion of the Benchmark**

Strategy	Guideline
Duration	The maximum weighted average maturity (WAM) of the money market portion of the benchmark is 90 days.
Exchange risk	100% U.S. dollars. Investments are also allowed in the following currencies with their respective currency hedge against U.S. dollars: Canadian dollar, Japanese yen, euro, British pound, Swiss franc, Swedish krona, Danish krone, Norwegian krone, Australian dollar, and New Zealand dollar.
Credit risk	<ul style="list-style-type: none"> <li>• 100% of the value of the money market portion of the benchmark may be invested in U.S. Federal Government explicitly guaranteed assets or in issuers/issues with a minimum credit rating of P–1 by Moody’s Investor Services, A1+/A1 by Standard and Poor’s, and F1 by Fitch Ratings.</li> <li>• At the time of purchase the issuer of an eligible asset or the eligible asset itself must be rated by at least two of the following rating agencies as: P–1 by Moody’s Investor Service, A1+/A–1 by Standard and Poor’s, and F–1 by Fitch Ratings. The ratings by two agencies can be used if and only if the third agency does not issue an opinion about the rating status of the issuer and/or issue. The lowest of the available ratings applied by any of the agencies to an issuer or issue at the time of purchase will prevail over the others. Exception is made for U.S. Government securities.</li> <li>• Downgrades after purchase to P–3/A–3/F–3 by any of the rating agencies mentioned above must be sold within the 10 Trading Days following this event. These rules also apply to downgrades to P–2/A–2/F–2 in excess of 5% of the money market portion of the benchmark.</li> <li>• The maximum non–U.S. Federal Government sector exposure as a percentage of the money market portion of the benchmark is 100% in U.S. agencies, sovereigns in eligible currencies, and supnationals in eligible currencies; 75% in banks; 50% in corporates; and 50% in asset-backed commercial paper (ABCP).</li> <li>• The maximum non–U.S. Federal Government exposure (current face*price/100 as determined on the date of purchase) allowed per issuer as a percentage of the money market portion of the benchmark is 5%. In the case of ABCP, when an entity guarantees more than 10% of an issue, such amount guaranteed must be added to the credit exposure of the entity.</li> <li>• Eligible issuers of corporate/bank debt must have a minimum book equity of \$5 billion.</li> </ul>
Liquidity risk	<ul style="list-style-type: none"> <li>• Any type of negotiable instruments issued by eligible issuers in eligible currencies with a maximum maturity of 397 days.</li> <li>• Investments are also allowed in term deposits with a maximum maturity of 1 month and up to 10% of the value of the money market portion of the benchmark.</li> </ul>

**Table 9. The Benchmark**

Sector	Currency	Weight <sup>1</sup>	Reference
Money Market	U.S. dollar	15%	iMoneyNet First Tier Institutional (gross of fees and taxes).
Bonds	U.S. dollar	85%	1–5 yr. Salomon Smith Barney U.S. Government Bond Index Component of the World Government Bond Index.

<sup>1</sup>These weights are not final and will be adjusted to achieve the relevant effective duration near the date of funding of the account.

#### 4. *Investment Guidelines for the Stable Bucket: U.S. Asset Rotation Mandates*

447. Of the total value of the Stable Liquidity Bucket, 50 percent is allotted to U.S. asset rotation mandates with the following investment guidelines:

##### *Objective*

448. The objective of the mandate is to generate returns over the performance of the benchmark (as described below) in excess of 30 basis points per annum over three-year rolling periods, within a maximum ex ante expected tracking error objective of 100 basis points per annum and in compliance with the investment guidelines set forth below.

##### *Benchmark*

449. The benchmark composition is as presented in Table 9.

##### *Risk limits*

##### (i) Currency risk

The Mandate may invest up to 50 percent in eligible assets (as described below) denominated in eligible currencies provided that they are fully hedged to the U.S. dollar within a tolerance limit of  $\pm 0.25$  percent of the value of the Mandate in unhedged exposure to non-U.S. dollar currencies. The following are the eligible currencies: U.S. dollar, euro, Japanese yen, Swiss franc, British pound, Canadian dollar, Australian dollar, Swedish krona, Danish krone, Norwegian krone, and New Zealand dollar.

##### (ii) Interest rate risk

450. The effective duration of the Mandate may vary in a range between  $\pm 1$  with respect to that of the benchmark; its convexity may not be below

$-1$  in absolute terms and spread duration may not exceed  $\pm 2.85$ .

##### (iii) Money market investment guidelines

- In addition to the investment guidelines described in Section 2 for the Money Market portion of the benchmark, the mandate may invest up to 100 percent of its value in U.S. Federal Government securities and up to 15 percent in First Tier Short-Term Investment Funds (STIF) available with the Custodian.
- The restriction in Section 2 on the maximum WAM of 90 days for the Money Market portion of the benchmark is replaced by the overall restrictions on interest rate risk in Section 2.3.ii applied to the value of the overall mandate.

##### (iv) Bond investment guidelines

- Eligible assets: bonds and debentures without attached options in eligible currencies, bonds, and debentures with embedded options denominated in U.S. dollars only, Fixed-Coupon Mortgage-Backed Pass-Through Securities (MBS) denominated in U.S. dollars only, Asset-Backed Securities (ABS) denominated in U.S. dollars only, collateralized by credit card receivables and auto loans, Collateralized Mortgage Obligations (CMOs) denominated in U.S. dollars only, restricted to first or currently paying tranches of sequential bonds, planned amortization classes (PAC), targeted amortization class bonds (TAC), and floating rate bonds that are not support tranches. Private placements, including 144a securities, are not considered an eligible asset class.

**Table 10. Issuer Limits**

Issuer	Credit Quality	Limit in Percent
United States government	U.S. government	No limit
Sovereign in local currency (includes agencies fully guaranteed)	AAA	35.4
	AA	21.2
	A	10.6
Sovereign in nonlocal currency (includes agencies fully guaranteed)	AAA	4.1
	AA	1.4
	A	0.3
Supranationals	AAA	2.0
	AA	0.7
	A	0.1
U.S. agencies without explicit guarantee—GSEs	Federal Home Loan Banks	10.6
	Fannie Mae	5.3
	Freddie Mac	3.5
U.S. agencies explicitly guaranteed	Ginnie Mae	44.7
U.S. corporates	AAA	0.8
	AA	0.8
	A	0.2
U.S. dollar-denominated ABS (restriction per individual program)	AAA	0.8

- Eligible investments must have a debt seniority of guaranteed, Senior secured, or Senior.
- At the time of purchase the issuer of an eligible asset or the eligible asset itself must be rated by at least two of the following rating agencies as: A3 by Moody's Investor Service, A- by Standard and Poor's, and A3 by Fitch Ratings. The ratings by two agencies can be used if and only if the third agency does not issue an opinion about the rating status of the issuer and/or issue. The lowest of the available ratings applied by any of the agencies to an issuer or issue at the time of purchase will prevail over the others. Exception is made for U.S. Government securities.
- In the case of a downgrade after purchase below the minimum acceptable level by any of the rating agencies mentioned above, the investment must be sold within ten trading days following this event.
- Sector limits as a percentage of the total value of the mandate: 100 percent in U.S.

Federal Government securities, 100 percent in Sovereign securities issued in local eligible currencies, including fully guaranteed agencies, 8.2 percent in Sovereign/Supranational securities issued in non-local eligible currencies, including fully guaranteed agencies of which 4.1 percent may be invested in Supranationals, 11 percent in U.S. Agencies without explicit guarantee from the U.S. Federal Government, 45 percent in Ginnie Mae, 8.2 percent in U.S. corporates, and 8.2 percent in U.S. Asset-Backed Securities guaranteed by credit card receivables and auto loans. Sector limits described in this section are exclusive of the sector limits described in Section 2 for the Money Market.

- Issuer limits as a percentage of the total value of the mandate ( $\text{Current Face} \times \text{price} / 100$  as determined on the date of purchase) are presented in Table 10.
- Investments must have a minimum issue size of \$500 million in accordance with the index

**Table 11. Noneligible Offshore Financial Centers**

Africa	Middle East	Western Hemisphere	Asia and the Pacific	Europe
Seychelles	Bahrain	Anguilla Antigua and Barbuda Aruba Belize Bermuda British Virgin Islands Cayman Islands Dominica Grenada Montserrat Netherlands Antilles Panama St. Kitts and Nevis St. Lucia St. Vincent and the Grenadines The Bahamas Turks and Caicos Islands	Cook Islands Macao SAR Malaysia (Labuan) Marshall Islands Nauru Niue Palau Samoa Vanuatu	Andorra Cyprus Gibraltar Guernsey Isle of Man Jersey Liechtenstein Monaco

inclusion criterion established by the Salomon Smith Barney indices, with the exception of MBS, CMOs, and ABS, where this limit does not apply.

- The maximum holding of any specific issue is restricted to 10 percent of the issue size of any security, with the exception of MBS, CMOs, and ABS, where this limit does not apply.
- (v) Investment guidelines for instruments with embedded options
- The mandate may invest in assets with embedded options other than MBS or its derivatives and ABS up to 8 percent of the total value of the mandate. This provision does not apply to Treasury Inflation Protected Securities (TIPS).
  - For MBS a limit is set at 45 percent of the market value of the mandate, of which 7.5 percent can be allocated to eligible CMOs. For CMOs the notional amount of any security purchased will be added to the exposure of the issuer of the security, not to the exposure of the issuer of the underlying asset, and they are to be issued and collateralized by an eligible GSE.

- For Asset-Backed Securities, the limit is set at 8.2 percent of the market value of the mandate.

#### *Other restrictions*

##### (i) Restriction on eligible financial markets

451. Eligible issuers may not be located in the offshore financial markets described in Table 11.

##### (ii) Restrictions on managers

452. Managers may not invest in securities issued by themselves, their parent company, or any of their affiliates (or any special-purpose subsidiary for which they serve as incorporator, manager, or trustee, or in which they are an investor).

#### *Derivatives*

##### (i) Over-the-counter (OTC) currency forwards

- Foreign exchange forward transactions can be executed for hedging purposes only.
- The maximum maturity of foreign exchange forward transactions cannot exceed four (4) months as from the date of transaction.
- Eligible counterparties for forward and spot foreign exchange transactions must have a minimum credit rating of A-1 by Standard &

**Table 12. Eligible Exchanges and Futures Contracts**

Exchange	Contract
Chicago Board of Trade	U.S. treasury bond; U.S. 10-year treasury note; U.S. 5-year treasury note; U.S. 2-year treasury note; 5-year and 10-year interest rate swap futures contracts
Chicago Mercantile Exchange	Eurodollar
Eurex	Schatz; Bobl and Bund contracts
London Financial Futures and Options Exchange	Euribor Long Gilt
Tokyo Stock Exchange	JGBs
Bourse de Montréal	Canadian government bond
Stockholmsbörsen	Swedish government bond
Sydney Futures Exchange	Australian government bond; New Zealand government bond
Københavns Fondsbørs	Danish government bond

Poor's, P-1 by Moody's Investor Service, and F-1 by Fitch IBCA by at least two of these agencies.

- If any eligible counterparty with which there is an open position is downgraded below the minimum permitted credit rating by any of the credit agencies, the position must be closed with such counterparty during the ten (10) trading days following such event so long as the Adviser maintains an enforceable netting agreement with such counterparty.
- The net exposure in open foreign exchange forward and spot operations with any eligible counterparty cannot exceed 10 percent of the value of the mandate at any given moment of time.
- The maximum amount of foreign exchange operations to be settled on the same date with any eligible counterparty cannot exceed 5 percent of the value of the mandate. For counterparties with which the manager does not have an enforceable netting agreement in place, the limit shall be 2.5 percent.
- The notional amount of all open foreign exchange forward operations may not exceed 50 percent of the value of the mandate.

(ii) MBS to-be-announced (TBA) trades

- TBA trades are authorized restricted to a settlement date not exceeding three months from trade date.
- The underlying pools for TBA trades must come from an eligible MBS.

(iii) Exchange-traded futures contracts

- The futures contracts and corresponding exchanges that are shown in Table 12 are authorized:
- The maximum expiration or delivery date of any contract cannot exceed six (6) months from trade date.
- Eligible counterparties for futures contracts: broker-dealers designated as futures commission merchants by an appropriately designated self-regulatory organization or government body as required by applicable laws and regulations. Eligible broker-dealers must be members of the clearinghouses associated with the following exchanges: Chicago Board of Trade, Chicago Mercantile Exchange, Eurex, and London Financial Futures and Options Exchange.

**Table 13. The Benchmark**

Sector	Currency	Weight	Reference
Money Market	USD	15%	iMoneyNet First Tier Institutional (gross of fees and taxes)
Bonds	USD	57%	1–5 yr. Salomon Smith Barney U.S. Government Bond Index
	EUR	22%	1–5 yr. Salomon Smith Barney German Government Bond Index
	JPY	6%	1–5 yr. Salomon Smith Barney Japanese Government Bond Index

## (iv) Restrictions on leverage

453. The notional amount of all long futures and MBS TBA positions shall not exceed the market value of all assets with a final maturity of less than 397 days.

### 5. Investment Guidelines for the Stable Liquidity Bucket: Global Mandates

454. Of the total value of the Stable Liquidity Bucket, 50 percent is allotted to global mandates with the following investment guidelines:

#### Objective

455. The objective of the mandate is to generate returns over the performance of the benchmark in excess of 30 basis points per annum over three-year rolling periods, within a maximum ex ante expected tracking error objective of 100 basis points per annum and in compliance with the investment guidelines set forth below.

#### The benchmark

456. The benchmark composition is as presented in Table 13.

#### Risk limits

## (i) Currency risk

- The mandate may invest up to 50 percent of the value of the account in eligible assets (as described below) denominated in eligible currencies, in addition to the eligible assets of the benchmark, provided that they are fully hedged in such a way that the account

maintains the currency composition of the benchmark. The following are the eligible currencies: U.S. dollar, euro, Japanese yen, Swiss franc, British pound, Canadian dollar, Australian dollar, Swedish krona, Danish krone, Norwegian krone, and New Zealand dollar.

- The mandate may deviate up to  $\pm 10$  percent in unhedged currency exposure in any of the eligible currencies with respect to its participation in the benchmark, subject to the constraint that the maximum aggregate currency exposure is 10 percent of the value of the portfolio. The aggregate currency exposure shall be calculated as the sum of all net long positions in each individual eligible currency against the benchmark.

## (ii) Interest rate risk

457. The effective duration of the mandate may be in a range between  $\pm 1$  with respect to that of the benchmark.

## (iii) Money market investment guidelines

- In addition to the investment guidelines described in Section 2 for the Money Market portion of the benchmark, the mandate may invest up to 100 percent of its value in U.S. Federal Government securities and up to 15 percent in First Tier Short-Term Investment Funds (STIF) available with the Custodian.
- The restriction in Section 2 on the maximum WAM of 90 days for the Money Market por-

**Table 14. Issuer Limits**

Issuer	Credit Quality	Limit in Percent
United States government	U.S. government	No limit
Sovereign in local currency (includes fully guaranteed agencies)	AAA	35.4
	AA	21.2
	A	10.6
Sovereign in nonlocal currency (includes agencies fully guaranteed)	AAA	17.9
	AA	6.0
	A	1.2
Supranationals	AAA	8.9
	AA	3.0
	A	0.6
U.S. agencies without explicit guarantee—GSEs (Noncallable debentures only)	Federal Home Loan Banks	10.6
	Fannie Mae	5.3
	Freddie Mac	3.5

tion of the benchmark is replaced by the overall restrictions on interest rate risk in Section 4.3.ii applied to the value of the overall mandate.

(iv) Bond investment guidelines

- Bonds and debentures without attached options in eligible currencies. Floating rate notes with a maximum final maturity of five years and a maximum reset period of up to one year. 144a securities, including private placements, are not considered an eligible asset class.
- Eligible investments must have a debt seniority of guaranteed, Senior secured, or Senior.
- At the time of purchase the issuer of an eligible asset or the eligible asset itself must be rated by at least two of the following rating agencies as: A3 by Moody's Investor Service, A- by Standard & Poor's, and A3 by Fitch Ratings. The ratings by two agencies can be used if and only if the third agency does not issue an opinion about the rating status of the issuer and/or issue. The lowest of the available ratings applied by any of the agencies to an issuer or issue at the time of purchase will prevail over the others. Exception to this stipulation is made in the case of U.S. Federal Government securities.
- In the case of a downgrade after purchase below the minimum acceptable level by any

of the rating agencies mentioned above, the Adviser must sell the investment within the 10 trading days following this event.

- Sector limits as a percentage of the total value of the mandate: U.S. Federal Government Securities, 100 percent; Sovereign in eligible local currencies, including fully guaranteed agencies, 100 percent; Sovereign/Supra-national in eligible non-local currencies, 36 percent, of which 18 percent can be invested in Supranationals; U.S. Agencies (GSEs) without explicit guarantee from the U.S. Federal Government, 11 percent.
- Issuer limits as a percentage of the total value of the mandate (current face\*price/100 as determined on the date of purchase) are depicted in Table 14.
- Investments must have a minimum issue size of \$500 million in accordance with the index inclusion criterion established by the Salomon Smith Barney indices.
- Investments in any security may not exceed 10 percent of its issue size.

*Other considerations*

(i) Restrictions on eligible financial markets

458. Eligible issuers may not be located in the following financial offshore centers described in Table 15.

**Table 15. Noneligible Offshore Financial Centers**

Africa	Middle East	Western Hemisphere	Asia and the Pacific	Europe
Seychelles	Bahrain	Anguilla Antigua and Barbuda Aruba Belize Bermuda British Virgin Islands Cayman Islands Dominica Grenada Montserrat Netherlands Antilles Panama St. Kitts and Nevis St. Lucia St. Vincent and the Grenadines The Bahamas Turks and Caicos Islands	Cook Islands Macao SAR Malaysia (Labuan) Marshall Islands Nauru Niue Palau Samoa Vanuatu	Andorra Cyprus Gibraltar Guernsey Isle of Man Jersey Liechtenstein Monaco

## (ii) Restrictions on managers

459. Managers may not invest in securities issued by themselves, their parent company, or any of their affiliates (or any special purpose subsidiary for which they serve as incorporator, manager, or trustee, or in which they are an investor).

*Derivatives*

## (i) Over-the-counter (OTC) currency forwards

- The maximum maturity of foreign exchange forward transactions cannot exceed four (4) months as from the date of transaction.
- Eligible counterparties for forward and spot foreign exchange transactions must have a minimum credit rating of A-1 by Standard & Poor's, P-1 by Moody's Investor Service, and F-1 by Fitch IBCA by at least two of these agencies.
- If any eligible counterparty with which there is an open position is downgraded below the minimum permitted credit rating by any of the credit agencies, the position must be closed with such counterparty during the ten (10) trading days following such event so long as the manager holds an enforceable netting agreement with such counterparty.

- The net exposure in open foreign exchange forward and spot operations with any eligible counterparty cannot exceed 10 percent of the value of the mandate at any given moment of time.
- The maximum amount of foreign exchange operations to be settled on the same date with each eligible counterparty cannot exceed 5 percent of the value of the mandate. For counterparties with which the manager does not have an enforceable Netting Agreement in place, the limit shall be 2.5 percent.
- The notional amount of all open foreign exchange forward operations may not exceed 50 percent of the value of the account.

## (ii) Exchange-traded futures contracts

460. The authorized futures contracts and corresponding exchanges are depicted in Table 16.

- The maximum expiration or delivery date cannot exceed six (6) months from trade date.
- Eligible counterparties for futures contracts: broker-dealers designated as futures commission merchants by an appropriately designated self-regulatory organization or government body as required by applicable laws and

**Table 16. Eligible Exchanges and Futures Contracts**

Exchange	Contract
Chicago Board of Trade	U.S. treasury bond; U.S. 10-year treasury note; U.S. 5-year treasury note; U.S. 2-year treasury note
Chicago Mercantile Exchange	Eurodollar
Eurex	Schatz; Bobl and Bund contracts
London Financial Futures and Exchange Options	Euribor, JGBs and U.S. Treasury contracts Long Gilt
Tokyo Stock Exchange	JGBs
Bourse de Montréal	Canadian government bond
Stockholmsbörsen	Swedish government bond
Sydney Futures Exchange	Australian government bond; New Zealand government bond
Københavns Fondsbørs	Danish government bond

regulations. Eligible broker-dealers must be members of the clearinghouses associated with the following exchanges: Chicago Board of Trade, Chicago Mercantile Exchange, Eurex, and London Financial Futures and Options Exchange.

(iii) Restrictions on leverage

461. The notional amount of all long futures positions shall not exceed the market value of all assets with a final maturity of less than 397 days.

# 7

## Czech Republic

### Developing a Sound Governance and Institutional Framework

#### Reserve management objectives and coordination

462. The functions and objectives of holding reserves determine the reserve management strategy of the Czech National Bank (CNB). There are two main functions of reserves. The first is to serve as a source of liquid funds for meeting known and potential foreign liabilities and obligations of the central bank. In a wider sense, the obligations of the CNB are (i) to meet foreign exchange intervention requirements; (ii) to meet foreign exchange payments of CNB's clients (of which the government is the most dominant one); and (iii) as a "backup" for meeting balance of payments crises. The second function is to serve as a form of national wealth, although it is only the central bank that has access to reserves. Foreign exchange reserves are a by-product of the monetary and exchange rate policy of the central bank. Due to the exchange rate regime and other developments since 1993, foreign exchange inflows are being absorbed into reserves. The foreign exchange inflows in the form of foreign direct investment (FDI) or speculative capital put pressure on the domestic currency, and by reverse interventions, the foreign exchange is accumulated in foreign exchange reserves of the CNB.

463. The general objective of reserve management is to ensure that reserves are positive,

stable, and readily available for use. Positiveness and stability represent the risk limits, and availability for use ensures liquidity. This is a widely defined objective, and more detailed and concrete objectives are defined by the management of CNB depending on the conditions in the markets. However, even clear objectives are not easy to transform into measures of risk management such as investment horizon, duration, or the best currency composition.

464. From the inception of the Czech koruna in 1993 until 1997, it was pegged to a basket of two currencies, namely, the deutschemark and the U.S. dollar. It was easy to define the currency allocation in terms of the basket while at the same time avoid accounting losses. On a daily basis, the central bank bought (rarely sold) hard currencies. Each reserve currency was divided into two portfolios. One was the investment portfolio, which was fixed in size, and the other was the liquidity portfolio, which absorbed all inflows. The risks in each portfolio were managed separately with separate benchmarks primarily for duration and instruments. During the first three years of its existence, the central bank had accumulated substantial reserves with the level increasing by almost nine times. These inflows reduced the overall duration of the reserve to zero, thereby affecting returns when the yield curve was upward sloping. This situation arose because the focus was too much on the individual portfolios

instead of on the entire reserves. There were no automatic procedures that would properly adjust the risk profile of reserves (the overall duration to development of balance of payment). This policy was changed in 1999 and today all the limits are set up first at the overall level, and the limits of individual portfolios are derived from the overall limits. Furthermore, the limits are expressed in relative terms (i.e., their absolute level is a function of the size of reserve) and the future development of reserve size is taken into consideration.

465. It is important to note that except for the central bank's obligations and liabilities, the foreign reserves do not reflect the liabilities of any other entity. Even the central government's position in foreign exchange is treated separately from the position of the central bank. If the government would like to either eliminate or hedge its foreign exchange position it must deal with the CNB. The central bank does not consider the government's foreign exchange position while structuring its reserves. The reason is that it would be hard to differentiate between the position of the central government and positions of other institutions and companies financed from the central budget. For example in the Czech Republic, the government owned a company dealing with gas. The company was buying gas from abroad and distributing it here, meaning that this company's assets were in Czech koruna while its liabilities were in U.S. dollars. This was exactly the opposite of the central bank balance sheet. If the dollar strengthened against the koruna, the central bank booked a profit and the company booked a loss. This loss had to be covered from the central budget. The profit of the central bank is by law transferred to the central budget. Both the central bank and the company have separate budgets and it could happen that both have the same position (if the company decides to hedge its foreign exchange position). The question is whether such a setup is enough to (i) have foreign reserves in the same structure as the company's liabilities, and (ii) allow the company to avoid hedging its liabilities against foreign exchange risk just because the loss is compensated by the central bank's profit. We believed that this is not a manageable situation.

### **Institutional framework**

466. The CNB, since its inception after the fall of the old central planned economy, has performed all the functions, including reserve management. In the Law of the CNB, international reserves management is defined as one of the main activities of the central bank. When carrying out this activity, the CNB acts independently of the government. The reserves are part of the balance sheet of the CNB. However, by the same law, all the property of the CNB, including the reserves, is the state property, which the CNB is mandated to manage. Therefore it is sometimes difficult to point out the legal owner of reserves. The CNB can freely deal with the reserves and the return on reserves is part of the CNB's total performance. The bank's net profit, after appropriation to certain funds, is transferred to the central government budget. The performance report that provides the details of the CNB's profits and losses is submitted every year to the Lower House of the Czech parliament. The above description confirms the central bank's independence from the government and parliament, but also points out that its operations are under certain supervision of the government and Parliament. This kind of supervision creates pressure on providing positive and stable return, indirectly influencing the risk profile of reserves.

467. The CNB Board, which is the highest decision-making level in the CNB, approves the basic strategy of reserve management and the permissible instruments. The strategy is defined by setting the currency allocation and maximum duration, and stipulating rules for credit and operational risk management and rules for portfolio management. The executive director for risk management sets the credit limits and the benchmarks (currency benchmark within 5 percent from the strategic currency allocation). The portfolio managers cannot deviate from the currency benchmark but can deviate from the duration benchmark up to  $\pm 20$  percent only. The portfolio management rules permit deviation from the benchmark on credit quality, that is, investment in securities issued by issuers other than those included in the benchmark. Two separate departments—the Risk Management and Transactions Support Department and the Financial Markets

Department—provide for execution and control of reserves management independently of each other.

### Transparency and accountability

468. The CNB is not required under any regulation, including an internal one, to publish details on reserve management. However, it regularly publishes the level of reserves in the “Statistics” section of its website and, in addition, in response to published standards of the IMF, it decided to change the structure of the published information on reserve management in its Annual Report for 2001. The new structure provides more information on the results achieved in reserve management rather than on the market conditions as was the case until now. The chapter on reserve management now consists of absolute and relative performance and risk profile of reserves, including credit, interest, and currency risks. The CNB subscribes to the SDDS of the IMF and has been publishing its balance sheet since the last decade. Information on the basic structure of reserves and foreign liabilities of the CNB can therefore be accessed.

469. The foreign reserves management as a whole, including results, trading and settlement procedures, control and check systems, information systems, and distribution of responsibility are audited every year as part of the overall external audit of the CNB. The central bank does not carry out special audit of only the reserve management function. The auditor is selected by public tender, its term is five years, and both the CNB Board and the Minister of Finance must approve the selected auditor. The performance of the CNB is not audited by the highest auditing office but, as mentioned above, the performance is submitted to the Parliament. The Parliament can either agree or disagree with the report. If Parliament disagrees with the report, the central bank is requested to provide additional information and data.

### Information systems

470. There are two major information systems in use in the area of reserve management—one for the front office and the other for the back office.

Both the systems have been developed internally. The decision to use internal capacity was made in 1996. Until that time, the portfolio managers, the risk managers, and the settlement staff used PC-based applications such as Excel or Lotus. It was a dilemma to choose between externally and internally built systems. The rationale for choosing the latter was that the CNB did not want to lose the option to incorporate in the future its procedures and methods for dealing, settlement, risk management, and accounting, which it would probably have to do if it chose the external system. Some financial limits also existed and influenced the final decision. Working with an external adviser, the basic content and structure of the system was designed in such a way that it is flexible to future internal changes in terms of organization structure, new products and instruments, new risk methods, changes of the accounting standards, and similar demands. Until now we have been successful in implementing functions like real-time distribution, deal entry, a database of historical prices, and a database of approved instruments. Within the next two years, we plan to implement the position keeping functionality and some of the risk measurement calculations, and connect the front office with the back office system. The advantages of an internal system are that it is flexible and friendly to changes, it is built under a controllable budget, and other aspects like backup or emergency installation are less difficult to do from the operational point of view. It is, however, unclear if these advantages are not offset by the fact that the system is still to be completed and the delay of four years limits the implementation of new risk measurement methods and introduction of new instruments. Because the project is in a very advanced stage, it was agreed that it should be finalized. But the planning and budgeting process and mainly the control of the time schedule and budget are based on the limited capacity of the CNB, which suffers a major handicap in IT projects compared to external and specialized firms.

### Human resources

471. In the field of the human resources, the position of the CNB does not differ a great deal

from other central banks. On the position of portfolio manager, of which we have six positions, 24 men have changed during the last 11 years. A very similar situation exists in the area of risk management, IT support, and open market operation. The limited financial capacity of the CNB to pay competitive salaries has resulted in most of our staff being fresh graduates from universities. We would like to share an interesting and useful experiment that was organized by the CNB together with the World Bank in 1991. Through the public tender, 25 men were selected according to their knowledge of mathematics, statistics, and English. These individuals were offered work in some commercial banks and in the central bank, mostly in treasury areas. They had to undergo a three-year course on financial markets, instruments, and banking; several short seminars; and affiliations in commercial banks abroad. The course was financed by the central bank and the commercial banks. The participants of the course agreed to return the loan, in the event they left the course before completion or if they left the banks they had joined. Currently, many of the successful participants have reached the highest levels of management in the central bank, the commercial banks, and financial institutions in Czech Republic (e.g., vice governor of the CNB, executive director of risk management of the CNB, board member in Komerční banka and GE Capital Bank, etc.).

## **Establishing a Capacity to Assess and Manage Risk**

### **Risk management**

472. The CNB started active reserve management in 1991. At that time bank deposits were the only instrument used for investment. Foreign exchange trading was used as an additional source of return. Risk management was “operated” by both the front office and back office. The back office provided the liquidity structure and the dealers managed liquidity. There also was a book of limits for deposits with approved banks but limits were “impressionistic” rather than based on any strict formula or rule. The interest rate risk, the foreign exchange risk, and the operational risk were not

monitored. The reporting consisted of the gains and losses from foreign exchange trading and did not include mark-to-market valuation of term trades such as forwards. Six dealers and four back office operators performed the entire reserve management function. In 1992, the central bank bought its first security, the U.S. Treasury bill, and thereafter the risk management department was established. The main task of the department was liability management, credit risk management, and benchmarking. With the help of the World Bank and neighboring central banks (the Austrian central bank mainly) the new book of limits was created based on the financial strength of the banks. The formula calculating the limits was a function of the bank’s rating, capital, and assets. The approach is currently more sophisticated and the term of the investment is considered, as a distinction is made between the trading counterpart and the debtor.

### **Benchmarking process**

#### ***Interest rate risk***

473. The benchmarking process started in 1993 with simple benchmarks applied on each of the portfolios. They were combinations of general maturities such as one-week and three-month LIBOR indices for the liquidity portfolios, and two-, three-, and five-year benchmark government notes and bonds for the investment portfolios. The overall duration, calculated ex post, was around 1.5 years in the very beginning, though the rationale for choosing this duration is difficult to find out. This approach was changed in 1999 when the new benchmark representing the entire reserve and two sub-benchmarks for each reserve currency were set up. The benchmark is a composite of a general maturities index for the money market part and the external Merrill Lynch government index for the medium- and longer-term part of the yield curve. The most important fact is that the overall duration is derived from the objectives and targets of reserve management. Duration is established based on the requirement that the portfolio should not record a loss in any three-month period. For setting the target duration, historical time series of yields on the relevant financial mar-

kets are used. In addition to historical data, the methodology for setting duration takes into account the current situation in the financial markets. If short-term interest rates are higher, the higher is the interest rate risk that can be accepted. By historical statistical data, it is proved that by using this approach the benchmark performs better by 5–10 basis points. This type of reset of the benchmark is done quarterly and therefore has marginal impact on transaction costs. It is our experience that neither the internal nor the external (public) benchmark would help to decide what duration and currency composition is ideal.

### **Currency risk**

474. The currency risk was until May 1997 relatively easy to manage. The koruna was fixed to a basket of U.S. dollars and deutschemark, and the currency allocation of reserves was identical to the basket. The U.S. dollar and deutschemark offered the two most liquid markets and absence of yield diversification was compensated by the fact that there was no risk of accounting losses when the reserves were valued in domestic currency. In May 1997, the CNB decided to float the koruna, and the basket as an anchor for reserve currency allocation ceased to exist. The deutschemark was declared as the intervention currency and thus emerged large foreign exchange risk because reserves were in both U.S. dollars and deutschemark whereas the koruna was floating. Taking into consideration, the currency of intervention, benefits of diversification, and the need to operate in liquid and efficient markets, it was decided to hold reserves only in U.S. dollars, deutschemark, and yen and the currency allocation decision was based on the structure of the balance of payments, that is, 65 percent in deutschemark, 30 percent in U.S. dollars and 5 percent in Japanese yen. After three years, due to problems with rating of Japan and its banking system, it was decided to hold reserves in U.S. dollars and euros. The allocation of reserves into these currencies takes into account various factors, an important one being investment diversification. The aim is to attain the most stable income possible given the exchange rate between the reserve currencies. When setting the ratio between the two

currencies in the international reserves, the CNB analyzes the historical time series of the yields on U.S. and European markets and the EUR/US\$ exchange rate. Other factors taken into consideration include the nature of the domestic foreign exchange market, where EUR/CZK is the most important and most traded currency pair. Based on these considerations, the currency composition was set at 73.4 percent for euros and 26.6 percent for U.S. dollars.

### **Credit risk**

475. Credit risk issues can be divided into two groups: issues relating to the selection of the issuers of the financial instruments used for reserves management, and issues relating to the selection of business partners for the execution of reserves management transactions. The sole acceptable issuers are the governments and central banks of OECD countries as well as certain governments and international organizations (e.g., the World Bank) and selected banks from those countries. Moreover, maximum maturity is limited to 10 years for government bonds and 3–6 months for claims on banks (depending on the bank's rating). The credit risk management is based on two sets of limits—one for banks and financial institutions as the CNB's counterparties, and the other for banks and financial institutions as debtors of the CNB. In both the cases, the limits are calculated by using a formula that is a function of rating, capital, and size of assets. The minimum rating of banks as debtors is individual C, long-term A-, and minimum assets of US\$10 billion. Any exception can be made only by the Board of the central bank in writing with a fixed termination.

### **Operational risk**

476. Operational risk control is based on the split between responsibilities for execution and for the benchmarking and settlement at the highest managerial level. There are two departments covering the reserve management, and their executive directors report directly to the board. One is responsible for trading and execution, the second is responsible for risk management, settlement, nostro

accounts management, and for IT support. The data regarding the execution are passed on from the front office to both risk management and the back office. The back office also provides data about the settlements to the risk management. Within the risk management department, all the data are compared and the final position of the bank is created every day. The back office monitors the credit limits before the trades are settled, while the risk management monitors limits at the end of the day. The director of risk management has the right to stop the settlement if unauthorized trades are submitted to the back office. Since the executive directors in charge of execution and control are different, it is difficult to manipulate the results.

### **Experience with external managers**

477. The CNB has had quite a long experience with external managers. The experience has been expensive and rather negative. During the last six years there were six mandates. The first two were signed in 1996. The goals at that time were to test if the internal benchmarks were realistic and to benefit from transfer of know-how. However, the external managers' performance was worse than that of the internal managers and the activity of external managers' was almost five times lower than that of the internal managers. The mandates were, therefore, terminated in 1999. In 2000, another three mandates were signed. This time the target was to test new instruments and ways of foreign exchange risk management. One mandate was supposed to test Pfandbriefs with a maturity of up to five years; the second one U.S. agencies' global notes; and the third one's role was to replicate our benchmark's basket of currencies of 35 percent in U.S. dollars and 65 percent euros and to invest on a hedged basis in 12 other major government markets. All managers ranked among the biggest firms and, except for one (FFTW), all managers were chosen by tender. The same reporting requirements were applied and the amounts under management were around US\$100 million. Even here the experience was negative since all managers had sizable problems with reporting (in one case two CNB experts had to visit the manager and help with the reporting system) and their activity was, in general, much

lower than the activity of the internal managers and therefore know-how transfer was very limited. Finally, the fees paid to the managers were higher than the relative performance. The benefits of having external managers were that it helped build contact with the asset management industry, provided the results of the tests, and confirmed the right approach to reporting. Despite the negative experience, we are preparing another set of mandates that would test for U.S. corporate bond portfolio management, mortgage-backed securities (MBS), and foreign exchange trading. These are the areas of limited capacity of the CNB.

478. The external managers' portfolios are subject to the same performance measurement rules and are used to verify and assess certain procedures that could potentially also be used for internal reserves management. These externally managed portfolios constitute approximately 2.3 percent of the reserves.

### **Operations in efficient markets**

479. The CNB currently invests its reserves in only euro- and U.S. dollar-denominated deposits and government bonds. Almost by definition these markets are considered as the most liquid and efficient. That is why we do not test and analyze the depth of these markets.

480. It is important to note that one of the weak points of reserve management is that the Czech law is different from the international one, mainly the U.S. and the U.K. law, according to which most of the agreements are governed. The difference means that there are not enough lawyers familiar with the international laws and there have been very few events where these two different types of laws have been tested in the court. In the event of some legal dispute, the uncertainty is high.

### **Dilemmas in Reserve Management**

481. Finally, the following is a list of dilemmas that must be solved generally and that the CNB is currently working on. The first dilemma is currency allocation versus the fact that the reserve's biggest foreign exchange risk comes from the defi-

dition of reserves (i.e., the reserves are in currency other than the domestic and accounting currency). The foreign currency risk in a floating exchange rate regime (meaning an unhedgeable position) is so large and hopefully the horizon so long that it is not clear if it makes sense to deal with currency allocation of reserves unless one takes the market view on the reserve currencies' exchange rates against each other.

482. The second dilemma is how to treat the ratings. Once the ratings express the probability of companies to default and once the central bank bases the credit limits on rating, the question is should the central bank differentiate between ratings of the banks and corporates. Why is it that no central bank has a problem with depositing funds in an AA bank, while only a few central banks would purchase AAA corporate debt?

483. The other dilemma is the link between the benchmarks and their traditional functions. The benchmark usually serves as the set of risk constraints expressed in assets that can be bought in the market (portfolio of real bonds, index, etc.). Managing the portfolio against the benchmark can mean the effort to beat the benchmark or the effort to beat the market within the limits. Beating the benchmark means that even a wrong investment decision may be considered in a relative sense as a value addition, even if the "benchmark's" investment performs worse. Beating the market means that the portfolio manager is able to exploit the market opportunity and by definition would perform better than the benchmark. Our external managers tried predicting the yields within certain horizons; they went short or long and took maximum duration positions, while our internal managers focused primarily on replicating the benchmark. The comparison of these two approaches applied on our

benchmarks during the last six years is by far in favor of internal managers. So the question is at what level the asset managers should take the market view—when setting up the benchmark or when managing the portfolio?

484. There is also another dilemma linked to the benchmark. Today it becomes standard to measure the risks by statistical methods. We can either compare the duration of two "portfolios"—where one is the real portfolio and the second is the benchmark—or we can compare two VaRs—where one is the value at risk of the real portfolio and the second is just the limit number meaning how much we are prepared to lose. However, apart from the risk, benchmarks are used for performance measurement despite the fact that the benchmark may not provide the best investment alternative. Therefore one can eliminate the benchmark portfolio for risk measurement purposes and measure the performance against an "ex post" calculated number. The proposal is that every day we can for certain markets and certain instruments (like the U.S. Treasuries market) calculate the best investment opportunity. And this best investment opportunity would be declared as the benchmarked performance for the previous day. To avoid the situation where the benchmark consists of one bond, some minimum holdings would have to be applied. Also, calculating the best investment out of several hundreds of bonds might be technically difficult. Therefore the best investment calculation would be done on a narrow set of bonds (instruments) that would best represent the market moves.

485. If the above methods are put together, the new benchmark would consist of VaR limit and return of the best overnight (alternatively over a certain period) investment alternative and no "benchmark as portfolio" would be needed.

# 8

## Hong Kong SAR

486. This paper discusses the principles and practices of reserve management in the Hong Kong Monetary Authority (HKMA). It further outlines the framework of our risk management system, which helps to achieve our statutory roles and our long-term investment objectives in a risk-controlled manner.

### **Developing a Sound Governance and Institutional Framework**

#### **The Exchange Fund of Hong Kong**

487. Hong Kong's Exchange Fund was established in 1935 by the Currency Ordinance (later renamed the Exchange Fund Ordinance). Since its inception, the Exchange Fund has held the backing to the note issues of Hong Kong. In 1976, the role of the Exchange Fund was expanded. The assets of the Coinage Security Fund, which held the backing for coins issued by the government, and the bulk of foreign currency assets held in the government's General Revenue Account were transferred to the Exchange Fund to enhance its ability to regulate the exchange value of the Hong Kong dollar.

488. On April 1, 1993, the HKMA was established by merging the Office of the Exchange Fund with the Office of the Commissioner of Banking. This was done to ensure that the central banking functions of maintaining monetary and banking

stability can be performed with a higher degree of professionalism and continuity, in the lead-up to 1997 and beyond, to command the confidence of the people of Hong Kong and the international financial community.

#### **Statutory role of the Exchange Fund**

489. The Exchange Fund's statutory role, as defined in the Exchange Fund Ordinance, is primarily to safeguard the exchange value of the currency of Hong Kong. Its functions were extended with the enactment of the Exchange Fund (Amendment) Ordinance of 1992 by introducing a secondary and subsidiary role of promoting the stability and integrity of the monetary and financial systems, and maintaining Hong Kong as an international financial center.

#### **Objectives of reserve management**

490. The investment strategies for the Exchange Fund should at all times be consistent with the objectives of the Exchange Fund. With the primary statutory purpose to safeguard the exchange value of the Hong Kong dollar, coupled with the need to repay the fiscal reserves money deposited with the Fund on demand, there is a need to maintain a high degree of liquidity of the Exchange Fund assets. As the reserves represent a store of value for the future, a secondary objective

is to maintain the long-term purchasing power of these reserve assets. The four key objectives for the management of the Exchange Fund are:

- to preserve capital;
- to ensure that the entire monetary base will be at all times fully backed by highly liquid short-term U.S. dollar-denominated securities;
- to ensure sufficient liquidity for the purpose of maintaining monetary and financial stability; and
- subject to the above, to achieve an investment return that will preserve the long-term purchasing power of the assets.

### **Institutional framework**

491. The authority for the investments held by the Exchange Fund rests with the Financial Secretary, who consults with the Exchange Fund Advisory Committee (EFAC) to establish the long-term strategic investment direction of the Exchange Fund.

492. While the long-term strategic investment strategy is set by the EFAC, the day-to-day management of the Exchange Fund is carried out by the Reserves Management Department of the HKMA. In carrying out its responsibilities, the Reserves Management Department operates under the delegated authority from the Financial Secretary and within investment policy approved by the EFAC.

### **Management of the Exchange Fund**

#### ***Portfolio segregation before October 1998***

493. Prior to October 1998, the HKMA identified three main operational functions of the assets held in the Exchange Fund. The three operational portfolios were:

- a portfolio of assets to act as a *hedge* against the interest-bearing liabilities of the Exchange Fund (i.e., deposit placements from the Hong Kong Government), to ensure that the Exchange Fund can at all times meet all of the claims upon it;

- a portfolio of *liquidity* reserves to be available whenever required to meet market operational needs; and
- an *investment* portfolio to preserve the value of the Exchange Fund for future generations of the people of Hong Kong.

494. The investment management styles for these three portfolios were different. For the hedge portfolio, a mix of money market and fixed income securities denominated mainly in U.S. dollars was held to match the maturity profile of the liabilities. The prime consideration in choosing the investments for this portfolio was the credit standing of the issuers; this was to provide maximum security for the assets and ensure that holders of the Exchange Fund's liabilities (i.e., Exchange Fund Bills and Notes) have the greatest protection and assurance that those liabilities will at all times be honored.

495. For the liquidity tranche, the Exchange Fund held prime liquid U.S. dollar-denominated money market securities. The choice of U.S. dollars is partly because the U.S. dollar remains the base currency for the foreign exchange markets of the world and for the HKMA's market operations, and partly because the U.S. market is the largest and most liquid in the world, enabling a very large sum of funds to be mobilized, if required, without disrupting the global financial market.

496. The investment portfolio was a multicurrency portfolio invested in the major money markets and fixed income markets of the world, with a small holding in foreign equities. The majority of the assets was denominated in U.S. dollars, reflecting the fact that our base currency is linked to the U.S. dollar.

#### ***Portfolio segregation after October 1998***

497. In September 1998, the Monetary Base was redefined to include *Exchange Fund Bills and Notes* in addition to *Certificates of Indebtedness, coins in circulation*, and the *aggregate clearing balance* maintained by banks with the HKMA. In order to enhance the transparency of the operation of the currency board arrangements, a Backing Portfolio was created by designating certain asset and liabil-

**Table 17. Investment Benchmark of the Exchange Fund**

	Investment Benchmark Since 1999	Investment Benchmark Before 1999
Bonds	80%	90%
Equities	20% (Hong Kong: 5%)	10% (Hong Kong: 0%)
Currencies	80% U.S. dollar bloc 15% European bloc 5% Japanese yen	70% U.S. dollar bloc 20% European bloc 10% Japanese yen

ity items in the Exchange Fund as those specifically related to currency board operation.

498. From October 1998 to date, the Exchange Fund is managed in only two distinct portfolios, namely the Backing Portfolio and Investment Portfolio. The Backing Portfolio was established such that the monetary base is at all times fully backed by foreign reserves and that the changes in the aggregate size of the monetary base correspond to the inflows and outflows of funds. Assets in the Backing Portfolio are therefore short-term, highly liquid U.S. dollar-denominated interest-bearing securities to fully back the monetary base.

499. The balance of the assets of the Exchange Fund that constitutes the Investment Portfolio is invested in OECD bond and equity markets to preserve the long-term purchasing power of the Fund's value for future generations of Hong Kong.

### ***Redefining investment benchmark***

500. In 1998, three events led us to conduct, at the end of the year, a major revision of the investment strategy of the Exchange Fund.

- First, the decision was taken to allow the fiscal reserves, from April 1998, to earn a return that is the same as that for the Exchange Fund as a whole.
- Secondly, the HKMA purchased a large amount of Hong Kong stock in August 1998 through market operations.
- Thirdly, the assets of the ex-Land Fund were merged into the Exchange Fund in November 1998.

501. Having regard to the above considerations, a new investment benchmark was constructed for the Exchange Fund in 1999. This investment benchmark has been in use since then. The principles and methodology to construct this investment benchmark are described in further detail in paragraphs 538–542. The new investment benchmark defined in January 1999 and the previous benchmark are presented in Table 17 in simple terms.

502. Over the years, the Exchange Fund has embarked on a greater use of the long-term capital markets by diversifying into new markets and instruments. As shown in Table 18 below, the current strategic investment benchmarks permit the Exchange Fund to invest in greater numbers of bond, equity, and currency markets than previously allowed in 1995.

### **Adequacy of Hong Kong's foreign currency reserves**

503. As of end March 2002, the foreign currency reserve assets stood at US\$110.2 billion, which placed the Hong Kong SAR Government's foreign reserves as the fourth largest in the world after Japan, Mainland China, and Taiwan. These reserve assets represent over seven times the currency in cir-

**Table 18. Permissible Markets for Investment of the Exchange Fund**

	2002	1995
Bond markets	26	19
Equity markets	23	1
Currency markets	21	13

ulation, or 43 percent of Hong Kong dollar M3, one of the highest ratios in the world. Hong Kong's substantial official reserves provide backing for the Hong Kong dollar and offer a valuable—and growing—source of security for future generations.

504. Experience suggests that Hong Kong needs considerably more in foreign reserves than the bare theoretical minimum to maintain currency stability. Despite the fact that we have probably the most robust exchange rate system—by design and as a result of our continuous efforts to strengthen it ever since its establishment in October 1983, it is also true that our exchange rate system, characterized by Currency Board Arrangements, only requires our monetary base, currently at HK\$233 billion, to be fully backed by foreign reserves of about US\$30 billion at an exchange rate of 7.8. It is, however, incorrect to take the view to consider this theoretical minimum as all we need in foreign reserves.

505. The crucial lessons from the Asian financial turmoil in July 1997 and the excessive volatility that rocked the financial markets in 1998 highlighted the importance of strong reserves, prudent management of the Fund, and the critical role of risk management in the investment process.

506. During the initial attack on our currency in October 1997, the robustness of our exchange rate system automatically transferred the pressure on the exchange rate to our interest rates, without the need to use foreign reserves in the Exchange Fund other than those dedicated to backing the monetary base. Reflecting the severity of the currency attack, our overnight interest rate went up for a short while to over 200 percent, and interest rates for long-term money also rose sharply. This caused a lot of pain, to the community and speculators alike.

507. In August 1998, the attack on the currency came again and was many times more severe than in 1997. In that incident, we sold foreign reserves of about US\$10 billion for Hong Kong dollars, in anticipation of the drawdown of fiscal reserves deposited with the Exchange Fund, and relieved some of the pressure on the exchange rate and obviated the need for a repeat of the very sharp interest rate hike of 1997. We also sold large sums of foreign reserves for Hong Kong dollars for the purchase of Hong Kong stocks equivalent to

US\$15 billion. Thirdly, we made the monetary base much bigger in order to reduce the sensitivity of interest rates to inflows and outflows of funds. This involved committing another US\$13 billion as additional backing.

508. It should be noted that we had, in fact, mobilized the foreign reserves amounting to a few times the then-theoretical minimum requirement of US\$12 billion in the foreign reserves for the provision of 100 percent backing to the monetary base. We were able to do so without causing a breakdown of confidence in monetary and financial management in Hong Kong on the part of the international financial community, to a large extent because we had significantly more foreign reserves in the Exchange Fund than the sums mobilized and we had no liabilities other than the fiscal reserves deposited there.

509. A strong position of foreign reserves can safeguard the ability of the HKMA to deliver, when necessary, the statutory purpose of the Exchange Fund, which is to defend the exchange value of the Hong Kong dollar and to maintain the stability and integrity of Hong Kong's monetary and financial systems. This also supports our role as the lender of last resort. In order to maintain the stability of Hong Kong dollars under the Currency Board System, the size of foreign reserves we need is probably "the more the better." This foreign currency reserve involves a natural buildup process through inflow of capital, investment gains, or increases in fiscal placements.

### **Transparency and accountability**

510. Hong Kong's Legislative Council defines and limits the HKMA's powers and responsibilities, and sets out the Monetary Authority's accountability to the Legislative Council under Article 64 of the Basic Law. But the HKMA also recognizes a broader responsibility to the community of Hong Kong SAR, and a duty to promote an understanding of our role and objectives, and to keep ourselves informed of community concerns and open to public debate.

511. To this end, the HKMA pursues a policy of transparency and accessibility. This policy has two main objectives:

**Table 19. Major Milestones to Enhance the Transparency of Disclosure**

Year	Measures
1992	<ul style="list-style-type: none"> <li>• Started publishing the accounts of the Exchange Fund annually.</li> </ul>
June 1995	<ul style="list-style-type: none"> <li>• Started publishing the accounts of the Exchange Fund biannually.</li> </ul>
September 1995	<ul style="list-style-type: none"> <li>• Started publishing quarterly figures on foreign currency assets.</li> </ul>
January 1997	<ul style="list-style-type: none"> <li>• Started monthly disclosure of foreign exchange reserves.</li> </ul>
January 1999	<ul style="list-style-type: none"> <li>• Started publishing monthly International Reserves in accordance with IMF's Special Data Dissemination Standard (SDDS).</li> <li>• Started publishing monthly data on Analytical Accounts of the Central Bank in accordance with IMF's SDDS.</li> <li>• Started publishing monthly Abridged Exchange Fund Balance Sheet and Currency Board Accounts.</li> </ul>
April 2000	<ul style="list-style-type: none"> <li>• Started publishing Template on International Reserves and Foreign Currency Liquidity in accordance with IMF's SDDS.</li> </ul>

- to keep the financial industry and the general public as fully informed of the HKMA's work as possible; and
- to ensure that the HKMA is in touch with, and responsive to, the community that it serves.

#### ***Measures to increase transparency of disclosure***

512. Prior to 1992, the accounts of the Exchange Fund were confidential. However, in keeping with the commitment to greater transparency in disclosure, the government started publishing the accounts of the Exchange Fund annually in 1992. Biannual accounts have been published since June 1995, and headline figures for the foreign exchange reserves have also been released monthly since January 1997.

513. Over the past years, we have done a great deal to advance the policy of transparency and accessibility. The major milestones to enhance the transparency of disclosure are displayed in Table 19. This applies to technical matters such as the increased transparency of the currency board system, the daily publication of the size and composition of the Monetary Base, and the virtually real-time publication of the Aggregate Balance of the Banking System. In addition, we extend the

information available for general public consumption in print, through the press, on the Internet, and in our programs of educational briefings, seminars, and large-scale exhibitions.

514. The considerations of market sensitivity, commercial confidentiality, and statutory restrictions on disclosure of confidential information will, of course, place some limits on the amount of material we can make public. Given the increasing transparency and the extremely limited discretion over the currency board arrangements, which draw their credibility from a strict rule-based system, a certain constructive ambiguity is also necessary if we are to have the flexibility to deal decisively with sudden crises. Within these limits, we are committed to developing our policy of transparency, and to increasing the quality and comprehensibility of the materials we put out for public consumption.

### **Establishing a Capacity to Assess and Manage Risk**

#### **Delegation and control of investment management of the Exchange Fund assets**

515. The delegation of investment authority for managing the Exchange Fund assets is achieved

through a 3-level framework, covering three basic types of investment decisions:

- Long-term strategic decisions controlled by the EFAC;
- Medium-term market decisions delegated to the senior management down to the Executive Director level; and
- Short-term trading and anomaly trading decisions delegated to portfolio manager levels.

516. This 3-level framework of investment decision is reviewed every year to reflect any required change or amendment to the control and delegation structure.

### **Risk management framework**

517. In developing the risk management framework, the HKMA draws upon the best market practices of asset management in the private sector and applies these practices in determining the parameters for managing risks. The risk management framework serves to achieve two main objectives:

- identify and assess the financial and operational risks; and
- allow the management of risks within acceptable parameters and levels.

518. The Risk Management and Compliance Division is responsible for day-to-day monitoring and control of six major types of financial and operational risks, namely:

- (i) Market Risk;
- (ii) Credit Risk;
- (iii) Liquidity Risk;
- (iv) Currency Risk;
- (v) Settlement Risk; and
- (vi) Operational Risk.

### **Market risk control**

519. Overall market exposure is defined by the Exchange Fund's Preferred Neutral Position ("PNP") and tactical deviation limits for each asset class, market segment, and currency type. A weekly

Asset Allocation Meeting of senior executives and reserves management staff is held to review investment strategies for the overall Exchange Fund and the allocations to both internal and external managers as well.

520. The overall EF assets will be consistently tested by Value-at-Risk ("VaR") and scenario stress testing, which are used to quantify the market risks inherent in the portfolios under normal and extreme adverse market conditions. Extreme adverse market events include a stock crash and drastic bond yield shift in 1987 and currency crisis in 1994.

521. Using a market-based risk management model, a weekly report to evaluate both absolute and relative (to benchmark) VaR is made at a 95 percent confidence level for a 1-month horizon. The calculation of expected market risk/loss takes into account the price volatility of all asset classes, market segments, and correlation across markets given a specified time horizon and decay factor. In addition, VaR in both U.S. dollar and percentage terms is monitored to ensure that the Exchange Fund is not unduly exposed to market risk at any point in time.

522. Stress testing is employed to test the impact of a simultaneous recurrence of the worst equity, bond, and currency market crashes in the past 20 years on the total Exchange Fund assets.

523. Both VaR and scenario stress test reports are submitted to the EFAC meeting for review.

### **Credit risk control**

524. With the delegation by EFAC, the Credit Review Committee ("CRC") is established to be responsible for the following objectives:

- Monitor credit risks within parameters set by credit policy
- Review credit policy to meet the new investment policy requirements and to control counterparty or issuer credit risks
- Evaluate and set the credit limits for issuer, bank, counterparty, and country

525. The Risk Management and Compliance Division supports the credit analysis and assessment

based on market-accessible information. The control mechanism is segregated into 2 major areas:

- Centralize the credit assessment approach by standardizing the analytical framework in terms of economic and financial performance, debt ratio, liquidity, capital, asset size, and rating assessment by international credit agencies; and
- Centralize credit line allocation for internal and external managers via CRC.

526. Day-to-day credit exposure control on individual issuer, group level, and country levels is conducted through a pre-deal checking process for internally managed assets. For external managers, we appoint the custodian managers to perform the investment and credit compliance checking functions on behalf of the HKMA, based upon the limits that we segregate for external managers. At day-end, it is required to perform overall compliance checking on investment activities against the credit and investment limits defined in Exchange Fund Credit Policy and Investment Policy as well.

### ***Liquidity risk control***

527. The Backing Portfolio was established in October 1998 to ensure that the monetary base is at all times fully backed by U.S. dollar assets. The assets held in this portfolio should be securities that have the highest liquidity and credit quality, and should at all times be available to meet the convertibility obligation (e.g., HKMA sells US\$1 for HK\$7.80) to all authorized institutions that maintain accounts with the HKMA and have access to the local Real Time Gross Settlement system.

528. In addition, liquidity control measures include the following major limits:

- (i) Set percent limit of foreign currency assets to be converted into cash within 2 and 5 working days.
- (ii) Set percent limits of overall Exchange Fund assets for deposit and for term deposits over 1-month horizon.
- (iii) Set bond issue or program size limits to ensure efficient liquidation without disrupting the markets.

### ***Currency risk control***

529. The overall currency risk for the Exchange Fund can be determined with the combination of the benchmark currency mix and corresponding deviation limits. The PNP of currency mix strategically dictates the long-term currency exposure for the overall Exchange Fund assets. This has taken into account the long-term return and risk profile of currency as an independent asset class, together with all investment constraints such as the maintenance of adequate U.S. dollar assets to back the monetary base under the Currency Board System.

530. A list of authorized currencies is determined on the basis of underlying investment markets and the liquidity condition of each currency. At portfolio levels, we restrict the currency mix in accordance with their respective investment requirements and constraints. In the case of the Backing Portfolio, it is restricted to U.S. dollar assets. Meanwhile, the currency exposures at other externally and internally managed investment portfolios are subject to their underlying investment benchmark and deviation limits.

### ***Settlement risk control***

531. In order to mitigate settlement risks, we standardize settlement instructions together with using delivery versus payment (for bonds and equities), and payment versus payment methods to reduce the potential loss from settlement failure.

532. For externally managed assets, we use reliable and reputable master custodians to centralize and control the settlement workflow of externally managed assets by portfolio types in order to gain operational efficiencies.

### ***Operational risk control***

533. A separation of reporting line to senior management between settlement and dealing functions can achieve better control by avoiding potential fraud or collusion of official reserve assets among front desk dealing staff.

534. Straight-through processing starts with deal input, trade instruction, reconciliation of deal confirmation, and finally to dispatch of standard-

ized settlement instructions (e.g., SWIFT messages). After the deal is entered into the system, operational processing requirements, including report generation, account entry posting, and settlement, are electronically conducted in an automatic and uninterrupted workflow process.

535. Money market or repo facility is established at every nostro account with corresponding foreign commercial banks or central banks to reinvest the residual idle cash balance accumulated at the cutoff time of the domestic market. This is to ensure even the unexpected account balances due from unsettled trades are fully invested.

536. Contingency plans for crucial modules and off-site backup systems outside the main office are established to control and mitigate system failure risks due to unexpected system breakdown or power failure or any disaster situation.

537. Regular and firm-wide checking of the communications network, including the internal e-mail system, is conducted to avoid communication failure risk.

#### **Determination of investment benchmark and tactical deviation limits**

538. The investment benchmark, which directed the long-term strategic investment, is expected to meet the following investment objectives of the Exchange Fund:

- (i) to preserve capital;
- (ii) to ensure that the entire monetary base will be at all times fully backed by highly liquid short-term U.S. dollar-denominated securities;
- (iii) to ensure sufficient liquidity for the purpose of maintaining monetary and financial stability; and
- (iv) subject to (i)–(iii) above, to achieve an investment return that will preserve the long-term purchasing power of the assets.

#### ***To quantify investment objectives and constraints***

539. The investment objectives and constraints must be quantified for the optimization process:

- (i) to preserve capital, it is required to set a high probability level that returns in the short-, medium-, and long-term will not be negative.
- (ii) to ensure that the entire monetary base is at all times fully backed by liquid U.S. dollar assets, it is required to set a minimum percentage of total portfolio holdings in liquid U.S. dollar assets.
- (iii) to preserve the long-term purchasing power of the assets, it is required to set a reasonably high probability that the expected benchmark portfolio return shall exceed the long-term domestic inflation rate.
- (iv) To measure the downside risk below the long-term domestic inflation level, it is required to set the annualized shortfall in return against the long-term domestic inflation rate at an acceptably low probability level.

#### ***To determine the permissible markets and instruments***

540. The investment management of Exchange Fund assets is expected to be conducted in well-established markets that have sufficient breadth and depth to ensure that transactions can be efficiently absorbed in the market without undue effects on liquidity and the availability of funds. This is particularly the case for central banks, including the HKMA, as most transactions are typically in decent size. We assess the liquidity of each market and instrument by the following factors:

- (i) bid/offer spread at both normal and crisis conditions.
- (ii) dealing size at both normal and crisis situations.
- (iii) total portfolio holdings as a percentage of daily market turnover.
- (iv) availability of repo market for each instrument type.

541. Since the monetary base requires sufficient backing by U.S. dollar assets under the cur-

rency board system, we maintain a minimum percentage of total Exchange Fund (EF) asset holdings in U.S. Treasury products to ensure adequate liquidity. This prudent policy has proven to be essential based on the international crisis situations experienced in the past several years.

542. In summary, the Exchange Fund investment objectives are quantified into expected return, risk, and parameters of capital preservation and liquidity requirements. These parameters form the critical investment performance criteria in establishing the optimal new PNP, which is therefore expected to achieve the Fund's risk/return objectives and other trade-offs within the framework of a long-term passive investment policy.

#### ***Key features of optimization model to derive our investment benchmark***

543. A market well-tested optimization model is used to construct the optimal mix of asset allocation. Such a model overcomes the traditional mean-variance optimization method, which suffers from a tendency to create unbalanced portfolios for closely correlated assets such as bonds.

544. Due to stringent liquidity requirements for all the securities, only the more liquid and developed markets are included in the list of permissible asset markets. All permissible asset classes and currencies are included to conduct the optimization process. Historical returns and correlation across all market segments are applied to find the risk matrix, and such a risk structure is assumed to hold constant to derive expected portfolio volatility. No expected return for individual asset class is projected. We apply long-term equilibrium returns, which are consistent with market clearing levels for the global market-cap weighted portfolio.

545. Institutional investors will typically set a target portfolio risk for the investment benchmark. Instead of using a specific portfolio risk target, we test the optimal asset allocation against a set of critical investment performance criteria, which effectively reflects the control of overall portfolio risk level.

546. With the calculation of the total portfolio risk of investment benchmark, it is required to ana-

lyze the risk contribution of each asset class and market type. This process serves the following 3 purposes:

- (i) identify principal sources of risks by asset classes and market segments.
- (ii) ascertain that the risk exposures in the optimal portfolio correspond to positions where we would like to take risk.
- (ii) ensure that the portfolio risk is as evenly balanced as possible across different major international markets, including currency types.

547. The risk decomposition of the investment benchmark is based on a risk contribution framework.<sup>34</sup>

548. Although the investment benchmark represents an optimal asset mix for long-term investment, reoptimization is required under the following scenarios:

- (i) change of investment objectives and constraints.
- (ii) failure to meet the critical investment performance criteria arising from structural change of market performance and volatility structure.

#### ***Derivation of tactical deviation limits***

549. The evaluation and selection of the investment benchmark are based on the framework of critical performance criteria with return, volatility, and capital preservation parameters. We use the same framework to stress test the tolerance of the Exchange Fund PNP to additional volatility. Through incremental additional annual volatility, we establish that the PNP is able to tolerate an additional level of annualized volatility and still produce an acceptable performance when compared to the critical performance criteria.

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<sup>34</sup>Risk Contribution  
of nth asset =  $\frac{h(n) * \text{Vector of Marginal Volatility}}{\sigma}$ ,

where  $h(n)$  is the nth element of the position vector of Marginal Volatility =  $\Sigma h / \sigma$ . ( $\Sigma$ : Covariance matrix)  
( $h$ : Portfolio position vector).

550. With the established overall tracking error, a risk-based approach is used to calculate the permissible tactical deviations for short- to medium-term trading for currency composition, allocation by asset class, allocation by market within each asset class, and duration of each bond market. This method is essentially a VaR approach used by institutional investors to control the risks arising from trading positions. This is also consistent with the risk/return optimization method used to construct the Exchange Fund PNP.

551. All things being equal, the most volatile asset would logically be given the least permissible deviation. In calculating the deviations, we adopt a conservative approach and apply the permissible deviation for the most volatile market segment as the maximum permissible deviation for the asset class containing such market segment.

#### **Performance measurement framework of the Exchange Fund**

552. The monthly performance attribution analysis identifies the out-/under-performance of a portfolio compared to its investment benchmark. It decomposes total active return into various return attributes relative to the benchmark return. Based on our current setting, attribution analysis is divided into 2 levels: (a) fund allocation effect, (b) portfolio management effect. Each of them is further divided into various active return attributes according to the style of management, selection, manager skill, and other factors.

#### ***Fund allocation effect (i.e., overall asset allocation effect)***

553. Fund allocation effect is the contribution to return due to the management's withdrawal from or increased allocation to different (external or internal) portfolios or investment types of portfolios. At the moment, we have over 10 types of portfolios in different investment benchmarks. Under the fund allocation effect, there are 4 contribution factors, namely:

- (i) Asset allocation effect
- (ii) Country weighting effect

- (iii) Currency effect
- (iv) Benchmark adjustment effect.

#### ***Portfolio management effect (i.e., portfolio active return)***

554. This is the active return at portfolio levels relative to their benchmarks. From end of 1999, we began to use a market-based multifactor model to analyze the active returns of bond portfolios by factors of duration, curve steepness, curvature, and selection effect.

555. In the near term, another market based multifactor model is used to identify the sources of active returns from active equity mandates. The risk factors of equity analytical models are as follows:

- (i) U.S. equity model—Market cap, EPS ratio, BP ratio, net earnings revision, EPS torpedo, historical beta, price reversal.
- (ii) Global equity model—Market cap, EPS ratio, BP ratio, earnings growth, average dividend yield, long-term debt/asset ratio, volatility of ROE, volatility of EPS.

556. In addition, we internally maintain return-based attribution for investment managers with the following framework:

- (i) Alpha [ $\alpha$ ]: residual return component, i.e., to measure the ability of managers in the selection of securities.
- (ii) Down-market Beta [ $\beta$ ]: to measure portfolio exposure to benchmark in a down-market.
- (iii) Gamma [ $\gamma$ ]: to identify a manager's skill in managing market exposure against benchmark at times of down-market and up-market.
- (iv) Information Ratio (IR): Measurement of risk-reward trade-off given an investment manager's added value and excess volatility over benchmark.

557. We apply some quantitative methods such as the Sharpe ratio and an information ratio to respectively measure the portfolio risk-adjusted return and assess the effectiveness of use of information by managers.

## **Challenges of reserves management in the HKMA**

### ***Increased mobility of international capital flows***

558. The world economy becomes increasingly more integrated. This is evidenced by global synchronization in financial markets and increased capital flows among countries, particularly from industrialized into emerging economies. Most central banks, if not all, are therefore facing potentially large and abrupt inflows and outflows of capital, especially portfolio flows. Extreme care is needed in managing their reserves and, in some cases, to tighten the liquidity criteria to quickly respond to external shocks. This has disturbed the management of foreign exchange reserves and appeared to be contradictory to the diversification requirement suggested by the portfolio management theory.

### ***Global financial market synchronization***

559. The value-at-risk approach used by the HKMA to measure the expected market risk is based on assumptions of a normally distributed return series and a stable risk structure, i.e., stable return correlation across asset classes and markets over time. These notions tend to underestimate actual market loss due to a breakdown of “normal” price behavior across market segments at times of stress events. With global market synchronization and increased complexity of invest-

ment instruments, such risk has become even more evident. Stress risk management can be considered to address the above issue. This is to determine risk capital based on a preset high standard deviation event and a covariance matrix with the assumption of perfect correlation across all market segments. The accumulated risk capital allocation should then be limited to a percentage of total capital size of a fund to avoid undue market exposure.

### ***Use of derivatives to implement reserve management strategies***

560. In the long term, the supply shrinkage of government securities due to improving budget positions will cause central banks to keenly look for viable investment alternatives. While many central banks remain very cautious, some central banks have made use of derivatives to better manage market risk and liquidity risk. On the asset side, through the use of futures, it is possible to achieve duration strategy while maintaining a better liquidity profile. On the liability management side, central banks responsible for this have made extensive use of interest rates and currency swaps for issuing debt to adjust the risk characteristics of their portfolios. The use of derivatives requires more advanced risk management and IT system development to support the transactional processing, account posting, and overall portfolio risk assessment.

# 9

## Hungary

### Reserve Management Objectives and Coordination

#### Reserve management objectives

561. According to the Central Bank Act, one of the basic responsibilities of the National Bank of Hungary (NBH) is the management of foreign exchange reserves. The primary purposes of managing foreign exchange reserves, as for every central bank, are the following:

- support for the monetary policy (intervention),
- transactional purposes (supporting debt management, controlling crisis situations),
- wealth management objectives.

562. In the past couple of years, with the economic development of the country and with the improvement of credit ratings and debt service ratios, the direct transaction objectives—such as supporting the repayment of debt—have been gradually losing their weight. At the same time, support of the monetary policy has become the principal reserve management objective. One way to ensure the credibility of the exchange rate system is to hold an adequate level of reserves that can support the inflation targeting system in the form of intervention, if needed. Although the cost of holding reserves has significantly decreased with the country's improving credit ratings, the NBH still

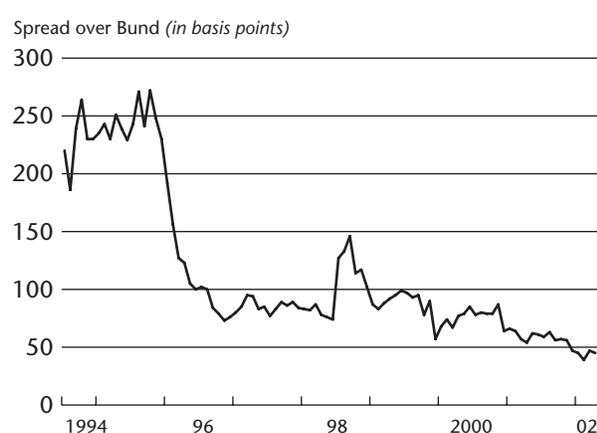
would not like to build reserves for the pure purpose of wealth accumulation. As stated above, the NBH aspires to manage reserves so as to help achieve the goals of monetary policy efficiently, meet the requirements of debt service, and, at the same time, try to optimize the return on the reserves without jeopardizing the above-mentioned goals.

#### Institutional framework

563. The reserve management policy of the NBH is defined by the Monetary Council (MC). The MC decides on the currency composition of foreign reserves, and interest and credit risk exposure. It approves the applied investment instruments and the list of business partners. Furthermore, according to the investment guidelines and the return requirements, the MC determines the benchmark portfolio. The MC monitors the results of the reserve management activity on a quarterly basis.

564. While the MC is a strategic decision-making body, the Asset and Liability Committee (ALCO) is responsible for tactical decisions related to reserve management. The ALCO holds a meeting at least once a month. The ALCO makes decisions on the deviation from the strategic benchmark and on the modification of operational limits. The ALCO also monitors closely the activity of the reserve management unit in charge of the implementation of daily investment and liquidity management operations.

**Figure 7. Hungary's Five-Year Credit Spread over Bund, 1994–2002**



565. An independent risk management unit is responsible for the evaluation of daily business activities and monitors compliance with the operational limits. This unit is in charge of the elaboration of the risk management policy and the reporting systems the senior management. The unit also sets up and maintains the benchmark indices for the portfolio managers.

### Determinants of reserve management policy

566. There are four special country characteristics that guide Hungary's reserve management policy:

- small open economy
- emerging/converging country
- relatively high foreign currency debt
- quasi-ERM-II exchange rate regime with no capital controls

567. Hungary is a small open economy with an export/GDP ratio above 60 percent. This means that exchange rate developments have substantial influence on inflation. Hence, to run a successful exchange rate policy, Hungary must have sufficient foreign exchange reserves.

568. Hungary is an emerging/converging country, with fast developing but still less liquid domestic financial markets. This means that the central bank cannot easily build up and down

reserves via foreign exchange market operations. In addition, the costs of holding foreign exchange reserves (spread between borrowing and investment rates) are, although decreasing, still negative. These facts must be taken into consideration when determining the adequate size of reserves.

569. Around 30 percent of the state debt is in foreign currency. The primary source of the annual EUR 2–3 billion debt service is the NBH's foreign exchange reserves. Hence, the size and currency structure of the debt service are an important input to set the reserves management policy.

570. The country's primary objective is to join the European Union and then the Economic and Monetary Union. The NBH is already running a quasi-ERM-II exchange rate regime with no capital controls. The currency is pegged to the euro with a plus/minus 15 percent fluctuation band. In order to give credibility to the band, the NBH must have adequate reserves in the current "quasi" and later in the real ERM-II system.

### Optimal currency structure

571. Prior to 1999, the NBH was responsible for the foreign currency borrowing of the country. So taking the gross currency structure first, we match the foreign currency liabilities of our balance sheet. This means we hold EUR, US\$, and JPY in our foreign exchange reserves.

572. In taking the net open currency position against the domestic currency, the Hungarian Forint, we take into consideration the following factors:

- currency of intervention;
- HUF basket;
- orientation of external trade; and
- macro level asset-liability considerations.

573. As stated above, Hungary is running a quasi-ERM-II system, where the central parity of the HUF is 100 percent pegged to the euro. As a consequence, more than 80 percent of the inter-bank HUF/foreign currency spot market turnover is against the euro. This means that the natural intervention currency is the euro.

574. Hungary is becoming increasingly integrated into the European Union. Hence, the currency structure of external trade, especially in the *competitive* sector, is more denominated in euros. This is also true for foreign direct investments and portfolio investments.

575. The currency benchmark for foreign currency debt of the government, managed by the State Debt Management Office, is 100 percent euro. To provide a hedge on a macro level, we take this fact into consideration when determining the optimal net currency structure to the extent it does not conflict with other objectives of holding reserves.

576. To summarize, the euro has a dominant part in the foreign exchange reserves. The dominance of the euro is justified by the fact that the Hungarian forint is 100 percent pegged to the euro, the objective of the country is to join the EU as soon as possible, the currency composition of government debt denominated in foreign exchange, and the fact that the intervention currency in the domestic market is the euro.

### ***Adequate size of reserves***

577. In setting the adequate size of reserves, we take the following into consideration:

- nature of present and future foreign exchange regime;
- Guidotti rule;
- ratios to monetary aggregates;
- foreseeable and potential future cash flows;
- hot money potentially leaving the country in 3–6 months;
- access to foreign exchange markets;
- access to foreign capital markets;
- cost of holding reserves; and
- international comparison.

578. The level of reserves should be sufficiently high to support the current quasi-ERM-II, and the future real ERM-II foreign exchange regime. To perform this task, the reserves must meet the Guidotti rule, i.e., the reserves should cover the

one-year liabilities of the whole country. Also, the level of reserves must be at least as high as the monetary base. Behind this, one can find the argument that to defend the currency, the system could be at any time *theoretically* converted into a currency board.

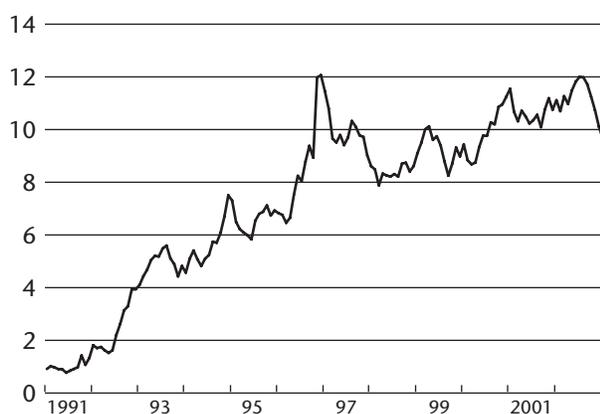
579. To keep the level of reserves in a desirable range, we try to quantify the foreseeable and potential cash flows. Debt principal and interest payments account for the biggest part of foreseeable outflows, amounting to \$2–3 billion in the first part of this decade and falling sharply in later years. The government's foreign currency borrowings are the biggest potential inflows. The NBH coordinates closely with the authorities responsible for debt management in order to harmonize policies. Privatization revenues are another possible source of inflows. These were considerable in the 1990s, but, looking ahead, NBH does not expect huge amounts from this source.

580. Stress tests are performed to see how external or internal shocks can affect the size of reserves in a three- to six-month horizon. We monitor nonresidents' holdings of government securities and equities, the open foreign exchange positions of the domestic commercial banks, the liquidity of the domestic interbank foreign exchange market, etc. Using our own and international historical evidence during currency crises (like the 1998 Russian crisis and the 2001 Argentine crisis) we estimate the potential outflow in a three- to six-month period, a period during which internal policy adjustments can be executed, or after which foreign capital markets can be accessed again.

581. Rarely is the central bank entirely free in setting the exact level of reserves. Even in the case of an efficient foreign exchange market of the domestic currency, the central bank can purchase or sell domestic currency for reserve level adjustment purposes under normal market conditions. In the case of Hungary, it was only in 2001, after full foreign exchange liberalization, that the liquidity of the HUF spot market reached a level where the NBH could purchase foreign currency purely for foreign exchange reserve management purposes (to cover interest payments on the foreign state debt), without effectively affecting HUF market exchange rates. To minimize the impact on

**Figure 8. Size of Official Foreign Exchange Reserves**

(1990–2002; in billions of U.S. dollars)



the exchange rate, it was executed in a transparent way, in equal, market-conform preannounced amounts (EUR 2.9 million a day, total EUR 374 million). Independent of this positive experience, when planning the future course of reserve levels, we conservatively do not take into account foreign market sales or purchases.

582. As the rating of the country is improving, access to international capital markets is getting relatively easier and easier. It means the necessary size of reserves can be lower than before, since the NBH does not have to build high precautionary buffers. The NBH has a formal agreement with the Ministry of Finance that for reserve replenishment purposes, the government is ready to execute borrowing transactions any time the central bank requests it. Moreover, in the future, other sources such as automatic borrowing facilities in the ERM-II system will be available.

583. Looking at the cost of holding reserves (see Figure 8. where, as a proxy, we used the relevant credit spread), there is a clear tendency toward lower costs. Nevertheless, it is still negative; so, as in the past, the NBH does not intend to hold higher reserves than necessary. The lower cost of holding only means that the NBH can tolerate bigger swings in the size of reserves. Going forward until the prospective EMU-entry, we expect the cost of holding to approach zero.

584. Finally, to verify actual levels of reserves we regularly carry out international comparisons. Taking a longer period we look at figures like import coverage, ratios to monetary aggregates, reserves to GDP, etc. Concentrating mainly on countries with similar features as Hungary, we examine how successfully different countries run monetary and exchange rate policies with different levels of reserves.

### *Investment policy*

585. With respect to the classical investment triad (return-liquidity-safety), the investment philosophy of the NBH is to achieve maximum return on reserves while maintaining the highest attainable liquidity and safety. Appropriate safety in this case relates to the obligation of the central bank to preserve the value of reserves held on behalf of the country. Concerning this special responsibility, reserve management is supposed to consider the appropriate risk level that allows a minimum probability of loss of capital in a certain given year. Liquidity requirement means the ability to provide an adequate amount of funds for a possible immediate foreign exchange market intervention. The adequate amount of funds has to be available with the lowest attainable cost and capital loss. The objective of maximizing returns ought to be considered only if all the liquidity and safety requirements are met. Developing this approach in the investment policy allows us to favor active against passive portfolio management.

586. In the process of developing the investment guidelines, the main objective of the NBH has been to adopt the best practices of central banks of developed countries. Like all central banks in the world, NBH has conservative guidelines that try to avoid instruments with high volatility and not permit investment in equities. The maximum time to maturity of bonds in the portfolio is ten years and the required rating is AA-AAA (by the big rating agencies). Our liquidity requirements with the mentioned maturity and rating considerations determine the available instruments in the bond market. Therefore, NBH holds mainly government, supranational and government agency issues of developed countries. The suffi-

ciently high level of reserves and the development of bond markets in the last ten years allowed us to gradually increase the size of AA rated securities with excellent liquidity features in the bond portfolio. This part of the portfolio bears higher yield without adding significant risk.

### Transparency and accountability

587. In 1999 and 2000, IMF addressed these issues in several proposals. The NBH joined the Fund's Special Data Dissemination Standard among the first central banks. According to the current practice, the NBH discloses the size and internal structure of its reserves monthly with a 20-day lag using IMF's Data Template on International Reserves and Foreign Currency Liquidity.

588. The management of our bank participated in meetings in Basel and Washington, D.C., where the framework of the Guidelines for Foreign Exchange Reserve Management was negotiated. Together with other central banks, we considered the proposed Guidelines in full detail and provided our bank's 10–15 years of experience concerning this issue. Since the approval of these proposals, the National Bank of Hungary has adopted most parts of it.

## Establishing a Capacity to Assess and Manage Risk

### Risks incurred by the NBH

589. Risks incurred by the NBH in managing foreign exchange reserves are primarily of a *credit*, *liquidity*, and *market* nature. Within credit risks, we can distinguish counterparty and spread risks. Concerning market risks, we put the emphasis on the *currency* and the *interest rate (yield curve)* exposures. There is a framework in place for identifying and managing these risks on an integrated and centralized basis in line with best homologue<sup>35</sup> and market practices, building on four key elements:

- system of partner and issuer *ratings*;

- system of partner, issuer, and sectoral *limits*;
- restrictions concerning *eligible assets and transactions*; and
- internal two-stage *benchmark procedure*—allowing for a certain range of permitted deviation—concerning sectoral allocation, duration, and currency composition.

### Investment instruments

590. Authorized investment instruments are

- bonds (authorized embedded options: put, call, cap, floor);
- minimum AA rated sovereign;
- supranationals (incl. BIS);
- AAA agency papers;
- AAA Pfandbrief;
- min. AA corporate bonds;
- min. AA commercial papers;
- min. AA or tri-party repos, buy-sell-back, and sell-buy-back agreements;
- AAA unsubordinated tranches of asset-backed securities;
- “plain vanilla” OTC bond options (put/call, long/short);
- interest rate futures and IRF options;
- interest rate swaps, currency swaps; and
- money market depots, rating: min. AA with certain exemptions.

591. Among the derivative instruments, only plain vanilla structures are permitted. (The minimum criterion to be a plain vanilla instrument is that we can price and analyze an instrument in our internal position-keeping and risk management system.) The primary condition for derivative deals is the existence of ISDA Master Agreement and mark-to-market agreement with our counterparties.

### Portfolio structure

592. Similar to the practice of other central banks, the NBH distinguishes a liquidity and an

<sup>35</sup>With special attention to the ECB and the connected European NCBs.

investment portfolio. The liquidity part is held to satisfy daily foreign exchange cash-flow needs, such as interest and principal payments of government debt, interventions, special transactions, and transfers. The term structure of these cash flows is partly predetermined (by interest and principal payments) and partly uncertain (foreign exchange intervention needs). Since the investment horizon of this portfolio is very short, the NBH avoids the risk of interest rate movements in this segment. The other stable part of our portfolio has longer investment horizons and higher return requirements. The fact that the probability of liquidation of this part of the portfolio is low allows our bank to hold bonds with longer time-to-maturity characteristics as long as the market movements and the shape of the yield curve justify this. According to the result of our optimization process, we hold around 20 percent of the whole amount of reserves in the liquidity portfolio and the rest in the investment portfolio.

### **Benchmarking**

593. NBH implemented a two-stage benchmarking system. The benchmarking policy, the actual *strategic benchmarks* concerning currency, interest rate, and credit structure of the investment portfolio, as well as the permitted deviations from these benchmarks, is set by the Monetary Policy Committee (MPC) in the annual Risk Management Policy Guidelines.

594. *Tactical benchmarks*, set by the ALCO, may deviate from the strategic ones within predefined ranges. Empirical evidence shows that ALCO deviated from the strategic benchmark only in case of major trend reversals (i.e., 1–2 times a year). This means the ALCO does not alter the benchmark in periods of normal business conditions.

595. In line with the tactical portfolio benchmarks, a separate Risk Management Department maintains *internal model portfolios* that serve as operational guidelines for portfolio managers. Portfolio managers may deviate from the *benchmark* within the predefined ranges so as to take advantage of favorable market conditions. Model portfolios are updated and investment portfolios are evaluated against the appropriate benchmarks and model portfolios on a monthly basis. The bonuses of portfolio managers are linked to performance vis-à-vis the benchmark.

### **Use of external managers**

596. In the second part of the 1980s and the first part of the 1990s, the NBH used external portfolio managers. The altogether rather mixed experience showed that the services of external managers are most useful when building up reserve management activity (i.e., to learn) or when they can provide facilities a central bank cannot easily establish. Currently, the NBH uses external portfolio managers only for its securities lending programs.

# 10

## India

### Introduction

597. The Indian approach to determining adequacy of foreign exchange reserves has evolved over the past few years. Various factors, ranging from the pioneering Report of the High Level Committee on Balance of Payments (Chairman: Dr. C. Rangarajan) to Governor Jalan's exposition of the combination of global uncertainties, domestic economy, and national security considerations in determining liquidity at risk and thus assessing reserve adequacy (Paragraphs 23 and 24 of Statement on Monetary and Credit Policy, April 29, 2002), have contributed toward the process of development of such an approach.

598. The three components of India's foreign exchange reserves include Gold, Special Drawing Rights (SDRs), and Foreign Currency Assets (FCAs). The last item, however, accounts for the major portion. As of September 6, 2002, out of the US\$62.1 billion of total reserves, India's FCAs stood at \$58.8 billion; gold accounted for about \$3.2 billion, the rest being SDRs. In July 1991, as a part of reserve management policy, and as a means of raising resources, the Reserve Bank of India (RBI) temporarily pledged gold to raise loans. The gold holdings thus played a crucial role in reserve management at a time of external crisis. Since then, gold has played a passive role.

599. In quantitative terms, the level of foreign exchange reserves has steadily increased from \$5.8

billion as of end-March 1991 to \$54.1 billion as of end-March 2002 and further to \$62.1 billion as of September 6, 2002.

### Developing a Sound Governance and Institutional Framework

#### Reserve management objectives

600. India's objectives of holding reserves, in broader terms are:

- maintaining confidence in monetary and exchange rate policies;
- enhancing capacity to intervene in foreign exchange markets;
- limiting external vulnerability by maintaining foreign currency liquidity to absorb shocks during times of crisis;
- providing confidence to the markets, especially credit rating agencies, to the effect that external obligations can always be met, thus reducing the overall costs to the economy or the market participants; and
- adding to the comfort of the market participants, by demonstrating the backing of domestic currency by external assets.

601. At a formal level, the objective of reserve management in India could be found in the Reserve Bank of India Act, where the relevant part

of the Preamble reads, “to use the currency system to the country’s advantage and with a view to securing monetary stability.” Monetary stability, in this statement, may be interpreted as internal as well as external stability, implying a stable exchange rate as one of the overall objectives of the reserve management policy. While internal stability implies that reserve management cannot be isolated from domestic macroeconomic stability and economic growth, the phrase “to use the currency system to the country’s advantage” implies that maximum gains for the country as a whole, or the economy in general, could be derived in the process of reserve management. This warrants taking a very dynamic view on the country’s requirements of reserves and how best to meet such requirements.

### Legal framework

602. In India, the RBI Act of 1934 contains the enabling provisions for the RBI to act as the custodian of foreign exchange reserves, and manage reserves within the defined objectives. The powers available to the RBI as custodian of foreign exchange reserves are enshrined in the Preamble to the Act. The “reserves” refer to both foreign exchange reserves in the form of gold and foreign securities and domestic reserves in the form of “bank reserves.” The RBI Act also broadly indicates the desirable composition of reserves, minimum reserve requirements, and the instruments in which the country’s reserves could be deployed.

603. Specifically, subsections 17(12), 17(12A), 17(13), and 33(1) of the RBI Act of 1934 define the scope of investment of foreign exchange reserves. The provisions, by way of severe restrictions on the credit quality of counterparties/securities in the Act, reflect the RBI’s utmost concern about the safety of foreign exchange reserves.

604. In brief, the law broadly permits the following investment categories:

- (i) Deposits with other central banks and the Bank for International Settlements (BIS).
- (ii) Deposits with foreign commercial banks.
- (iii) Debt instruments representing sovereign/sovereign-guaranteed liability (with residual maturity not exceeding 10 years).

- (iv) Other instruments/institutions as approved by the Central Board of Directors of the central bank.

### Institutional framework

605. The decisions on currency composition and asset allocations are taken by the Reserve Bank in consultation with Government of India. Within the RBI, while the major decisions relating to currency/investment are made by a Strategy Committee headed by the Governor/Deputy Governor in charge of foreign exchange reserve management, the Department of External Investments and Operations is given some flexibility with regard to currency composition to take advantage of market trends. Further, within the RBI, a “Financial Markets Committee,” comprising heads of departments responsible for domestic debt management, reserve management, and monetary policies, facilitates day-to-day coordinated administering of policies.

### Transparency and accountability

606. On public disclosure, the RBI has been constantly endeavoring to ensure compliance with best standards of transparency, in line with major international central banks/reserve management authorities. Within the broader framework of monetary, fiscal, and financial policies, areas relating to transparency and disclosure constitute important aspects of reserve management. The policy on reserve management as well as all relevant information are articulated through a variety of means from time to time, the most significant being the half-yearly Monetary and Credit Policy Statements by the Governor of the RBI. The speeches of the Governor and Deputy Governors are important sources of policy analysis, actions, and intentions. The Annual Reports of the RBI provide an authentic version of RBI’s perspective as approved by its Board. Periodical publications, Press Releases, and Discussion Papers of the RBI provide additional important sources of information.

607. The RBI has also been providing, on a regular basis, appropriate data relating to foreign exchange market operations. The RBI publishes

daily data on exchange rates, forward premiums, and foreign exchange turnover and on a weekly basis the movement in foreign exchange reserves, in the Weekly Statistical Supplement (WSS) of the *RBI Bulletin*. Data on nominal effective exchange rate (NEER) and real effective exchange rate (REER), RBI's purchases and sales in the foreign exchange market, along with outstanding forward positions, are published in the *RBI Bulletin* with a time lag of one month.

608. The RBI has all along been ahead of central banks of many developing and industrial countries in regard to publishing details on the size of its gross foreign exchange market intervention (purchase and sale) and its net forward position. The daily reference rate of U.S. dollars and euros as well as the middle rates for four major currencies, namely, U.S. dollars, pounds sterling, euros, and Japanese yen are made available by the RBI website.

609. As a part of the Special Data Dissemination Standards (SDDS), the IMF has prescribed a data template for disclosure of international reserves and foreign currency liquidity of countries that have subscribed to SDDS. India is among the 49 countries that have adopted the SDDS template for publication of detailed data on foreign exchange reserves. The data template provides information on a number of parameters, including currency composition (SDR and other currencies), deployment of foreign exchange reserves, and forward position. These data are made available on a monthly basis, since October 2001, both through the RBI and IMF (SDDS) websites.

## Principles, Policies, and Practices of Reserve Management

### Reserve management operations

610. Currently, accretion to foreign currency reserves arises mainly out of purchases by the RBI from Authorized Dealers. In addition, there is income from deployment of foreign exchange assets held in the portfolio of the RBI. Aid receipts on government accounts also flow into reserves. Outflow of reserves arises mainly on account of sale of foreign currency to Authorized Dealers. There are occa-

sions when foreign exchange is made available from reserves for identified users, as part of a strategy of meeting lumpy demand for foreign exchange. The net effect of purchases and sales of foreign currency is the major determinant of the level of foreign exchange reserves. The sales or purchases also include those in forward markets, although such transactions are of a very small magnitude.

611. Decisions involving currency composition and the maturity pattern of the investments are driven by broad parameters of safety, liquidity, and profitability. The choice of the highest possible quality investment instruments and explicit constraints on critical portfolio variables, such as limits on various securities, currencies, counterparties, and sovereigns form the basic elements of reserve management. Transactions are put through with counterparties, approved for the purpose. Counterparties could be banks, subsidiaries of banks, or security houses. Such counterparties are approved by the RBI, taking into account their international reputation and track record apart from factors such as size, capital, rating, financial position, and service provided by them. While investments in securities are restricted to sovereign and sovereign-guaranteed instruments, the residual maturity of these instruments cannot exceed 10 years. A good percentage of reserves is invested in the money market, including deposits with top-notch international commercial banks. Investments in new products/markets are deliberated upon within the Department of External Investments and Operations, by its "Investment Committee," which meets at the start of every week before appropriate approvals are sought.

612. In practice, holdings of gold have been virtually unchanged and gold reserves are managed passively.

### Evolution of reserve management policy in India

613. India's approach to reserve management, until the balance of payments crisis of 1991, was essentially based on the traditional approach, i.e., to maintain an appropriate level of import cover defined in terms of number of months of imports equivalent to reserves. For example, the RBI's

Annual Report 1990–91 stated that the import cover of reserves shrank to 3 weeks of imports by the end of December 1990. Thus, the emphasis on import cover constituted the primary concern, say, until 1993–94.

614. The approach to reserve management as part of exchange rate management and, indeed, external sector policy underwent changes with the adoption of the recommendations of the High Level Committee on Balance of Payments (Chairman: Dr. C. Rangarajan) in 1992. The focus in deciding on the level of reserves was in fact shifted to ensuring a reasonable level of confidence in the international financial and trading communities in general and a plethora of factors that contribute to such confidence in particular. The extract given below provides evidence of this shift in the approach.

“It has traditionally been the practice to view the level of desirable reserves as a percentage of the annual imports—say reserves to meet three months imports or four months imports. However, this approach would be inadequate when a large number of transactions and payment liabilities arise in areas other than import of commodities. Thus, liabilities may arise either for discharging short-term debt obligations or servicing of medium-term debt, both interest and principal. The Committee recommends that while determining the target level of reserve, due attention should be paid to the payment obligations in addition to the level of imports. The Committee recommends that the foreign exchange reserves targets be fixed in such a way that they are generally in a position to accommodate imports of three months.” (Paragraph 6.3)

615. In the view of the Committee:

“The factors that are to be taken into consideration in determining the desirable level of reserves are the need to ensure a reasonable level of confidence in the international financial and trading communities about the capacity of the country to honor its obligations and maintain trade and financial flows; the need to take care of the seasonal factors in any balance of payments transaction with reference to the possible uncertainties in the monsoon conditions of India; the amount of foreign currency reserves required to counter speculative tendencies or anticipatory actions amongst players in the foreign exchange market; and the capacity to

maintain the reserves so that the cost of carrying liquidity is minimal.” (Paragraph 6.4)

616. As mentioned in the RBI’s Annual Report, 1995–96, with the introduction of the market-determined exchange rate, a further change in the approach to reserve management was warranted and the emphasis on import cover was supplemented by the objective of smoothing out the volatility in the exchange rate.

617. Against the backdrop of currency crises in East Asian countries in 1997 and in light of country experiences of volatile cross-border capital flows, it was felt that there was need to take into consideration a host of factors, including the shift in the pattern of leads and lags in payments/receipts during exchange market uncertainties. The RBI Annual Report, 1997–98, emphasized that besides the size of reserves, the quality of reserves also assumed importance. Thus, unencumbered reserve assets (defined as reserve assets net of encumbrances such as forward commitments, lines of credit to domestic entities, guarantees, and other contingent liabilities) were required to be available at any point of time to the authorities for fulfilling various objectives assigned to reserves.

618. As regards management of external liabilities, the policy of the RBI to keep forward liabilities at a relatively low level as a proportion of gross reserves and the emphasis on prudent reserve management were highlighted in the RBI’s Annual Report, 1998–99.

619. The overall approach to management of India’s foreign exchange reserves had undergone a further change during 1999–2000, reflecting the changing composition of balance of payments and liquidity risks associated with different types of flows as elaborated in the RBI Annual Report, 1999–2000. This is evident from the extract as below:

“The policy for reserve management is built upon a host of identifiable factors and other contingencies, including, *inter alia*, the size of the current account deficit and short-term liabilities (including current repayment obligations on long-term loans), the possible variability in portfolio investment, and other types of capital flows, the unanticipated pressures on the balance of payments arising out of external shocks and movements in repatriable for-

eign currency deposits of non-resident Indians.” (Paragraph 6.30)

620. In recent years, while focusing on prudent management of foreign exchange reserves, there has been an emphasis on “liquidity risk” associated with different types of flows. In this context, the traditional approach of assessing adequacy of reserves in terms of import cover has been broadened to include a number of parameters that take into account the size, composition, and risk profiles of various types of capital flows, as well as external shocks to which the economy is vulnerable.

621. Governor Jalan’s statement on Monetary and Credit Policy (April 29, 2002) provides an up-to-date and comprehensive view on the approach to reserve management:

“A sufficiently high level of reserves is necessary to ensure that even if there is prolonged uncertainty, reserves can cover the ‘liquidity at risk’ on all accounts over a fairly long period. Taking these considerations into account, India’s foreign exchange reserves are now very comfortable.” (Paragraph 23). . . . “the prevalent national security environment further underscores the need for strong reserves. We must continue to ensure that, leaving aside short-term variations in reserves level, the quantum of reserves in the long-run is in line with the growth of the economy, the size of risk-adjusted capital flows and national security requirements. This will provide us with greater security against unfavorable or unanticipated developments, which can occur quite suddenly.” (Paragraph 24)

622. The above discussion points to evolving considerations and indeed a paradigm shift in India’s approach to reserve management. The shift has been from a single indicator to a multiple indicators approach.<sup>36</sup>

623. Adequacy of India’s foreign exchange reserves at present could, however, be broadly assessed in terms of various indicators as described below:

- In terms of the traditional **trade-based indicator** of reserve adequacy, i.e., the import

cover (defined in terms of reserves in months of imports). While India’s foreign exchange reserves could cover only 3 weeks’ of imports as of end-December 1990, the position improved to about 11.5 months as of end-March 2002;

- In terms of **money-based indicators**, the proportion of net foreign exchange assets of RBI to currency with the public sharply increased from 15 percent in 1991 to 109 percent as of end-March 2002 and the proportion of net foreign assets (NFA) to broad money (M3) increased more than six-fold, from 3 percent to 18 percent, during the same period;
- **Debt-based indicators** of reserve adequacy showed remarkable improvement in the 1990s and the proportion of short-term debt (i.e., debt obligations with an original maturity up to one year) to foreign exchange reserves substantially declined from 147 percent as of end-March 1991 to 8 percent as of end-March 2001, whereas the proportion of volatile capital flows (defined to include cumulative portfolio inflows and short-term debt) to reserves decreased from 147 percent in 1991 to 58.5 percent as of end-March 2001. Further, as part of sustainable external debt position, the short-term debt component decreased from 10 percent as of end-March 1991 to 3 percent as of end-March 2001. Similarly, the size of debt service payments relative to current receipts decreased from 35 percent in 1991 to 16 percent in 2001.

## Establishing a Capacity to Assess and Manage Risk

### Risk management

624. The RBI has in place sound systems to identify, measure, monitor, and control various types of risk involved in reserve management. Broadly, risk management involves establishing parameters for:

- (i) desirable currency mix and limits to facilitate availability of convertible currencies;

<sup>36</sup>For a subsequent substantive discussion on the issue, refer to the Mid-Term Review of Monetary and Credit Policy for 2002–2003 (paragraphs 30–34), *RBI Bulletin*, November 2002, available on the RBI website, [www.rbi.org.in](http://www.rbi.org.in).

- (ii) permissible range of investment instruments that meet liquidity and safety requirements; and
- (iii) maturity or duration requirements to address interest rate or price risks.

625. The risks attendant on deployment of reserves, namely, credit risk, market risk, liquidity risk, and operational risk are detailed in the following paragraphs.

**Credit risk:** Credit risk refers to risk arising out of default or delay in payment of obligations. Credit risk is addressed by putting in place a framework under which investment is made in financial instruments issued by sovereigns, banks, and supranationals conforming to a minimum rating. For example, investments are invariably made in papers issued by AAA rated sovereigns and supranationals apart from those with BIS. As stated earlier a careful process of selection of counterparties and fixation of limits for each category of transactions is also in place. Ratings given by international rating agencies and various other financial parameters are considered before grading and fixing limits regarding each counterparty. The day-to-day developments regarding the counterparties are closely monitored.

**Market risk:** Market risk comprises currency risk and interest rate risk.

- (a) **Currency risk:** Currency risk arises due to uncertainty in exchange rates. Foreign currency reserves are invested in multicurrency, multimarket portfolios. In tune with international trends, RBI follows the practice of expressing foreign exchange reserves in U.S. dollar terms. The senior management is kept informed of the currency composition of reserves through the weekly Management Information System (MIS) report.
- (b) **Interest rate risk:** The central aspect of the management of interest rate risk for a central bank is to protect the value of the investments as much as possible from the adverse impact of interest rate movements. The

interest rate sensitivity of the reserves portfolio is measured and managed in terms of benchmark duration and permitted leeway from the benchmark. The emphasis is to keep the duration short, which is in tune with the approach to remain risk averse and keep a liquid portfolio. The benchmark duration and the leeway are suitably altered keeping in view the market dynamics.

**Liquidity risk:** The choice of instruments determines the liquidity of the portfolio. While bonds and treasury bills of AAA rated sovereigns are highly liquid, BIS Fixbis/Discount fixbis can be liquidated at any time to meet the liquidity needs. With the increasing focus of central banks, academics, and market participants worldwide on the adequacy of reserves, the Department of External Investments and Operations has been undertaking exercises based on stochastic models in order to estimate “Liquidity at Risk (LaR)” of reserves.

**Operational risk:** Internally there is a total separation of the front and back office functions. The internal control systems ensure several checks at the stages of deal capture, deal processing, and settlement. The middle office is responsible for risk measurement and monitoring, performance evaluation, and concurrent audit. The deal processing and settlement system is also subject to internal control guidelines based on the principle of one point data entry, and powers are delegated to officers at various levels for generation of payment instructions. To hold the dealers to a high degree of integrity, a code of conduct has been prescribed for them and an annual undertaking is obtained from each of them to ensure that they abide by the code of conduct.

**Custodial risk:** A major portion of the securities are held by the central banks. While all U.S. Government securities are held with the Federal Reserve, all gilts and Japanese Government Bonds (JGBs) are with the Bank of England and Bank of Japan, respectively. All primary cash accounts are with the central banks in their respective countries. BIS provides both custo-

dial and investment services and accordingly they are also the custodians for investments with them. A small portion of other euro securities and assets managed by external asset managers are placed with carefully selected global custodians. The custodial arrangements are reviewed from time to time and the developments relating to the custodians are tracked regularly to ensure that the risk is kept to the minimum.

### **Audit and Management Information System (MIS)**

626. There is a system of concurrent audit in the Department of External Investments and Operations for monitoring compliance with all the internal control guidelines, independent of the process flows. Reconciliation of nostro accounts is done on a daily basis for major currencies.

627. In addition to the annual inspection by the Inspection Department of the RBI and statutory audit by external auditors, there is a system of appointing a special external auditor to audit dealing room operations. The main objective of the special audit is to ensure that risk management systems and internal control guidelines are adhered to by the Department.

628. A sound management information system (MIS) exists in the Department of External Investments and Operations for comprehensive reporting to senior management on all significant areas of activity. Reports are provided to senior management, with their frequency depending on the type and sensitivity of information.

### **Division of reserves into tranches**

629. The guidelines for foreign exchange reserve management developed by the IMF indicate that a number of reserve management enti-

ties subdivide their reserves portfolio into “tranches,” namely, liquidity tranche and investment tranche according to liquidity and investment objectives and policy requirements. In the case of the RBI, a system that creates an explicit division of the reserves of this kind is not in place. However, the RBI has two broad portfolios with independent risk parameters, namely, the money market portfolio and the bonds portfolio. The money market portfolio comprises instruments with maturity of less than one year and it is predominantly guided by transaction and intervention needs. By its very nature (because of low duration), the money market portfolio runs a lower market risk (in relation to interest rate movements). In contrast, the bonds portfolio consists of long-term holdings (up to a maximum of 10-year residual maturity) of triple-A rated sovereigns and supranationals.

### **External asset managers**

630. A small portion of the reserves has been assigned to external asset managers with the objectives of gaining access to and deriving benefit from their market research. It also helps to take advantage of the technology available with asset managers while utilizing the relationship to obtain the required training/exposure for the central bank’s personnel dealing with foreign exchange reserve management. The asset managers are carefully selected from among the internationally known asset management companies. They have been given clear investment guidelines and benchmarks and their performance is evaluated at periodic intervals by a separate unit within the middle office. External asset managers’ views and outlook on international bond and currency markets are examined and taken as input by operational personnel.

# 11

## Israel

### Background

631. Israel's foreign-exchange reserves are owned and controlled by the central bank, Bank of Israel (the Bank), which is therefore the "reserve management entity," as defined by *Guidelines*. Within the Bank, the Foreign Currency Department (Department) is responsible for performing the reserve management function, under the direction of the Governor of the Bank.

632. The size and role of Israel's foreign-exchange reserves have evolved over the 17 years since the 1985 Stabilization Program, which marked a watershed in the country's economic history. The early years of this period were characterized by a fixed exchange rate, which served as a nominal anchor for the price-level and a target for monetary policy, accompanied by a strict currency-control regime and the absence of significant interbank trading in foreign currency. In this environment, the reserves portfolio served as a "buffer" for capital flows, with the Bank intervening in the market on a daily basis.

633. Over the last decade or so, the focus of monetary policy moved from exchange-rate targeting to inflation-targeting, the exchange-rate regime was gradually liberalized, foreign-currency controls were all but eliminated (with the last restrictions due to be lifted at the end of 2002), and an active interbank foreign-exchange market, in which the Bank has not intervened for several years, developed. The

exchange-rate regime is now defined by a band for the value of the sheqel against a basket of currencies, with the lower bound fixed, while the upper bound increases by 6 percent per year. As of early 2002, the width of the band, relative to its midpoint, was around 45 percent. The Bank has declared a policy of nonintervention within the band, but is committed to defending the band's limits until such time as it is formally abolished. The past decade was also witness to a substantial increase in the size of the reserves, which tripled in dollar value from 1994 to 1998, while the ratios of the reserves to various other aggregates increased by lesser degrees. This increase was primarily due to intervention by the Bank in the local foreign exchange market, to defend the limit on sheqel appreciation set by the band.

### Governance and Institutional Framework

#### Objectives, scope, and coordination of Israel's reserves management

##### *Objectives*

634. In conjunction with the evolution of economic policies and circumstances described above, the Bank's understanding of the purposes served by the foreign-exchange reserves has changed and developed, a process that remains ongoing. Based on the experience of other countries and the rele-

vant academic literature, the Bank has identified four principal goals that are served by holding the reserves portfolio:

- **Reducing the probability of a crisis in the local foreign-exchange market.** Although, as noted, the Bank's stated policy is not to intervene within the limits of the band, the knowledge that it has access to substantial reserves of foreign currency serves to reassure both residents and foreign investors, on the one hand, while deterring speculative attacks on the other. However, it should be emphasized that the importance of the reserves in this regard is secondary to that of sound and credible macroeconomic policies that support economic and financial stability.
- **Providing a strategic reserve of liquidity,** for use in a market crisis—should one nevertheless develop—together with other tools, such as the interest rate, or for use in a national emergency. In such situations, a high level of reserves improves the resilience of the economy and expands the range of options available to policymakers.
- **Improving the standing of the country in international capital markets,** where many of the players view the level of a country's foreign-exchange reserves as an important indicator of its financial stability.
- **Providing the government with a degree of flexibility in managing the composition of public-sector debt.** Since the government can buy foreign currency from the Bank at will, it could choose to fund part of its foreign-currency expenditures (debt service or other expenses) from local-currency sources (taxes or borrowing) rather than from income or new borrowing in foreign currency. However, excessive use of this option could impair the ability of the reserves to serve the other goals listed.

635. In contrast with the evolving state of the Bank's purposes for *holding* reserves, the Bank's objectives in *managing* the reserves have remained fairly stable over the years, although the means of achieving them have been refined and adapted to

changing circumstances. Though not formally adopted in this language, the Bank's investment policy has been developed on the basis of the following objectives for reserves portfolio management:

- **Preserving the real foreign purchasing power of the reserves.** This goal finds expression in the currency composition of the reserves, the management of their interest-rate risk, and the limitations on credit risk.
- **Maintaining a high degree of liquidity.** This goal is met mainly via limits on the types of assets that may be included in the reserves portfolio.
- **Subject to meeting the first two objectives, earning a reasonable rate of return on the portfolio.** This goal has influence on the choice of portfolio duration, the level of credit risk accepted, and the decision to employ active management.

636. A further objective of the reserves management process, though one clearly subordinate to the three listed above, is the accumulation of information and expertise that can be of value to other core functions of the Bank, such as the formulation of monetary policy or exchange-rate policy (as noted in *Guidelines*, Sec. I, Par. 2.).

#### *Scope and coordination*

637. Management of the foreign-exchange reserves is closely linked with the formulation and conduct of exchange-rate intervention policy, with a number of individuals at various levels having involvement in both.<sup>37</sup> As noted above, the reserves management process also provides valuable information resources to the makers of domestic monetary policy.

638. Under current policy, the Bank is not involved in liability management,<sup>38</sup> nor are the reserves managed with a view to hedging the inter-

<sup>37</sup>However, under the Bank's current policy of nonintervention, "conduct" of intervention policy is limited to information-gathering activities, so long as the exchange rate is within the band.

<sup>38</sup>Other than the use of short-term repurchase agreements for tactical liquidity management.

est-rate exposure of Israel's foreign-currency liabilities. Israel's foreign-currency borrowing is managed by the Ministry of Finance. Traditionally, the maintenance of a "Chinese wall" between the reserve manager and the liability manager has been seen as an important safeguard for the reserves' unencumbered status, the value of which outweighed any advantages that might be obtained from coordination between the Bank and the Finance Ministry. (This issue is currently being reexamined.) However, the currency composition of Israel's short-term debt service is a factor in setting the currency composition of the reserves (see paragraph 649 below).

## **Institutional framework**

### ***Legal foundation and structure of internal governance***

639. The Bank of Israel's authority to own and manage the foreign-exchange reserves of the country is based on The Bank of Israel Law, 5714–1954, and on the legal interpretations that have been developed around it over the course of the years. It should be noted that the law and its interpretations primarily address the types of foreign-currency assets that the Bank may own and the counterparties with whom it may transact.<sup>39</sup> Thus, many aspects of the Bank's investment policy and governance framework for the reserves are matters of internal Bank policy.

640. The main directives regarding management of the reserves portfolio in its various aspects, and the degree of leeway allowed to the Department in each aspect, are set by the Foreign Currency Committee, which is chaired by the Governor and includes senior managers from various departments of the Bank. The Department reports to the Foreign Currency Committee on current developments in international markets, on the performance of the portfolio and the various investment decisions made by the Department, and on any alterations in the

parameters of the Bank's investment policy that the Department wishes to propose.

641. Investment decisions of the Department, within the boundaries set by the Foreign Currency Committee but beyond the leeway allowed to individual portfolio managers, are discussed in the Investments Committee, which is chaired by the Director of the Department and attended by staff members of the front and middle offices and by back-office managerial staff. The Investments Committee meets weekly to review market developments and front-office positions, as well as to consider investment decisions within its purview and recommendations to the Foreign Currency Committee. *It should be noted that the role of both the Investments Committee and the Foreign Currency Committee is advisory, rather than authoritative, since responsibility for their decisions is ultimately borne by the officers chairing them (the Director of the Department and the Governor, respectively).*

642. Investment decisions within the boundaries set by the Investments Committee are made by portfolio managers, with the approval of the head of the front office (which is normally always given). Senior portfolio managers are responsible for one or more nonoverlapping portfolios, typically defined by currency and range of maturities. They are assisted in this by junior portfolio managers, who may be given responsibility for part of a portfolio, and by trader-analysts (see below). No organizational separation is made between trading and portfolio management activities. The application of the above principles to active management of the reserve portfolio is discussed further in paragraph 662, below.

### ***Staff***

643. As stated in the *Guidelines* (Sec. IV, Par. 36), "appropriately qualified and well-trained staff, following sound business practices" are an essential element of the framework for reserve management. The Department's personnel policy in recent years has been based on the following principles:

- The Department's goal is to employ tenured, long-term employees who become known well. Thus, staff members of the front, middle, and back offices are regular employees

<sup>39</sup>In brief, the Bank is permitted—within the framework of the reserves—to own gold, foreign currency, and securities that are issued or fully guaranteed by a foreign government, to invest in bank deposits and CDs, and to utilize derivatives such as futures and options, provided the underlying asset is of a type that the Bank is permitted to own.

of the Bank, governed by the same collective-bargaining agreements as staff members of other departments.

- When vacancies occur in the front office, they are normally filled by probationary employees who are recent MA-level honors graduates in economics or finance, *without* prior financial market experience. Practical training as a trader-analyst thus takes place on a *tabula rasa*, and is oriented toward the specific needs of the Bank. A combination of internal and external training is employed. Needless to say, all employees must be eligible for appropriate security clearances.
- At the end of a four- to five-year probationary period, trader-analysts who show exceptional ability are offered permanent employment as portfolio managers. Those who are not offered permanent appointments typically find that the experience gained in reserve management is well respected by potential employers in the private financial-services industry. A similar employment cycle applies to the middle office.
- Compensation is on the same pay scales as professional staff with graduate training in other departments of the Bank. As a matter of policy, there are no direct incentives to employees based on trade performance.
- Front and middle office staff members with permanent appointments generally remain in their positions on the order of a decade (with quite substantial variation around this mean). Rotation to posts in other departments of the Bank (including managerial positions) is an option for those who come to desire a change or suffer professional burnout. In past years, front and middle office “alumni” have also moved on to senior economic posts in other branches of the public sector.

### Transparency and accountability in the reserves management process

#### *Operational risk management*

644. As a manager of public funds, the Bank is particularly sensitive to issues of security and oper-

ational risk, and it strives constantly to maintain high standards of practice in this area, consistent with the norms of the financial services industry in the developed world and with reasonable cost-benefit trade-offs. Among the most important aspects of the Bank’s control procedures are the following:

- **The organization of the Foreign Currency Department and its established work practices.** These have been designed to reduce the possibility of loss due either to human error or to intentional misconduct. Standard working procedures, which are documented and enforced, include routine verification and authorization procedures. The use of computer systems, which include automated controls procedures, is extensive. And there is an almost absolute division of authority and responsibility, on both an organizational and personal level, in the Department’s primary tasks—transacting trades, processing trades, sending payment instructions, accounting, and auditing—so that a single individual does not have the ability to process a trade, send payment instructions, or alter records.
- **Control functions carried out by various units within the Department.** In addition to the back office, which performs a number of checks in the regular course of processing trades, and the Department’s auditing section, which reconciles all transactions after settlement, there is a staff member—the System Controller—who follows all transactions processing on a real-time basis, and who reports directly to Department management.
- **Monitoring by authorities outside the Department.** These include the Comptroller’s Department, which prepares the Bank’s daily financial statements, checks accounts, and authorizes the proper accounting scheme in the general ledger; the Bank’s Internal Auditor, who performs regular comprehensive examinations of specific topics within the Foreign Currency Department, reporting to management of the Department and the Bank; and the public accounting firm employed as External Auditor by the Bank,

which audits the Department's activities once a year and reports its findings in writing to the Governor of the Bank.

- **Management's follow-up.** Every irregular occurrence in the operational process is documented, with instructions for corrective action to prevent a recurrence. Once a year, a general overview of control procedures is undertaken. Needless to say, any recommendations of the external and internal auditors are also given the most serious consideration.
- **Codes of conduct.** All Foreign Currency Department employees are subject to the Bank's rules of conduct, which include special rules on conflict-of-interest for staff with market contact. Such staff members are also required to be familiar with, and to follow, the ethical codes of the markets in which they trade. The Department is currently studying this issue, with a view to drawing up a Departmental Code that would incorporate all the existing rules and possibly extend them.

### **Disclosure**

645. For many years it was the Bank's practice for the Department to prepare an Annual Report for use within the Bank, which was submitted to the Governor and members of the Foreign Currency Committee (see paragraph 640), with a very brief summary included in the Bank's Annual Report. In 2001, the Department's Annual Report was published separately, and in 2002 it was included in full in the Bank's Annual Report. These documents provide the public with extensive information on the Bank's objectives, investment policy (not including precise currency composition), and investment performance in absolute terms and relative to benchmark. They can be viewed on the Bank's website, at <http://www.bankisrael.gov.il/publeng/publeng.htm>. Up-to-date monthly data on the foreign-exchange reserves, in the form prescribed by the IMF Template, can also be found there, at <http://www.bankisrael.gov.il/deptdata/mth/imf/imfdata.htm>.

## **Assessing and Managing Risk**

### **Investment policy and benchmark portfolio**

646. The Bank of Israel's investment policy comprises the standards and procedures adopted by the Foreign Currency Committee, which ensure that management of the reserves is in accord with the Bank's long-term preferences, objectives, and strategies. It provides for conservative limits on the portfolio's exposure to various financial risks, the main ones being currency risk, interest-rate risk, and credit risk. (There are additional risks, such as liquidity risk (paragraphs 667–669) and operational risk (paragraph 644).) The Bank's investment policy defines a risk-neutral **benchmark portfolio** for the reserves, and limits the deviations of the actual portfolio from the benchmark in terms of the various financial risk factors. These deviations may be the result of **active management**, or may be due to the operational limitations of transacting in financial markets. The limits on each risk factor are applied independently; synergistic risk measures such as Value at Risk (VaR) are monitored, but currently have no formal role in the investment policy. The Department investigates new risk measures as they are developed; measures examined in recent years include partial duration and spread duration (not adopted) and option-adjusted duration (adopted for mortgage-backed securities).

647. The sections that follow give a brief introduction to some aspects of the Bank's investment policy. More complete information may be found by consulting the sources listed above in paragraph 645.

### **Neutral currency composition**

648. The neutral currency composition of the reserves is known as the *numeraire*. It is defined by fixed percentages of various currencies, with the number of units of each one allowed to vary as exchange rates change (in contrast to a currency basket, such as the SDR, in which the number of units is constant from day to day while the percentages vary). The composition of the numeraire is reviewed at least once a year.

649. When first adopted, the composition of the numeraire was based on the geographical dis-

tribution of goods and services imports. This composition was considered to preserve the real foreign purchasing power of the reserves, since imports constitute the foreign currency component of Israel's total final uses of funds.<sup>40</sup> A few years later, another element was added to the composition of the numeraire, namely, the currency composition of external debt service for the coming year. A further consideration in determining the currencies included in the numeraire has been that they are "reserve currencies," that is, those of countries with a tradition of economic stability and responsible policies in various fields.

650. The currency composition of the numeraire described here has changed over time only moderately, and it bears a reasonable resemblance to the currency composition of the total reserves held by official institutions. Nevertheless, over the past several years the Bank has reexamined the definition of the numeraire from time to time. To date, there has been no change in it, *inter alia* because the other systems reviewed yielded currency compositions that could change radically from year to year, making them very difficult and expensive to implement.

### **Neutral duration**

651. The interest-rate risk of a portfolio in a particular currency is defined by its duration, and by the distribution of that duration along the yield curve. The Bank of Israel has defined a neutral duration for each currency in the numeraire by using a modified shortfall approach.

652. Under the shortfall method, a portfolio manager sets a minimum threshold for acceptable holding-period yields. Since the future course of yields-to-maturity in the market is uncertain, it is impossible to rule out capital losses with absolute certainty (unless one invests in zero-duration assets such as cash), but only with a certain probability, known as the confidence level. The minimum

threshold and confidence level set by the portfolio manager, on the basis of his inclinations and risk aversion, together with the assumed distribution of yields to maturity in the market, determine the maximum allowable portfolio duration, or shortfall duration.

653. Unfortunately, for a given threshold and confidence level, the shortfall duration can vary significantly from month to month, as the yield curve shifts. In order to find a duration that would have acceptable characteristics in various financial climates, staff of the middle office conducted the following study: For each month of the period from January 1984, to June 1998, the shortfall duration was calculated, using a confidence level of 95 percent and a minimum threshold equal to one-half the yield on a risk-free asset. For U.S. dollars, this was defined as a three-month Treasury bill and for other currencies as the one-month LIBID interest rate. The resulting series of monthly shortfall durations was then examined, and a value selected that is lower than 95 percent of them. This gives a duration that, 95 percent of the time, would have given an *ex ante* probability of *at least* 95 percent of earning no less than one-half the risk-free rate.

654. After doing this calculation separately in each currency, and after further minor technical adjustments, a single neutral duration was set for the currency portfolios comprising the reserves. This duration is 16 months.

### **Formulation of neutral benchmarks**

655. The core element of the Bank's investment policy is the neutral benchmark of the reserves portfolio. Control of currency risk and interest-rate risk (and, to a limited extent, credit risk) is exercised via limits on the allowable deviations of the actual portfolio from its neutral benchmark (see paragraph 662), and it constitutes a risk-free portfolio for the Department, when it does not wish to have open positions, and provides a criterion for assessment of the Department's performance (paragraphs 664–666).

656. The overall neutral benchmark is constructed on the basis of benchmark portfolios in the various currencies of the numeraire, each one being represented in proportion to its numeraire

<sup>40</sup>This system was based on the 1979 study by A. Ben-Bassat, *The Management of Foreign Exchange Reserves, Israel's Experience*, Research Department, Bank of Israel (Hebrew), an abridged English version of which was published in the May 1981 *Bank of Israel Economic Review*.

weighting. Each of these component currency benchmark portfolios has a neutral duration (see above), and is composed of assets that are characterized by low risk and high liquidity, features that reflect the Bank's long-term investment strategy. Each currency benchmark portfolio is based on two components: the first, having a short duration, includes assets of up to one year to maturity, while the second, which has a longer duration, includes assets of between one and five years to maturity. The weights of the two components are then set such that the total duration of the currency benchmark portfolio is neutral. The assets included in the currency benchmark portfolio are government bonds of the currency's country. However, in currencies where the market for government securities maturing up to one year is not liquid, the short-term component contains indices that reflect the interest paid by the Bank for International Settlements (BIS).

657. Although the Bank's use of active management (paragraph 662) implies that there is usually a gap between the yield of the reserves portfolio and that of the benchmark, this difference is generally small. This means that the expected profit on the reserves portfolio is determined primarily by the composition of the benchmark portfolio, rather than by the quality of the Bank's active management. Therefore, periodic adjustment of the benchmark portfolio to ongoing changes in the global financial environment is a necessary process, and is one of the major challenges confronting the Bank.

### **Limitation of credit risk**

658. As is true of many official institutions, the Bank of Israel's sensitivity to credit risk is greater than its sensitivity to other financial risks. This is primarily due to the judgment that its ability to use diversification to limit the scope of losses is more limited in this area than it is *vis-à-vis* other types of risk, such as interest-rate risk. Additional reasons for heightened sensitivity would include: the possibility of correlation between losses due to credit risk in the portfolio and the need to make use of the reserves (e.g., in a global financial crisis), the limitations of currently available tools for quantify-

ing credit risk, the desire to avoid having to seek legal redress in the courts of a foreign country, and the fact that credit risk is "optional" (in that it could be almost completely eliminated by investing only in the securities of sovereign states in their local currencies), while other risk factors are not.

659. Investment of the reserves portfolio causes it to be exposed to the credit risk of various types of institutions—governments, international organizations, clearing systems, commercial banks, and broker-dealers. Investment in the securities of a foreign government creates exposure to the issuing country, while investments in bank deposits, time differentials in the settlement process, and trades involving delayed settlement (e.g., currency forwards) create exposure both to private firms and to the countries in which they operate. The Bank's willingness to assume exposure falls as the risk of experiencing a loss increases (i.e., as credit quality declines), as the time over which the risk extends increases, and as the type of entity to which the exposure pertains is thought to be less resilient (e.g., banks vs. governments).

660. The Bank uses a variety of tools to manage the credit risk of the reserves portfolio. Of these, the most important is the **System of Limits and Quotas**, which defines for each institution (bank, country, etc.) the maximum quantity of various types of credit exposure that may be assumed. It sets the minimum levels of credit quality for individual institutions of various types and also ensures appropriate diversification across firms and countries, in line with their relative size and credit quality. Additional tools for control of credit risk include: a ceiling on the total exposure of the reserves portfolio to the world banking system, limits on the permitted quantity of investment in "spread assets," such as Eurobonds, and limits on the maximum time for which certain types of exposure can be assumed (e.g., on the term-to-maturity of bank deposits).

661. Once a year, the System of Limits and Quotas is updated by the Department and submitted to the Foreign Currency Committee for approval. If an institution's quota is added or enlarged during the course of the year, the change must be approved by the Foreign Currency Committee. However, the Department may cancel

or reduce a quota on its own initiative at any time, if changes in the institution's status warrant doing so. It should also be noted that the Bank's relations with financial institutions are anchored in legal agreements, most of which have been signed in the past few years.

### Scope for active management<sup>41</sup>

662. In investing the foreign exchange reserves, the Department is authorized to use **active management** or **position-taking**, that is, to decide to depart from the overall benchmark portfolio, in terms of currency composition, duration, kinds of assets, and their distribution along the yield curve, with the goal of earning a higher yield than that of the benchmark portfolio. The leeway allowed for active management is defined separately for each type of exposure, and is based on the principle of limited delegation of authority and responsibility in the investment decision-making process from each level to the level below. In managing any type of position, it is customary to impose a maximum potential loss ("stop-loss"), with the position being closed if the cumulative loss on it reaches the limit. In recent years, the main focus of active management has been on asset allocation and security selection, which have formed an important part of the total contribution from active management.

- In the area of **currency risk**, the numeraire is viewed as a risk-free portfolio, and any deviation from it is defined as a position. Currency positions of more than limited scope must be authorized by the Foreign Currency Committee; however, the Foreign Currency Committee has not utilized this authority in recent years. The Department may decide on limited positions around the currency composition determined by the Foreign Currency Committee; within this boundary, the front office is permitted very limited positions around the currency composition set by the Investments Committee.

- The neutral **duration** for all currencies is set by the Foreign Currency Committee, and a deviation from it by the Department is considered a position. The Department is authorized to open positions of limited scope *vis-à-vis* the neutral duration in the various currency portfolios. The range of permitted durations is asymmetrical, as the Department is allowed greater leeway in reducing duration than in increasing it. Within this boundary, the front office is permitted very limited positions around the duration set by the Investments Committee.

- The **distribution of assets along the yield curve** is also a source of interest-rate risk, together with duration. The neutral distribution is that of the benchmark portfolio, while differences from it in the reserves portfolio represent positions. This type of position is normally decided on by the front office and monitored by the Investments Committee.

- Decisions on **asset allocation** may also create positions, as part of the reserves may be invested in types of assets that are not represented in the benchmark portfolio, such as Eurobonds, bank deposits, mortgage-backed securities, etc. Asset allocation decisions are normally made by the front office. However, in the case of asset allocation positions that are of unusually large scope, or that are of a long-term nature, responsibility for the position may be taken by the Investments Committee.

- Finally, decisions on **security selection**—the actual choice from among several alternative debt instruments to fulfill a specific role in the portfolio—of course are made throughout each workday by the staff of the front office, constituting an important component of active management.

663. The decision to employ active management is based on a number of considerations. First, and most importantly, the cumulative experience of the past fifteen years or so suggests that the Bank's use of active management has made a modest but statistically significant positive contribution to over-

<sup>41</sup>This section should be read in conjunction with paragraphs 639–642, above.

all portfolio return. In addition, active management requires those involved in it to be constantly up-to-date as regards market developments. This incentive helps to ensure that the Department's focus does not, over time, become too narrow, and it hones the skills needed for periodic adjustment of the benchmark portfolio and for other tasks, such as the formulation of intervention policy. Finally, the use of active management helps the Department to create an interesting and challenging work environment for front- and middle-office staff, assisting it to attract and retain highly qualified professionals.

### Performance attribution

664. The contribution of various investment decisions to the overall difference in yield between the reserves portfolio and the neutral benchmark over a given period is measured by the middle office, using the capabilities of the recently acquired portfolio management information system (paragraphs 670–677) together with a data-warehouse system developed in-house. (For a description of how performance attribution was done before the implementation of this system, see Box 1.6 of the Department's Annual Report for 2000, at the address given in paragraph 645.) The system is used to maintain portfolios that reflect the components of the neutral benchmark and portfolios that match the Bank's actual holdings, classified by maturity and asset type, including "leverage" portfolios, which are used to track the profit or loss of certain types of positions. Portfolios can be aggregated in hierarchies, so that the aggregate of actual holdings can be compared with the aggregate benchmark.

665. Leverage portfolios include long and short positions (though in its actual holdings the Bank never sells short a security). For example, the profit and loss on a currency position would typically be tracked using a leverage portfolio that includes a short position in cash in one of the currencies of the numeraire and a long position in cash in another currency (which may or may not be in the numeraire). By contrast, the performance of a particular asset class (e.g., inflation-linked securities) would be calculated by comparing the yield on a portfolio including all the Bank's holdings in

that asset class with a component portfolio of the benchmark.

666. The returns on portfolios are normally available to management and to the front and middle offices on command. An exception to the rule outlined above is the excess return on certain types of spread assets (e.g., bank deposits). Due to technical limitations, this is calculated only after the fact; however, the principles by which it is calculated are similar. Certain elements of yield curve positioning and security selection are necessarily calculated as the residual of other contributing factors and the total difference in return, but the middle office seeks to minimize the scope of this factor as far as possible.

### The role of efficient markets

667. As noted, an important goal of the Bank in managing the foreign exchange reserves is that they should have a high overall level of **liquidity**, defined as the ability to realize assets without delay and without diminishing their value. The liquidity of the various markets in which the assets comprising the reserves are traded is regularly assessed by the middle office, based on two criteria. The first is the width of the "bid-ask" spread between buying and selling prices; a narrow spread implies low transaction costs, relative to the midpoint price. The second is the ability to transact in large volumes without affecting the market price. In an illiquid market, an investor's attempt to buy or sell in large volumes will cause the spread to widen and the midpoint price to move in a direction unfavorable for the investor; thus, assets can only be sold in quantity at an average price lower than the one that prevailed before the investor began to sell.

668. Based on these criteria, the Bank classifies the assets of the reserves portfolio into four groups:

1. **Highly liquid**, including securities with a spread of 0–2 basis points or 0–2 cents and various demand deposits.
2. **Liquid**, including securities with a spread of 3–5 basis points or 4–6 cents.
3. **Short maturity**, including securities, deposits, and repurchase agreements with terms of less than a month.

4. **All others**, most of which are tradable and can be realized, however. This group has included, among others, GNMA mortgage-backed securities, TIPS (U.S. inflation-linked securities), and some types of Eurobonds.

669. During the years 1999–2001, the first group has typically accounted for no less than 20 percent of the reserves, and the first three groups together for 75–90 percent of the reserves.

### Portfolio management information system

670. Without doubt, the Bank's most significant move in recent years to enhance the quality of its reserve management and to improve transparency and accountability was its decision to acquire a new portfolio management information system. Although space limitations do not allow a full description of this project, which extended over more than three years and involved direct and indirect costs of well over US\$1 million, the main aspects of it can be briefly sketched.

671. **Recognizing the existence of a problem** was the first task, and probably the hardest. Even in ideal conditions, computer systems are often in flux, as front, middle, and back offices adapt to changing financial-market conditions. How, then, does one identify the transition point from routine imperfection to a fundamental problem requiring a more radical solution? One important warning sign was the proliferation of ad hoc solutions, often developed by end-users, to track risk measures and the profit and loss of positions. When the staff assigned to examine this problem formally mapped the Department's workflow, and counted between *five and ten distinct manual entries* to these independently maintained programs that were required *for a single trade*, it was clear that the risks had become unacceptably large. Among them,

- Substantial increase in the probability of human error, which could remain undiscovered for a considerable time.
- Inconsistency in the meaning of data across multiple systems, which sometimes were based on different concepts.

- Variation in the quality and maintenance of systems developed by end-users without professional IT training and responsibility.
- Blurring appropriate separation of responsibility, as, for example, when front-office staff, who were the only people with the expertise and access to data feeds required, built ad hoc systems to implement new compliance rules.

672. One bright spot was that the problems were found to be concentrated in the front and middle offices, with the situation of the back office judged quite acceptable.

673. **Defining the needs of the Department**, in a very detailed way, based on the gap between the current state of affairs and the desired one, was the next stage. This was done by an interdepartmental team chaired by the head of the front office and including senior people from the front and middle offices and the IT Department. The high professional level of this team proved essential to the success of the project. The team's analysis served as a guide for the general RFI (Request For Information) and the more detailed RFP (Request For Proposal), which were written at a later stage.

674. **Buy or build** was the next decision to be made, and it was not an easy one. Building a complex customized system "in-house" would have meant recruiting or contracting for substantial additional personnel in the IT area for a very lengthy project, with no guarantee that it would result in an ideal solution. On the other hand, experience to date suggested that most of the "off the shelf" systems in the market would not meet the Bank's needs. In the end, the team recommended that the possibility of purchasing a system should first be thoroughly explored, and only if a detailed examination of the available systems showed they were inadequate should the option of building in-house be revisited.

675. **Searching for systems, sending out the Request For Information (RFI) letter, and composing a short list based on the responses** were the subsequent stages of the project. The project team identified possible candidates through discussions with market participants and companies, and by searching the Internet and industry publications.

The RFI letter included a general description of the Bank's needs and the framework of reserve management, the layout of the IT systems in use, and a list of 12 questions that summarized the requirements of end-users and IT staff. Vendors were strongly encouraged not to limit themselves to just answering the questions, but rather to send publications, documentation, or other written material regarding the relevant modules of their systems, as well as information on pricing, training, and support. During this period, the Bank did not honor vendor requests to demonstrate their systems, and also found it necessary to decline various offers by companies to serve as consultants or implementation subcontractors. Based on the written responses to the RFI, a short list of candidate firms was drawn up. **Interviews** with two current clients of each short listed candidate were then conducted by conference call, based on a list of questions faxed to them in advance, *without* the participation of the vendors' firms.

676. Following these interviews, each candidate was invited to demonstrate its system, using a detailed **simulation** of initial portfolios, benchmarks, and a (fictional) day of trading activities provided by the Bank. Throughout the simulated day, cash flow, holdings, risks, and performance were measured. The simulations took place at the Bank's premises, with each vendor receiving three days in which to conduct its presentation. The program of three days was divided into carefully defined sessions, with each session relating to one of the main issues (e.g., markets, compliance, performance measurement, etc.). Each vendor was required to install its system at the bank for the occasion, so that the entire simulation was performed and demonstrated on each system. The simulation was of critical importance to the process. It gave the vendors greatly improved insight into our needs and the suitability of their systems to meet them. As a result, two companies realized that their systems were unable to perform the simulation, thereby reducing the short list. The simulation also enabled the project team and management to have the closest look possible at the suitability of each system to the Bank's requirements.

677. The **competitive tender** or **Request for Proposal (RFP)**, required by Israeli law for pur-

chase of goods or services by public sector bodies such as the Bank, was issued to the three candidates that participated in the simulation. The tender was very detailed with regard to the contractual terms of purchase (including warranty and maintenance issues), as well as the criteria for choosing a system and the future milestones of project implementation. An integral and important part of the tender was the Specification Matrix, consisting of about 500 specification line items regarding the quality and functionality of the system. In their replies, the vendors were expected to define the extent of their systems' capabilities by entering pre-defined codes for each line item (Supported, Not Supported, etc.). Where relevant, they could also add free-form comments. This detailed list helped to rank the proposals, and served as the basis for the implementation of the chosen system later on. The final choice of system was made based on considerations defined in the tender documents, with the weight of each component set prior to the review of the proposals. These included, among others, the quality of the system and its suitability for the Bank's intended uses, its price, warranty terms, and reputation.

## Conclusion

678. The preceding sections have not attempted to provide a comprehensive description of the Bank of Israel's reserve management process, but only to throw light on a few aspects of it that may be of particular interest to other official institutions. The Bank continues to explore numerous issues influencing reserve management. Some of these have been noted in the text; others include aspects of **legal risk**, **operational risk**, definition of the **universe of permissible assets**, and the **process of benchmark specification**. It should be emphasized that the Bank's approach to reserve management was not established in its present form all at once, but is the result of a long-term process of growth and development. In this regard, and bearing in mind that every institution's needs are unique to it, leading to various approaches, it is worthwhile to mention some of the fundamental conditions that underlay the development of reserves management at the Bank of Israel:

- An absolute commitment, at all levels of the organization, to maintaining the highest standards of integrity and professionalism.
- An organizational culture that encourages creativity and does not penalize those who question the “conventional wisdom.”
- A collegial working environment, encouraging full discussion of major decisions before their implementation.

- A commitment on the part of both staff and management to the professional development and continuing education of members of the organization.

679. An institution that is able to nurture these values will most likely enjoy excellent prospects for successful fulfillment of its responsibilities, whether or not the specific solutions it arrives at are similar to those described above.

# 12

## Korea, Republic of

### Developing a Sound Governance and Institutional Framework

#### Reserve management objectives

680. The Bank of Korea (BOK) holds foreign exchange reserves to maintain a capacity for intervention in the foreign exchange market, to cope with internal and external shocks, and to preserve the value of the national wealth. Therefore, the BOK puts the focus on safety and liquidity, while also endeavoring to generate high returns.

681. Subsequent to the Asian financial crisis in 1997, the foreign exchange regime in Korea moved from a market average exchange rate system to a free-floating rate system, and this reduced the central bank's need to intervene in the foreign exchange market. However, it became imperative to increase the volume of foreign reserves, since they play an important role in alleviating shock in times of financial crisis and can also enhance Korea's national credibility.

682. Although the current level of foreign reserves is sufficient to make any necessary foreign payments, such as for short-term foreign debt redemption or for withdrawal of foreign investment funds from the equity market, we believe that it is desirable to increase the amount of our foreign reserves even more, considering the efforts being put into improving the Korean financial system as well as our developing relationship with North Korea.

#### Scope of reserves management activity, and coordination with monetary and external debt policy

683. The foreign reserves that the BOK currently manages are the portion of government and BOK assets that are readily available for foreign payments, and consist of foreign-currency-denominated fixed income instruments, deposits, gold, and SDRs (see Table 20).

684. The BOK manages its foreign reserves in a manner so as not to hinder domestic monetary policy. When the BOK intervenes in the foreign exchange market, it observes the domestic interest rate and currency flows carefully so as to be in harmony with the open market operations.

685. The currency composition of the BOK's and the Government's foreign debt and its duration are taken into consideration when determining the currency composition and target duration of the foreign reserves, so that foreign exchange rate and interest rate risk can be reduced.

#### Institutional framework

686. As outlined in the pertinent laws, Korea's foreign reserves are comprised of funds from the BOK and the Government (Foreign Exchange Stability Fund).

- The BOK's authority to hold and manage the foreign reserves is outlined in the Bank

**Table 20. Reserves and Foreign Exchange Rates**

	End of 1996	End of 1997	End of 1998	End of 1999	End of 2000	End of 2001
Foreign reserves (in billions of U.S. dollars)	33.2	20.4	52.0	74.1	96.2	102.8
US\$/KRW	844.9	1,695.0	1,204.0	1,138.5	1,264.5	1,313.5

of Korea Act and the Foreign Exchange Transaction Act, which are open to the public.

- In accordance with the Foreign Exchange Transaction Act and the Budget and Account Act, the Government maintains the Foreign Exchange Stability Fund in order to stabilize the foreign exchange rate, and has entrusted the fund to the BOK to manage.
- Hence, the BOK, founded in June 1950, has been the sole reserves management entity for Korea's foreign reserves.

687. On the other hand, the BOK works closely with the Government on issues pertaining to policy decisions such as intervention in the foreign exchange market and monitoring foreign debt, in accordance with the Foreign Exchange Transaction Act.

688. In accordance with the regulations set forth by the Monetary Policy Committee, the highest decision-making body in the BOK, the Reserves Management Department (RMD) and the International Department of the Bank are responsible for foreign exchange management-related tasks. One Assistant Governor oversees both Departments (see Figure 9).

689. The RMD oversees all aspects of reserves management, including benchmark selection, investment guidelines establishment, risk management, portfolio management, accounting, and performance attribution. The department is structured based on the three major functions (front, middle, and back office), and is divided into 6 teams.

- The Reserves Management Planning Team formulates investment guidelines and the

benchmark, and determines the currency composition and range of investment products.

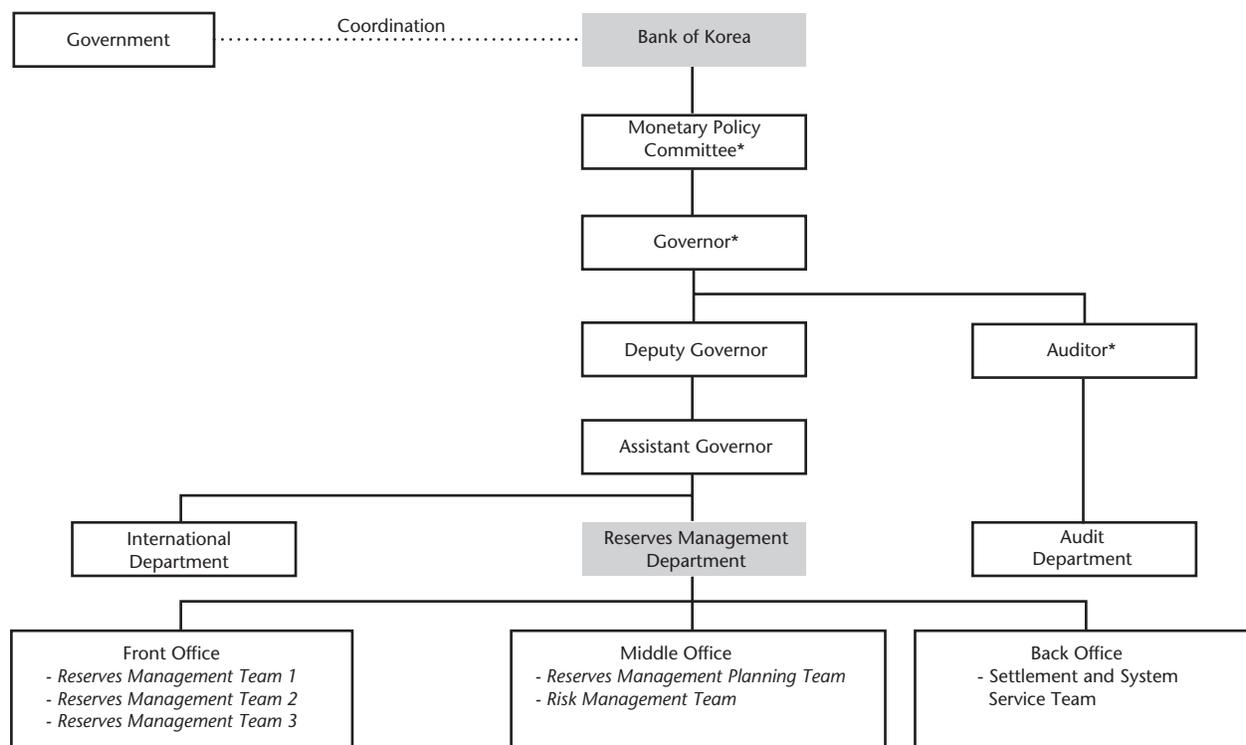
- The Risk Management Team establishes the risk limits on the commercial financial institutions, monitors various types of risk, and carries out performance analysis.
- Reserves Management Teams 1, 2, and 3 manage the portfolio in accordance with the investment guidelines and benchmark.
- The Settlement and System Service Team carries out settlement and accounting and looks after the IT systems.

690. Some of the major responsibilities of the International Department include the monitoring of foreign exchange transactions and of supply and demand, intervention in the foreign exchange market, and reviewing the volume of foreign reserves and reporting on this to the public.

### Accountability and transparency

691. To minimize the investment risk and achieve greater investment efficiency, the BOK assigns responsibilities in a hierarchical manner, in accordance with the BOK's internal regulations set forth by the Governor.

- The Governor determines the investment guidelines and the benchmark, including the currency mix and range of investment products, and approves the annual management plans.
- The Assistant Governor establishes the quarterly management plans within the parameters approved by the Governor. He also

**Figure 9. Organizational Chart**

\*Appointed by the nation's president.

mediates to harmonize the foreign reserves management plan and the foreign exchange policy that the International Department is responsible for.

- The Director of the Reserves Management Department and the heads of the three reserves management teams set and execute the weekly and daily investment plans.
- The Benchmark and Management Plans are established after approval of the Reserves Management Committee and the Investment Committee.

692. The major tasks of foreign reserve management are carried out in accordance with the "Regulation on Foreign Reserves Management" determined by the Governor, and the detailed

procedures are performed in accordance with the "Code of Foreign Reserves Management Procedures" set forth by the Director of the RMD.

693. The segregation of the accountabilities is achieved through defining the responsibilities of each function clearly, as described above. Moreover, strict firewalls have been established between each function, and each team has an independent reporting line.

694. The Risk Management Team prepares the risk management reports and submits them to the Assistant Governor on a monthly basis and reports the detailed management transactions and performance to the top management on a quarterly basis.

695. The auditing of Reserve Management activities is performed in two different ways, by means of internal audit and by external audits as follows:

- The internal audit is performed by the Risk Management Team and the Audit Department. The Risk Management Team reviews reserves management details on a daily basis to check for any breach of the investment guidelines or excess of risk limit, and ensures that the accounting is performed properly. In addition, it also measures the VaR numbers. The team reports the results to the Director.
- The Audit Department of the BOK reviews the management details daily, through the Bank's internal IT network, and performs an audit annually. The department is operated independently under the supervision of the Auditor appointed by the President, and the results of the annual audit are reported to the Governor and the Monetary Policy Committee as well as to other Government bodies.
- An external audit is performed at least once a year by the Board of Audit and Inspection, which is directly responsible to the President. Its purpose is to review both the accounting procedures and the foreign reserves management. The National Assembly also audits the foreign reserves management annually through the national audit.

696. The BOK calculates the size of the nation's foreign reserves daily and reports on this to top management and the Monetary Policy Committee on an ad hoc basis. In compliance with the IMF's SDDS, the BOK discloses the size of its foreign reserves twice a month, to the public as well as the IMF.

697. The general investment philosophy and direction are disclosed to the public through annual reports. However, we do not disclose details such as our benchmark, currency mix, portfolio composition, or portfolio returns, as to do so might adversely affect our foreign reserves management.

698. The BOK publishes an annual financial statement expressed in the domestic currency; however, this statement does not include the comments of the external auditors.

### **Retaining qualified staff**

699. Staff are selected from among the existing BOK staff based on the BOK's general human resources guidelines, and trained. No external professionals are hired.

700. The staff selected are encouraged to remain in the department long-term, in order to strengthen their expertise. They are also encouraged to participate actively in the training programs sponsored by various domestic and foreign institutions.

701. The BOK has not adopted a performance-based compensation system. Therefore, the professionals in the foreign reserves management teams are subject to the same compensation and promotion system as other staff members of the Bank.

## **Establishing a Capacity to Assess and Manage Risk**

### **Risk management**

702. To monitor the different types of risk associated with foreign reserves management, the BOK has the following procedures in place:

- **Credit Risk:** Investment is only permitted in instruments with credit ratings of AA or above, and the trading counterparties are selected based on strict criteria.
- **Liquidity Risk:** The size of the liquidity tranche is maintained at an appropriate level at all times, and all investments are made in liquid and marketable securities such as sovereign bonds.
- **Market Risk:** The criteria for the currency mix and target duration and the permitted deviation range are determined in advance and monitored closely on an ongoing basis. The VaR system is also utilized to track and monitor the greatest possible loss at a certain confidence level.

703. Since 1997, the BOK has separated its reserves into three different tranches and established different benchmarks for each tranche.

- The liquidity tranche is managed to meet the ad hoc foreign payment demand using U.S. dollar-denominated money market instruments. The optimal size of the liquidity tranche is determined quarterly based on the statistical analysis of the foreign reserves cash flow.
- The investment tranche is managed for the purpose of enhancing returns, and its assets are usually invested in mid- to long-term fixed income instruments.
- The trust tranche is the assets outsourced to internationally recognized asset management companies for the purpose of transfer of investment knowledge or know-how as well as enhancement of returns.

704. The currency composition of each tranche is determined based on the following principles:

- The entire liquidity tranche is composed of a single currency, the U.S. dollar, as most of the foreign exchange transactions are settled in U.S. dollars, and the U.S. money market is very well developed.
- The investment tranche is determined considering (1) the currency composition of the Government's and the BOK's foreign debt, (2) the currency composition of the current account payments, and (3) the size of the global sovereign bond market. In addition, other central banks' currency compositions are also used for reference.
- The trust tranche maintains the same currency compositions as the market index benchmarks employed for the respective investment strategies.

705. The BOK does not hedge its currency exposure, following the generally accepted principle that currency exposure is neutral if the currency composition is maintained as determined in advance. The BOK employs a strategic currency management strategy on a long-term basis for the purpose of rebalancing (adjusting) the portfolio, rather than engaging in short-term (tactical) currency trading.

### Investment instruments

706. In accordance with the BOK's internal regulations, investment in deposits and marketable securities are permitted for reserves management as follows:

- For marketable securities, investment is limited to securities with AA or above credit ratings—sovereign bonds, agencies, supranationals, and financial debentures. Stocks, corporate bonds, ABSs, and MBSs are not permitted.
- With regard to deposits, they may be made only with financial institutions having credit ratings of A or above.
- However, outsourced assets are allowed to be invested in corporate bonds, ABSs, and MBSs, provided that their crediting ratings are AA or above.

707. Although strategically the BOK adopts a passive investment strategy that usually does not deviate much from the benchmark, active strategies are undertaken occasionally depending on market conditions.

708. To facilitate such active investment strategies, the deviation range of the benchmark is determined in advance for the currency composition and duration, and sufficient range is permitted for achieving the optimal active strategies.

709. In addition, the BOK measures and monitors absolute VaR and relative VaR numbers on a daily basis, as a complementary tool for more effective risk management.

### Recent trends and challenges

710. The globalization of the securities market has deepened the coupling effect of interest rate risk, resulting in a diminished diversification effect in bond investments. Portfolio managers aspire to maximize diversification through careful analysis of the correlations between bond markets.

711. The BOK employs the book value system as part of its accounting standards, but performance and risk management are measured using

the daily market prices. Therefore, we do not foresee any problem even if the accounting standard is changed to the market price valuation system.

### **Benchmark selection**

712. The BOK uses different benchmarks for different tranches, and they are determined by the Governor.

- For the liquidity tranche, we have developed a benchmark composed of deposits and short-term U.S. treasuries.
- For our investment tranche, we have modified the JP Morgan Government Bond Index to suit our investment guidelines.
- For our trust tranche, the Lehman Brothers Global Aggregate Index and Lehman Brothers U.S. Intermediate Government/Corporate Index are employed.

713. The benchmarks are reviewed annually in consideration of changes in the market environment. However, we try to keep the strategic benchmark stable, unless the market environment changes are significant.

### **Assessment of performance**

714. The performance of our reserve management activities is measured using market valuation and compared to the performance of the benchmark. Starting in 2002, the information ratio is used to measure risk-adjusted returns. Performance is evaluated quarterly. The performance evaluation is reported to the Assistant Governor quarterly and to the Governor annually.

### **External management**

715. Along with a benchmark, the BOK provides very strict investment guidelines to the fund management institutions to manage the risk. Separating the fund management bodies and the custodian banks also helps to reduce the operational risk.

716. In addition, the transaction details are received from the custodian banks and fund management companies and reconciled daily, to monitor risk as well as any breach of investment guidelines.

### **Management information systems**

717. The daily risk reports are submitted to the Director of the RMD and the monthly risk reports are submitted to the Assistant Governor. The quarterly performance reports to top management include some of the risk-related indexes such as currency composition, duration, VaR numbers, and risk adjustment measurement index, as well as the performance figures.

718. The BOK conducts stress tests and measures the changes in asset value of the foreign reserves daily using scenarios in which historical events that had significant impact on the market (e.g., Black Monday, the Asian financial crisis, and the September 11 terrorist attacks) recur, or hypothetical scenarios in which market conditions change dramatically (such as the yield on U.S. treasuries goes up by 50 basis points). The results are submitted to top management regularly through risk reports.

719. To reduce operational risk, the BOK has established strict firewalls between functions, which provides a system of checks and balances among the teams. In addition, all dialogues over the phone are recorded.

720. The custodians and counterparties are selected based on strict guidelines, and their credit ratings and corporate governance are closely monitored and reported to the Director of the Reserves Management Department.

### **Efficient markets**

721. In order to maintain the liquidity of the foreign reserves, the BOK trades in the markets where large-sized transactions can be executed without severe price distortions. The BOK trades in the regional markets located in the same time zone—Tokyo, Hong Kong SAR, Singapore—and in some of the European markets such as London and Frankfurt that have time zones that over-

lap with Korea. For the New York market, which is in a different time zone, the BOK's New York representative office just executes the orders from the headquarters, in the name of the head office.

722. The BOK's investment instruments are restricted to high-investment-grade bonds that are usually very liquid and marketable, and therefore traded actively in all major international financial centers.

# 13

## Latvia

### Governance and Institutional Framework

#### Reserve management objectives and coordination

723. Reserves at the Bank of Latvia are managed according to three primary requirements: stability, liquidity, and income. Clearly, there are trade-offs between income versus stability (or capital protection) and liquidity. In practice, the Bank of Latvia has set an investment benchmark that represents and communicates the Board of Governors' views on these three conflicting goals. The specific aspects of this strategy will be discussed later; but it is important to note at the outset that the Bank of Latvia puts relatively significant emphasis on the income portion of reserves management.

724. Any analysis of appropriate risk/return trade-offs for central bank reserves management needs to incorporate reserves adequacy and potential intervention needs. Latvia's foreign exchange and monetary regime is a quasi-currency board. The bank pursues a fixed exchange rate target (vs. the SDR), with a  $\pm 1$  percent intervention band. Latvia is a quasi-currency board because we also have and use a number of open market instruments to manage domestic liquidity, which wouldn't be the case in a traditional currency board.

725. On the one hand, automatic interventions at relatively tight intervention bands would necessitate the need for highly liquid reserves. On the other, it is highly unlikely that we would ever see interventions of such size that would entail the sale of the entire money base; and therefore, it would appear that we have a good deal of reserves that would not be necessary for intervention purposes, that could be invested with a higher degree of risk, in exchange for increased expected returns.

726. The use of reserves in Latvia is generally restricted to maintaining the defense of the foreign exchange policy, and generating income for the central bank and the State Budget (through existing profit retention arrangements). Since Latvia has a vibrant banking sector with a large amount of international business, official reserves are rarely needed for current account needs or to provide foreign exchange for local enterprises. The amount of foreign exchange in local bank balance sheets is more than enough to satisfy the needs of importers, exporters, and other financial institutions. All of these factors have been analyzed at the Bank of Latvia, and influence the specific reserves management practices, which will be discussed later.

727. As stated in the law on the Bank of Latvia, the central bank has the sole mandate to manage the foreign exchange reserves of the country (the mandate also permits us to engage external man-

agers to manage a portion of the reserves). As a quasi-currency board, the size of the reserves is entirely dependent on automatic intervention operations, and therefore coordination with monetary policy is not much of an issue. The Bank of Latvia has, at times, offered foreign exchange swap products to the local market, and these operations are always coordinated with monetary policy.

728. The Bank of Latvia works closely with the State Treasury and Finance Ministry to coordinate debt policy, but reserves management is not influenced by the currency composition or maturity of the government's external debt. Each institution is responsible for managing its foreign exchange and interest rate positions. The Bank of Latvia is the fiscal agent for the State Treasury and Finance Ministry, however, and frequently manages money on behalf of these institutions, but these funds are managed in separate portfolios and do not influence the central bank's reserves portfolio. Any non-reserve foreign exchange in the central bank's balance sheet (such as Finance Ministry money or funds from foreign exchange swap operations) is run on a matched-book basis, to minimize any adverse effects on the bank's income statement. While requiring the management of several portfolios with different investment characteristics complicates the foreign exchange management process at the bank, this arrangement allows a very clear understanding of every risk taken on the balance sheet from foreign exchange operations.

### **Organizational and decision-making structure**

729. Investment guidelines for reserves management are set by the central bank's Board of Governors. More specific guidelines (such as allowable risk parameters for other portfolios, for example) are set by the Executive Board. All reserves management operations are undertaken in the Foreign Exchange Department. Great care is taken to ensure that all levels of management are aware of the results of reserves management operations. Monthly performance reports are given to the Executive Board. The Board of Governors analyzes the effects of reserves management on the bank's budget at its meetings, and all management has access to daily accounting reports on the bank's

intranet. The central bank is currently installing a new treasury system, which will provide more detailed management information. The system should be live by year-end 2002. Furthermore, the Governor of the Bank of Latvia and the Chairperson of the Executive Board are members of the bank's Investment Committee (along with members of the Foreign Exchange Department), which meets weekly. Therefore, the highest levels of management are always informed of any developments positively or negatively affecting the reserves portfolio.

### **Transparency and accountability**

730. Foreign exchange reserves operations are audited by external auditors and the State Control annually and by internal auditors more frequently. Disclosure of performance and positions is quite transparent. The central bank's published monthly financial statements will reflect all market value changes in all portfolios, and the annual statements are quite specific, offering detailed reports of currency position and also credit quality. While the Bank of Latvia, like most central banks, does not publish results in accordance with International Accounting Standards, the amount of transparency is very high, with footnotes to the financial statements being very detailed, providing any reader of the financial statements possessing a modest amount of accounting knowledge with all the information necessary to analyze the true performance from reserves management. And while relative performance numbers versus the benchmark are not specifically published, the benchmark itself is not confidential, and all of the data that would be needed to make such an analysis are publicly available.

## **Capacity to Assess and Manage Risk**

### **Risk management and benchmark portfolio**

731. As the Bank of Latvia uses reserves to defend a fixed exchange rate target (against the SDR), the neutral currency composition mirrors this target. Specifically, the reserves benchmark consists of the components of the SDR currency

basket, weighted as in the SDR. When the reserves portfolio is invested according to the neutral currency weights, then there are no valuation fluctuations due to currency movements.

732. Regarding interest rate risk, the benchmark consists of the 1–3 year government bond index in each component currency. This maturity sector was chosen for various reasons. First, extending duration, and having a market, not cash, benchmark, markedly increases the return on reserves over the long run. Obviously, increasing expected return leads to an increase in expected volatility. However, the 1–3 year sector was chosen to mirror the risk tolerance of the Board of Governors of the Bank of Latvia. The 1–3 year sector offers notable return enhancement, but volatility is limited—during the time periods available in most financial databases, the 1–3 year maturity sector has never ended a 12-month period with a negative return. Clearly, sub-zero returns can be observed in shorter time periods.

733. Liquidity is, of course, a primary concern. The Bank of Latvia has several liquidity constraints in its reserve management guidelines, which result in the purchase of instruments that can be realized in times of market stress. Unlike other central banks, however, the Bank of Latvia does not maintain separate liquidity and investment tranches in its reserves portfolio. We have found that the addition of extremely liquid short-term instruments for a liquidity portfolio is not economically justified in our case. The instruments we hold in longer-term maturities are more than liquid enough to satisfy any intervention (or even working capital) needs, and any perceived negative effects from increased transaction costs from liquidating market instruments in times of stress are more than offset by increased long-term returns. Maintaining separate liquidity and investment tranches in effect puts the reserves portfolio in a “barbell” strategy. And while such a strategy offers increased portfolio convexity, convexity has a price, and such a portfolio will be suboptimal in the long term, as it will not outperform a duration-neutral “bullet” strategy.

734. Within limits set by the Board of Governors and the Executive Board of the Bank of Latvia, the portfolio managers are allowed to take active positions away from the benchmarks, in the aim of prof-

its from expected rate moves. The long-term strategic benchmark is set by the Board of Governors, and the Investment Committee (comprised of Foreign Exchange Department staff, the Chairperson of the Executive Board, and the Governor of the Bank) meets weekly to set tactical benchmarks. The Investment Committee also holds a quarterly meeting to discuss strategic themes. Individual portfolio managers are free to trade instruments in a range around the tactical benchmark set by the Investment Committee.

### Instruments

735. The central bank uses futures, options, swaps, and other derivatives in the management of currency, interest rate, and credit risks. Derivatives can be used for hedging purposes, to quickly and efficiently restructure the risk parameters of the portfolio, and for taking active positions. Leverage limits are set by the Board of Governors’ investment guidelines.

736. A certain portion of reserves tends to be invested in “spread product”—agency and supranational paper, corporate bonds, mortgage-backed and asset-backed securities, commercial paper, and similar products. Our studies have shown that greater long-term risk-adjusted expected return can be gained from “moving down the credit curve,” than by adding duration, or taking active currency positions. Our investment guidelines limit the amount of credit risk allowable in the portfolio, and limit liquidity and concentration risk as well. With a minimum allowable long-term rating of A-, all of the instruments the Bank of Latvia purchases for its reserves portfolio are safely in the “investment grade” category.

### Staff

737. The management of a portfolio with such diverse products requires front, middle, and back office staff that can understand, measure, and manage the various risks involved. The Bank of Latvia has been able to attract and maintain extremely competent staff; turnover in the reserves management department has been limited. The central bank is able to offer its reserve manage-

ment staff sufficient salaries—while not necessarily exceeding those available in the private sector, salaries are at least competitive. It is also possible for reserves management staff in some cases to earn higher salaries than senior management members, or department heads in other bank areas. Furthermore, we have found that allowing more complicated investments tends to keep reserves management staff interested and motivated—it would be much harder to retain our best specialists if the reserves portfolio were limited to, say, only government paper.

738. To maintain a high standard of professionalism in the reserves management staff, every single member of the front and middle offices (and the department head), as well as some back office staff, are enrolled in, or have completed, the Association for Investment Management and Research's (AIMR) Chartered Financial Analyst (CFA) program. This program is a series of annual exams (three years' minimum) that cover all aspects of the investment process, including accounting, taxes, corporate finance, fixed income, equity management, derivatives, portfolio management, ethics, financial analysis, etc. All AIMR members also adhere to a Code of Conduct regarding conflicts of interest in asset management and analysis, and annually sign professional conduct statements.

### **Risk and performance measurement**

739. Information systems are also crucial to the management of these risks. The Bank of Latvia currently has specialized systems covering position management, risk analysis, performance attribution, exception reporting, and accounting requirements for all reserves management operations. Obviously, these systems are capable of processing all the allowable instruments in the bank's reserves and other foreign exchange portfolios. The central bank is currently installing a new bank-wide treasury system, which will further integrate these processes, and a new risk management package will further supplement our existing risk management efforts.

740. The Bank of Latvia employs external asset managers to manage portions of the reserves portfolio. These managers are subject to the same invest-

ment guidelines and limits as our internal managers, and every external manager transaction is also entered into our in-house information systems. As a result, the managers provide good external benchmarks for our internal managers, and everyone's performance is measured using the same data and methodology. We have found our external manager program to be quite successful—at first, the managers provided valuable technical assistance and training; now, besides providing external benchmark data, they can be used to discuss investment strategies and ideas. Since every manager has the same goals, in trying to outperform the same benchmark, these discussions can be more fruitful than with some sell-side counterparties that may not know our specific needs at best, or may be trying to sell their specific inventory at worst.

741. Compliance with limits and guidelines is monitored constantly, for both internal and external manager portfolios. Exception reporting is automatic; in the case of a limit breach, the department head, Chairperson of the Executive Board, and Governor are notified electronically. Daily asset mix reports, which show various deviations from strategic and tactical benchmarks (within permissible limits), are also distributed electronically.

742. Portfolio performance is measured on an absolute basis (for accounting purposes), and relative to the benchmark (for investment management purposes). Our performance attribution system disaggregates composite returns into returns from specific strategies, and these reports are always available online in our information systems, and e-mailed weekly to reserves management staff, the Governor, and Chairperson of the Executive Board.

743. Operational risk and legal risk are constantly managed, and also addressed in several department and Executive Board procedures documents. All reserves management operations undergo an annual external audit, and specific aspects are audited more frequently by the Bank's Internal Audit department.

### **Conclusion**

744. The Bank of Latvia places a focus on the return aspect of reserves management, which necessitates excellent staff, excellent systems, and

the willingness of senior management to understand and sanction relatively higher risk levels. We feel the systems and staff at the Bank of Latvia are more than capable of managing the assumed risks,

and our performance to date has tended to justify this attitude. The nature of reserves management is always evolving, and the Bank of Latvia will continue to invest resources in staff and systems.

# 14

## Mexico

### Developing a Sound Governance and Institutional Framework

#### Reserve management objectives and coordination

745. The main objective for Banco de Mexico (the Bank) in the management of its reserves is the maximization of returns subject to liquidity needs and constraints. With the implementation of a floating exchange regime in 1995, the Bank has been increasing the weight that it places on return enhancement, while also placing high attention on other risks involved in its investment decisions.

746. There is no explicit coordination between monetary policy decisions and external debt management. However, in the past, when the Bank had liabilities with the IMF, reserves were split to allow the synthetic purchase of an SDR-denominated portfolio in order to hedge the currency risk. Additionally, the Bank, as a financial agent for the Federal Government, has a mandate to invest and manage the resources that were pledged as collateral in the Federal Reserve Bank after the 1989 negotiations of the Mexican Brady Bonds; in performing these duties, the Bank must observe restrictions imposed under the “Collateral Pledge Agreement.”

#### Transparency and accountability

747. The Bank publishes its Reserves on a weekly basis in its Summarized Balance, and its

Assets and Liabilities on a monthly basis in the Data Template on International Reserves (foreign currencies).

748. However, with respect to a more detailed disclosure, the Bank considers the effort required to explain the technical issues related with reserve management to the public to be very costly. Instead, that effort should be placed in addressing more important topics of national interest.

749. External audits are performed once a year and the results are delivered only to the Congress and the President.<sup>42</sup>

750. Internally, the audit department monitors operations on a daily basis to verify if the bank norms are being met. However, the middle office is responsible for monitoring whether investments comply with the guidelines set by the Board of Governors on a daily basis as there are degrees of freedom that allow some deviations from the benchmarks. These deviations are limited using a Value-at-Risk approach.

751. The Bank keeps formal documentation of every topic approved by the Board of Governors. The General Direction of Central Banking Operations also gives authorizations in writing.

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<sup>42</sup> Chapter VII, Article 51, subindex III of Banco de Mexico’s Law (BDML) states: “In April of each year, a report on the implementation of monetary policy during the second semester of the previous year and, in general, on the activities of the Bank throughout said year, within the context of the domestic and international economic situation.”

Finally, both the General Director and the Director of Operations are constantly informed of every investment strategy put in place, and of the performance generated against the benchmarks on a daily basis.

752. Recruiting employees with high business ethics and high professional skills is the way to ensure sound management of internal operations. Due to the confidential nature of the work within the Direction of Operations, a particular effort is taken in selecting personnel. Training the staff by sponsoring them to graduate studies, as well as sending them to highly recognized Central Bank Seminars, are ways of confronting the difficulty of retaining high-quality staff. In the end, however, the most efficient tools to avoid this situation have been a challenging work environment and an increased level of responsibility.

### **Institutional framework**

753. The Constitution of Mexico gives total autonomy to the central bank and defines the control of inflation as its main objective.

754. According to Banco de Mexico's Law (BDML), reserves are wholly owned by the Bank in order to facilitate the accomplishment of the objective mentioned above.

755. The BDML also gives power to the Bank's Board of Governors to define policies and standards in order to perform its duties, including the management of reserves. The types of operations, the definition of reserves, and the authorized assets in which to invest are defined in BDML Articles 7, 19, and 20, respectively (see Box 1).

756. Even though the "Exchange Rate Commission" (composed of members from the Ministry of Finance and Banco de Mexico) is the highest decision authority on exchange rate policy and the management of foreign reserves, in practice, it is the Bank's Governing Board that authorizes the main investment guidelines. The Governing Board is informed semiannually of the investment performance; nevertheless, reports are available daily at their request.

757. An Investment Working Group formed by senior operating staff is responsible for the oversight of ongoing operations. Weekly meetings are

held to evaluate and decide on the investment strategy to be followed by headquarters-based staff.

758. External fund managers act independently based on the same guidelines placed by the Board for internal operations. There are no predetermined proportions on the amount of reserves that can be placed with external managers; although currently approximately 5 percent of total reserves are delegated to five different institutions. These institutions provide a list of all the operations executed on a daily basis, and deliver a performance report on a monthly basis.

759. In addition to the Investment Working Group, a Risk Management Unit, which is independent from the Operations Department, supervises to ensure that risks and limits in the management of reserves are met on a daily basis by both the external managers and the Operations Department. Within the Operations Department, foreign exchange dealing operations are executed independently from the investment reserves management activities.

760. A Counterpart Working Group that assembles every six months, led by the General Director of Operations and formed by the Operations Department and the Risk Management Unit, is responsible for evaluating and approving the addition or deletion of counterparts from a predefined authorized list.

## **Establishing a Capacity to Assess and Manage Risk**

### **Risk management**

761. The main risks that the Bank faces are liquidity, credit, currency, and interest rate risks. To deal with all of them the Bank has a specific approach. The Board of Governors defines the strategic asset allocation embodied in two benchmark portfolios: one for the investment portfolio and the other for the foreign exchange diversification of reserves. Once the benchmarks have been defined, the Board sets the guidelines that will apply to the active management of the international reserves.

762. The investment benchmark has been modified several times; currently it is composed of

### Box 1. Banco de Mexico's Law

**BDML ARTICLE 7** states, among other things, that Banco de Mexico shall be entitled to perform activities such as:

- I. Deal with securities;
- II. Make deposits in either domestic or foreign credit institutions or security depository institutions;
- III. Purchase those securities provided for in Article 20, Section II, issued by international financial institutions or legal entities with foreign domiciles;
- IV. Carry out transactions involving foreign currency, gold, and silver, including repurchase agreements.

**BDML ARTICLE 19** states: The reserve provided for in the previous article shall be composed of:

- I. The foreign currency and gold, property of the Central Bank, that are free of all lien and whose availability is not subject to any restriction;
- II. The amounts resulting from the difference between Mexico's participation in the International Monetary Fund and the balance of unpaid contributions to said institution that are payable by the Bank, when this balance is less than the aforementioned participation; and
- III. The foreign currency procured through financing obtained for exchange regulatory purposes from the legal entities referred to in *Article 3, Section VI*. To determine the amount of the reserve, the foreign currency not yet

received from the sale of domestic currency will not be taken into consideration; and the Bank's liabilities in foreign currency and gold, except for those liabilities with maturities over six months and those corresponding to the financing referred to in Section III of this article, will be deducted.

**BDML ARTICLE 20** states that reserve investments must be made in securities, deposits, or other obligations issued by highly rated foreign institutions.

Pursuant to this Law, the term foreign currency includes foreign bank notes and metallic coins, bank deposits, negotiable instruments, securities, and all types of credit documents payable abroad and denominated in foreign currency, as well as international means of payment in general. The foreign currency qualified to be part of the reserve is only the following:

- I. Foreign bank notes and metallic coins;
- II. Deposits, negotiable instruments, securities, and other liabilities payable outside national territory that are considered to be first rate in international markets, denominated in foreign currency, and payable by international financial institutions, foreign entities, and governments other than the Mexican Government, provided they are highly liquid or redeemable within a term no longer than six months;
- III. Credits payable by central banks, redeemable within a term no longer than six months, and which are current; and
- IV. The special drawing rights issued by the International Monetary Fund.

U.S. Treasury instruments (65 percent), U.S. agencies debt (32.5 percent), and AAA credit card ABS (2.5 percent), and is of a 1.25 year duration. Securities lending is permitted and is executed through three securities lending agents (that happen to be three of the Bank's custodians) and the income generated is considered part of the return that is compared against the performance of the benchmark.

763. The foreign exchange benchmark is normally modified on a yearly basis, and currently it is composed of 88 percent dollars and the remaining

12 percent in other G-7 currencies and Swiss francs, but historically the average has been 90 percent dollars vs. 10 percent non-dollars. The use of derivatives is authorized as part of the foreign exchange active management.

764. For both benchmarks Value-at-Risk (VaR) methodology is used to estimate on a daily basis the portfolios' exposure to market risk. VaR is estimated for a one-month horizon period with a 95 percent confidence interval. The maximum amount of risk allowed is equivalent to 0.25 percent of the difference portfolio VaR. Additionally if

the maximum cumulative underperformance in any calendar year, or any part of a calendar year, reaches 50 basis points (or more) below the return of the fixed income benchmark (or 100 million dollars (or more) worse than the foreign exchange benchmark) the portfolio will be managed passively thereafter so as to replicate the benchmark for the remainder of the calendar year. For both benchmarks, the middle office marks to market the positions daily in order to verify that investments comply with the guidelines set by the Board of Governors.

765. In relation to liquidity, credit, currency, and interest rate risk:

- **Liquidity risk:** The Board has chosen G-7 currencies and Swiss francs for foreign exchange operations and as those that constitute the Central Bank Forex Benchmark. For investment decisions the Board has chosen assets with deep secondary markets and high credit quality (such as U.S. treasury instruments, agencies, and industrialized country debt). Additionally the Bank splits its reserves into several tranches. Out of the 88 percent of the international reserves that are held in U.S. dollars, 6 percent are in a liquidity portfolio with a very short duration.<sup>43</sup>
- **Credit risk:** The investment guidelines do not allow the purchase of sovereign securities lower than Aa2 as rated by S&P in their long-term debt, placements with foreign banks must be in A2, P2 institutions as rated by S&P and Moody's, respectively, in their short-term debt, and the total exposure to bank risk cannot exceed 50 percent of the international reserves. Finally, the invest-

ment in AAA credit card asset-backed securities is allowed. Ratings are reviewed semi-annually as well as limits for individual bank exposure. These limits are based on their relative credit rating against the rest of authorized bank institutions and also based on their market competitiveness.

- **Currency risk:** Due to the nature of the Bank's Balance expressed in Mexican pesos, foreign exchange movements in the peso-dollar market have a direct impact on the Bank's results. In the internal management of international reserves, however, currency risks arise from deviations against the foreign exchange benchmark.
- **Interest rate risk:** The exposure to interest rate risk arises from deviations against the investment benchmark, even though in this particular portfolio the use of derivatives is not allowed. The Value-at-Risk methodology described above is used to monitor and control risk. Additionally, the investment staff is not authorized to buy more than 10 percent of any individual security and the maximum maturity investment is 10 years.

### Operations in efficient markets

766. The Bank agrees that undertaking transactions in deep and well-established markets ensures that reserve-related transactions can be easily absorbed at market-determined prices without undue distortions or adverse impacts on the level and availability of foreign exchange reserves. That is why the currencies and assets used by the Bank comply with this requirement. Nevertheless, the Bank recognizes that there could be extreme situations such as LTCM or September 11 events that can cause liquidity to disappear at any time, making it impossible to avoid these distortions for the management of international reserves.

<sup>43</sup>The liquidity portfolio considers investments with maximum maturities of three months (although investments in instruments such as U.S. treasuries and U.S. agencies can be made liquid on a same-day basis).

# 15

## New Zealand

767. This report outlines the framework for managing foreign reserves in New Zealand. We cover matters raised in the IMF's guidelines on reserves management under two broad themes: developing a sound governance and institutional framework and establishing a capacity to assess and manage risk.

### **Developing a Sound Governance and Institutional Framework**

768. The responsibility for foreign reserves management rests with the central bank—Reserve Bank of New Zealand (the Bank). Two major benefits arise from this arrangement. First, synergistic benefits arise with a single organization taking responsibility for monetary policy, financial system oversight, and foreign reserves management. Second, the Bank's independence from the government means that the management of foreign reserves is undertaken at arm's length from the political process.

769. The Minister of Finance has important roles in setting the range within which the Bank must maintain foreign reserves and can direct the Bank to intervene in the foreign exchange market.

### **Objectives and strategies**

770. The Bank's reserve management objectives are to actively manage the foreign reserves portfolio to:

- Meet the immediate liquidity needs for any foreign exchange market intervention.
- Maximize risk-adjusted net returns (or minimize risk-adjusted net costs), subject to the first objective.
- Develop and maintain a broad skill base in foreign securities and foreign exchange dealing to support the Bank's capability for conducting foreign currency market intervention or responding to other crises, and to enhance the Bank's general understanding of financial markets, instruments, and practices.

771. These objectives are long-standing—they were first developed in the late 1980s. The objectives have been subject to review since then, but have remained substantially the same because the principles that underlie them have remained relevant through time. These principles are that the Bank should:

- have both the funds and expertise to be able to intervene effectively in times of extreme market disorder; and
- manage public assets prudently and cost-effectively.

772. These underlying principles are reflected in the reserves management objectives in the following ways. First, the primary objective for reserves management is to maintain liquid assets so that even in the event of extreme market disorder

in both the foreign exchange market and global bond market the Bank has the capacity to undertake effective foreign exchange intervention.

773. Second, the Bank actively manages foreign reserves. It does so because it believes that active management:

- generates positive returns (in excess of compensation for risk and of active management overheads) and so reduces the costs of holding reserves; and
- encourages the dealers to actively participate in a wider range of instruments and markets than would otherwise be the case and so improves the Bank's market intelligence and contacts, knowledge of market practices, and foreign exchange intervention and risk management skills. The skills and experience gained from reserves management have been of value to the Bank in the context of its other roles too. For instance, foreign reserves dealers were able to provide valuable input when the Bank, in the context of its financial system oversight responsibilities, was managing the sale of a derivatives portfolio of a failed financial institution. It is not possible to be precise about how much added value is obtained from active management but, in times of crises, extensive market knowledge, contacts, and experience become invaluable.

774. The key strategic issues arising from New Zealand's reserves management center around two issues: the level of reserves and the funding of reserves.

### *Level of reserves*

775. The Bank manages reserves at a level agreed with the Minister of Finance—currently this is SDR 1.5b–SDR 1.8b. The level of reserves is determined in the context of our exchange rate/monetary policy implementation strategy and foreign exchange intervention strategy. New Zealand operates a free-floating exchange rate regime—the Bank does not enter the New Zealand dollar (NZD) market to support a level or range for the NZD that it may consider appropriate in the context of monetary policy.

776. The level of reserves also reflects our intervention strategy. We hold reserves to preserve the functioning of the market for NZDs in time of crisis—i.e., when the market ceases to make a two-way price (bid and offer) for NZDs. If price-makers exit the NZD market, the Bank may enter the market as a temporary “price-maker of last resort.” The aim would be to facilitate early reentry of price-makers, by taking on foreign exchange risks that arise in price making in times of heightened foreign exchange or financial market uncertainty, until a new price-clearing level for the NZD is determined. The Bank would maintain control over the transaction sizes used to determine a market clearing price. The Bank has not had to intervene in the foreign exchange market since the NZD was floated in March 1985.

777. Our base-line level of reserves was first approved in the late 1980s. Much has happened since then, including the Asian crisis and a greater understanding internationally of factors influencing macro-financial stability. The Bank is embarking on a review of reserves levels with these lessons in mind.

### *Funding reserves*

778. The Bank funds its foreign reserves by way of foreign currency borrowing. The benefit of this strategy is that the Bank is not as exposed to significant foreign exchange risk as it would have been had it funded reserves from NZD liabilities (including notes and coins).<sup>44</sup> This assists the Bank in maintaining its independence as it is less exposed to political risks that arise (rightly or wrongly) when a government or public sector entity reports large losses from risk positions. A strategic issue for the Bank to consider in the future is whether costs of holding reserves could be reduced by financing reserves from notes and coins and/or fixed rate borrowing in the local market (where the Government's AAA rating gives it a competitive

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<sup>44</sup>This funding arrangement requires the Bank to spread its borrowing requirements to minimize its exposure to refinancing risk—i.e., minimize the risk that the Bank has to finance a substantial portion of reserves at a time when an extreme event in international markets has a significant adverse effect on borrowing (refinancing) costs.

advantage). The Bank would enter into a currency swap to continue to hedge its foreign exchange risk.

### **Institutional framework**

779. As noted at the outset, the Bank is the entity responsible for foreign reserves management; however, it has a working relationship with the Treasury and in particular the Treasury's Debt Management Office (DMO) in two respects. We discuss this relationship and then outline the institutional arrangements within the Bank.

#### ***The Bank and Treasury***

780. The relationship with the Treasury arises in two contexts. First, the Minister of Finance has the power to direct the Bank to intervene in the foreign exchange market. It is anticipated that in a foreign exchange crisis, the Bank will be intervening with the approval of the Minister of Finance, although the Bank has the power to intervene in the foreign exchange market of its own accord, if required.

781. The Bank also has a close working relationship with the DMO in the context of funding reserves (among other functions—e.g., government cash management and bond tendering). The Bank decides on the timing and nature of reserves funding (i.e., fixed or floating rate, maturity, currency), consistent with its reserves management strategy, but it is the DMO that raises the funds (borrowing is undertaken in the Government/Crown name). The proceeds of the borrowing are passed to the Bank by way of loans from the DMO to the Bank and in this way the risks arising from the reserve assets and liabilities are managed by the Bank.

#### ***Arrangements within the Bank***

782. Foreign reserves management is carried out across two departments. The Financial Markets Department conducts front-office operations (e.g., dealing, portfolio and asset/liability management, counterparty relationship management) and some middle-office operations (e.g., risk management policy, contract maintenance, counterparty credit rating reviews). The Financial Services Group con-

ducts back-office operations (e.g., settlements, treasury, and financial accounting) and some middle-office operations (e.g., compliance monitoring, risk and exposure reporting, risk system maintenance).

783. Other departments and committees also play important roles in the management of foreign reserves. The Risk Assessment and Assurance Department (RAA) participates in high-level strategic reserves management issues, acting as the Governor's advisor on risk frameworks and architecture. This department also contains the internal audit function. The Reserves Oversight Committee (ROC) comprises Governors and senior managers and reviews the appropriateness of the portfolio structure, approves new business initiatives (including new financial instruments), and monitors active management and passive benchmark performance. The Risk Management Committee (RMC) comprises Governors and senior managers and reviews the risk management arrangements with respect to all the Bank's operations, including reserves management.

### **Accountability through governance and transparency**

784. Accountability for the cost-effective management of reserves in accordance with performance expectations and risk tolerances is achieved through formal governance arrangements and transparent reporting of results and processes.

#### ***Governance***

785. The Bank's powers, authorities, and accountabilities are contained in the Reserve Bank of New Zealand Act 1989 (the Act). The Bank's powers and authorities are vested with the Governor, who delegates appropriate authorities to relevant staff. The Bank conducts its foreign reserves operations in accordance with a mandate from the Governor. The Mandate for the Management of the Foreign Reserves Portfolio (the Mandate) contains the purpose, objectives, reserves level, performance expectations, risk management policies, and key management responsibilities and delegations with respect to reserves management. The Mandate,

which was implemented in September 2000, was designed to avoid any misdirection of focus toward detailed and immaterial risk and procedural issues. It was felt that a succinct, high-level mandate modeled along funds management industry lines would emphasize high-level, strategic focus on risk and return issues with respect to the foreign reserves management function. Based on the experience of two years of operations, the Mandate appears to be serving its purpose.

786. The Bank's Board of Directors<sup>45</sup> (which comprises a majority of independent directors) has responsibility for, among other matters, keeping under constant review the performance of the Bank in carrying out its functions. Unlike boards of most entities, which have a capacity to direct and influence the entity's functions and operations, the Bank's board may only advise the Governor with respect to matters relating to the Bank's functions and exercise of its powers. However, if the board considers that the Bank is not adequately carrying out its functions, it may recommend to the Minister of Finance that the Governor be removed from office. Senior managers report to the Board monthly on the financial results of foreign reserves management. The Board's Audit Committee also meets regularly to monitor the audit function within the Bank, receive reports from the Bank's external auditor, review the Bank's financial statements, and advise the Board on the Bank's accounts.

787. The Head of Financial Markets, who reports to the Governor, is accountable for reserves management performance and compliance with risk management arrangements. The ROC assists the Governor in monitoring performance and portfolio structures at a high level. The Chief Financial Officer (who heads the Financial Services Group and reports to the Deputy Governor) is accountable for, among other matters, settlement operations, reserves accounting/financial reporting, and monitoring the Financial Markets Department's compliance. Reserves operations in both the Financial

Markets Department and Financial Services Group are subject to both internal and external audit.

### *Transparency*

788. The Bank publishes an annual report that lays out the governance arrangements, reports on the key performance indicators with respect to its functions (including reserves management), contains a report from the non-executive directors, and includes audited financial statements prepared in accordance with New Zealand generally accepted accounting practice (GAAP). New Zealand GAAP requires compliance with New Zealand accounting standards, which are at least as rigorous as international accounting standards. In addition, the Bank applies relevant financial risk disclosures recommended by the Basel Committee on Banking Supervision. The key financial reporting implications of these policies are:

- Foreign reserve assets and foreign currency liabilities funding those assets are valued in the Statement of Financial Position (Balance Sheet) on a marked-to-market basis with gains and losses booked to the Statement of Financial Performance (Profit and Loss). This fair value methodology is employed because we regard the reserves as available for sale (intervention). Liabilities are valued using the same methodology as the assets so that the financial statements capture the effects of the quality of our financial risk management—gains/losses from unhedged risk positions are booked to P&L.
- Extensive disclosures are provided in the notes to the accounts on a range of reserve management matters—e.g., risk management policies, quantitative risk exposures (including credit risk and market risk losses, including from tail (extreme) events), net reserves management income (active management performance and passive or risk neutral performance are separately identified).<sup>46</sup>

<sup>45</sup>The Bank's Board is about to undergo a restructuring—a non-executive director will replace the Governor as Chair of the Board, and Deputy Governors will no longer hold Board positions. This follows an independent review of the operation of monetary policy in New Zealand.

<sup>46</sup>Note, the effect of translating reserves management performance back into NZD is not material (but is separately disclosed) because foreign reserves are funded by foreign currency liabilities.

## Establishing a Capacity to Assess and Manage Risk

### Benchmark portfolio and instruments

789. The Bank's framework for managing all risks arising from foreign reserves management is documented in the Risk Management Document. The main risks the Bank faces from this activity are business risk, liquidity risk, credit risk, market risk (interest rate and foreign exchange risk), and operational risk (including custodial risk). The key elements of the strategy for managing these risks are outlined below. This section concludes with a discussion of active management performance monitoring and controls.

#### *Business risk*

790. This encapsulates the political and infrastructural risks arising from the markets in which, and instruments with which, we manage reserves. We aim to minimize reputational risk by limiting authorized instruments to "plain-vanilla" fixed income instruments and derivatives. The derivatives activities encompass only futures and swaps. We do not invest in non-fixed income instruments such as equities. Nor do we invest in options or fixed income securities with material option risk such as mortgage-backed securities.

791. The markets in which we operate are in essence restricted to those of well-developed countries (mainly the U.S. and Germany although we have scope to participate in G-10). We do not operate in emerging markets.

#### *Liquidity risk*

792. Reserves are not divided into tranches to meet different objectives per se. However, reserves are actively managed within the overriding constraints that reserves must be liquid and diversified primarily across the U.S. and Germany. This means that the base level of reserves must be invested in specified classes of liquid assets in these markets—i.e., Government securities (including central bank deposits), reverse repos (with Government security collateral), and CD/CPs (primarily by issuers rated AA- or better). In broad terms, at least a third of

the liquid reserves must be held in Government securities and no more than a third of the liquid reserves can be held in CD/CPs. The investment of a significant proportion of reserves in CD/CPs instead of Government securities significantly reduces the cost of holding reserves (the CD/CP investment yield is close to the funding costs), without significantly reducing credit quality (given the credit rating criteria we apply and the short maturity of the instruments) or materially altering our liquidity (since our holdings represent a small proportion of turnover and amount on issue).

793. The currency composition of reserves is determined by the intervention strategy and risk preferences. The U.S. dollar is our intervention currency so the majority of our liquid assets are denominated in this currency. The proportion of reserves held in other major currencies varies depending on prevailing risk conditions and net borrowing costs. Depending on local market conditions we may hold reserves in only one currency other than the U.S. dollar. Currently, we hold liquid reserves in U.S.dollar- and euro-denominated assets.

794. The instrument composition of reserves is reviewed periodically in the context of liquidity risk stress scenarios—e.g., widening of credit spreads and bid/offer spreads. The Risk Management Committee reviews underlying assumptions about extreme market conditions, our intervention strategy under those conditions, and the financial cost of liquidating reserves under such conditions. Based on this analysis, the instrument composition of liquid assets is determined.

#### *Credit risk*

795. The risk of loss from counterparty default is managed by way of individual counterparty and aggregate credit risk limits. Individual counterparty limits are determined in accordance with the Governor's strategic tolerance for loss—the loss from default of a non-sovereign counterparty should not exceed the Bank's capital. In practice, this means we set the counterparty limit for AAA/AA+ rated entities at a level just below Bank capital. Limits for counterparties with a lower rating are assigned a proportionately lower limit

based on the relative default rate for entities with that lower rating. For instance, if the probability of default of a single-A rated entity was three times higher than that of an AA+ rated entity, the limit for the single-A rated entity would be one third the limit of the AA+ rated entity. We do not permit credit exposures to entities rated lower than A.

796. Concentration of credit risk is controlled by aggregate credit limits—primarily country limits and, in some cases, bank or corporate sector limits within countries. The thresholds for aggregate credit limits are set on the basis of judgments about political risks arising from losses in the event of sector or country crises. We are in the process of supplementing these judgments with a quantitative analysis of counterparty default correlation. Our aggregate credit limits also include a cap on the aggregate amount of credit exposure we have to all single-A rated counterparties to ensure that the credit quality on the reserves portfolio is maintained at a high level.

797. Credit exposures relative to limits are generally reported on a gross basis—exposures are only reported on a net basis where there is a legally enforceable netting contract.

### **Market risk**

798. The market risks the Bank is exposed to are interest rate risk and foreign exchange risk. Both these risks are controlled by the same market risk limit framework. The (parametric) Value-at-Risk (VAR) methodology is used to measure and control market risk. The VAR limits are set well within the Governor’s stated tolerance for market risk losses in a year to allow for both accumulated market risk losses over a year under normal market conditions and losses from extreme movements in market prices or “tail-events.” The accumulated losses over a year allow for poor active management performance and (mark to market) losses on the passive portion of reserves due to adverse interest rate trends (narrowing credit spreads). The allowance for tail-events is based on an analysis of simulated worst single day losses on a diversified portfolio over the 1990s, scaled up to allow for unobserved tail-events. This simulation/stress test analysis is conducted annually. Given that we invest

in instruments that are highly liquid (even in extreme/stress scenarios) we believe it is appropriate to measure market risk (including tail-event market risk) with only a one-day holding period.

799. Actual daily P&L results are compared with estimated gains and losses from the VAR model each month. The results of the “back-testing” analysis are reported to the Reserves Oversight Committee quarterly.

800. The VAR-based framework for managing market risk has been in operation since 1998. It is a considerable improvement over our in-house duration and convexity market risk model, which it replaced, because VAR captures spread risk and FX risk. We have found VAR a very useful “common ruler” for measuring market risk on a range of different instruments and positions and most helpful in communicating to senior management about the quantum of risk (under normal market conditions). VAR presents challenges for us in terms of understanding where our market risk exposures lie and what are our key risk factors (nature of and changes in interest rate and exchange rate volatilities and correlations). We are in the process of developing management reports to get better insights into our risks that lie behind VAR. Senior management are aware of market risks that lie beyond VAR—the results of the annual tail-event analysis are reported to them and estimates of extreme losses are published in the annual report. We also find (parametric) VAR less useful for capturing the risks over time on the passive portion of reserves because the main market risk on this portion of reserves—credit spreads—is mean-reverting. This means scaling parametric VAR by time overstates risk. VAR derived from historical simulation is our preference for the future, but system and database management issues constrain our desire to move in this direction in the foreseeable future.

### **Operational risk**

801. Minimizing operational risks in the management of reserves is of critical importance in two respects:

- Maintaining a continuous intervention capacity; and

- Minimizing financial loss and reputation damage from fraud.

802. In order to maintain a continuous intervention capacity the Bank sets internal controls and processes with respect to system and data integrity (e.g., data reconciliation), disaster recovery planning (including maintaining an off-site capacity and crisis procedures and contacts), and key-person risk (including succession planning, mentoring, knowledge sharing, and information dissemination). The Bank is also dependent on its securities custodians effectively managing their operational risk. We review custodians' controls before we place securities with them and, on an ongoing basis, test their systems (with their cooperation) by executing securities transfers instructions from time to time to simulate cash raising in time of intervention. In addition, we have a policy of diversifying our security holdings across a few custodians so that our intervention capacity is not entirely exposed to operational risks or disaster scenarios with respect to a single custodian.

### ***Fraud***

803. The Bank has in place a number of operational controls to minimize financial and reputational damage from fraud. These include separation of front- and back-office operations, logged dealer phones, tracking of deal tickets, transaction and position reconciliation across P&L and risk reporting, and confirmation and settlement instruction matching with counterparties. The Bank also places considerable importance on front-, middle-, and back-office operations having a good understanding of the nature of, and risks arising from, the instruments in which we deal, so transactions will be subject to reasonableness checks along the process chain. The aim here is to not rely too heavily on any one person (particularly in the front office) for advice on appropriate processing of transactions. This widespread understanding of appropriate processes is an objective we are continually striving to achieve.

### **Active management**

804. As noted above, the Mandate includes provisions for active management of reserves and

clearly outlines the performance expectations that must be met to continue this activity. Active management takes the form of interest rate and currency trading over short-term (ranging from intraday to up to three months) and medium-term (three to 24 months) horizons. Positions are entered into at the discretion of dealers and on the basis of rule-based analytics. Given the rather limited range of instruments and markets in which we can operate, we strive for diversification by trading with different investment horizons and by using different decision processes (dealer discretion and rule-based analytics).

805. Active management returns and risks are measured against a benchmark (comprising both assets and corresponding liabilities), which is constructed within the Bank, independently of the front office, to reflect the composition of reserves and funding under passive management—the risk-neutral position. The benchmark is managed within broad risk parameters defined by the Governor and with the objective of minimizing costs, consistent with a passive management strategy. Portfolio managers must actively manage reserves in a manner that adds value—i.e., generates a return that exceeds the benchmark and covers charges for additional risks from active management as well as additional costs arising from active management. Performance is measured on a rolling three-year basis, but attention is also paid to performance in a financial year to monitor the Bank's political risk exposure that may arise when it publishes results of operations in the annual report. Active management performance is also monitored relative to that of comparable (external) fund managers, six monthly. Information ratios are used for this purpose. This enriches our understanding of our portfolio managers' performance; however, it is not the relative performance of portfolio managers that determines whether we continue with this activity; it is their absolute performance—they must add value (as defined above).

806. Active management risks are controlled using the same framework used to control the risks on the entire reserves (active and passive reserves), as outlined above. Market risk is the only area where we have separate active management limits. VAR and stop-loss limits are applied

at the portfolio and aggregate (all portfolios combined) level.

807. The Bank does not currently use external fund managers as we believe that this would constrain our capacity to meet the objective of reserves management to increase the Bank's knowledge of instruments and market practice and maintain market contact; divert scarce resources to managing the relationship; and not significantly increase returns if the managers were subject to the same risk constraints as our portfolio managers.

808. However, we would consider using external fund managers if there were markets or instruments in which we wished to participate but did not have the expertise to do so directly. In these circumstances, we would expect that external fund managers would not only improve active management risk-adjusted performance, but also provide a means by which we could learn from their activities.

809. We do make use of overseas investment banks' bond lending services. The Bank undertakes this activity itself, but time zone differences mean that it is economical for us to outsource this

activity to entities that operate in markets at night in New Zealand.

## Conclusions

810. The Bank's management of foreign reserves is continually evolving. There are a number of strategic issues that underlie reserves arrangement and it is the Bank's (and government's) practice to review these issues periodically. Reserves management in New Zealand also evolves in light of market developments in financial instruments and risk management practices, and of our own experiences and lessons. We recognize that our practices differ in many significant respects from the practices in other countries (there are also significant similarities too). We believe that this is appropriate because, while there are core principles underlying reserves management, the practices adopted in meeting those core principles should vary according to countries' public policy, institutional frameworks, skills, and resources.

# 16

## Norway

### Background

811. At the end of 2001, Norway's central bank, the Norges Bank (the Bank), managed funds worth Nkr 795 billion (US\$88 billion) in the international capital markets. The bulk of this capital was the Government Petroleum Fund (Nkr 613 billion/\$68 billion), which is managed on behalf of the Ministry of Finance, and the Bank's international reserves (Nkr 170 billion/\$19 billion). Norges Bank's international reserves comprise the foreign exchange reserves, gold reserves, and claims on the IMF. In addition, the Bank manages the Government Petroleum Insurance Fund (Nkr 11 billion/\$1 billion) on behalf of the Ministry of Petroleum and Energy.<sup>47</sup>

812. The foreign exchange reserves (Nkr 157 billion/\$17 billion) are split into four sub-portfolios;

- the *liquidity portfolio* (Nkr 37 billion/\$4 billion), which is to be used in connection with the conduct of monetary policy (for potential foreign exchange interventions and to influence liquidity and interest rates in the Norwegian money market);

- the *long-term portfolio* or investment portfolio (Nkr 106 billion/\$12 billion), which should also be available for market operations, but should be invested on the basis of more long-term considerations;
- the *immunization portfolio* (Nkr 6 billion/\$1 billion), which is equivalent to government foreign currency debt and is intended to neutralize foreign exchange and interest rate risk associated with this debt; and
- the *Petroleum Fund buffer portfolio* (Nkr 7 billion/\$1 billion), which receives capital daily, and is transferred to the Government Petroleum Fund on a monthly basis.

813. The liquidity portfolio is managed by Norges Bank Monetary Policy (NBMP) by the Market Operations Department (MOD). All other funds/portfolios are managed by Norges Bank Investment Management (NBIM), which was established as a separate wing in January 1998 to meet the Bank's challenges of having been delegated the responsibility for managing the Petroleum Fund. NBIM's sole purpose is to function as investment manager and thereby take advantage of the benefits inherent in being a large institutional investor. Economies of scale made it natural to assign NBIM the responsibility for handling a large part of the foreign exchange reserves. To prevent duplication of internal resources, NBIM delivers settlement and IT services to NBMP/MOD.

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<sup>47</sup>Guidelines and performance reports for the foreign exchange reserves and various funds managed by the Bank and invested in the international capital markets are presented on Norges Bank's website ([www.norges-bank.no](http://www.norges-bank.no)).

814. In addition to being responsible for the management of the liquidity portfolio, NBMP/MOD also carries out the purchases of foreign exchange to the buffer portfolio. This ensures that these responsibilities are viewed in conjunction with the department's activities in implementing monetary policy.

815. The way the Bank carries out the mission of managing the Petroleum Fund has also contributed to a more professional management of the foreign exchange reserves with more focus on performance, and has influenced the investment strategy of the long-term portfolio (as compared to the old strategy back in 1998, equities are now included, the number of markets is larger, and the duration of the fixed income portfolio is higher).

## Developing a Sound Governance and Institutional Framework

### Reserve management objectives and coordination

816. The objectives of reserves management are: (i) funding intervention, (ii) managing national wealth (high return), and (iii) immunization of government foreign currency debt.

817. In the monetary policy, a formal inflation target was adopted in March 2001. The interest rate is the main monetary policy instrument, but interventions may be considered in special circumstances. Measured in months of imports, Norway has quite large reserves. Both the size of the reserves and the change in the monetary policy imply that it is more appropriate with a longer investment horizon.

818. The Executive Board of the Norges Bank establishes guidelines for the management of the foreign exchange reserves. The aim of the management is to maximize the return within the constraints specified in the guidelines. From 2001 onwards, a part of the long-term portfolio (20 per cent) has been invested in equities. The Executive Board has decided to further increase the equity share, and to include nongovernment securities in the bond portfolio.

819. The management of the foreign exchange reserves is coordinated with the Ministry of

Finance's management of government foreign debt. The way this is carried out is that a small part of the reserves—the immunization portfolio—has been set aside to be equivalent to government foreign currency debt. In 2004, the existing government foreign debt (worth only Nkr 6 billion at end-2001) will be settled in its entirety.

820. One may therefore conclude that objectives (i) and (iii) mentioned above have become less important over time and (ii) more important.

### Institutional framework

821. Pursuant to the Norges Bank Act, Norges Bank shall invest the official foreign exchange reserves with a view to maintain the foreign exchange policy that has been established. The King in council may issue rules concerning the investment of the official foreign exchange reserves. In practice, however, Norges Bank's Executive Board has laid down guidelines for the investment of reserves.

### Transparency and accountability

822. There is a clear division of responsibilities, which is reflected in the organizational setup and well documented in written guidelines, mandates, and job instructions. The overall responsibility for operations rests with the Executive Board, which sets the overall strategic guidelines (including major risk limits) and receives quarterly management reports.<sup>48</sup> The Board has delegated to the Governor to set supplementary guidelines. The Governor has in turn delegated further specifications to the responsible manager (wing leader).

823. Instrumental to the establishment of a clear distribution of roles and responsibility is the division between strategy formulation on the one hand and operational management with a clear responsibility for performance on the other. A separate unit within the Governor's staff has been given

<sup>48</sup>Until 2000 the Executive Board delegated to the Governor to define the benchmark portfolios and the limits for relative risk (tracking error), as well as credit risk (minimum rating level). These fundamental limits are now placed with the Board itself.

the responsibility for preparing advice on the strategic guidelines and benchmark portfolios of the reserves and the Petroleum Fund.<sup>49</sup> The leader of the respective wing has responsibility for the performance results of the portfolio(s) under management. This principle of decentralized management is an important characteristic of Norges Bank's general management model. This may contrast with various other central banks where investment management decisions may be based (more or less) on investment committees with members from different parts of the organization. Responsibility for internal control lies with the wing as part of the line-based management model.

824. NBIM is a separate management unit that does not have access to market-sensitive central bank information ("Chinese walls"). The manager reports directly to the Governor, like the other wing leaders. Within NBIM, there is a sharp line between the departments that make decisions regarding investment, and the Investment Support Department, which takes charge of transaction settlement, risk measurement, return measurement, and accounts. Responsibility for control rests with the front office departments. These constantly monitor the internal and external management. Independent control of market and credit risk is carried out in the Investment Support Department. The Legal and Compliance Department oversees the internal control functions, and is a *primus motor* in compliance work.

825. NBIM's most important objective is to achieve the highest possible return pursuant to applicable mandates and limits. It is easy for the delegating authorities and other observers to assess whether the performance targets are attained. Assignments are clearly defined in written mandates, and NBIM's results can be compared with defined benchmark portfolios. The establishment of NBIM as an independent unit in Norges Bank makes its responsibility for performance more transparent.

826. In NBMP/MOD, risk control and return measurement are carried out in a separate unit independent of the front unit. The middle office unit reports to the head of MOD.

827. Outside NBMP/MOD and NBIM, the Governor of Norges Bank has a staff to supervise and monitor compliance and, as mentioned, to formulate strategy. Previously the Governor also had a special advisory committee from departments other than NBIM, NBMP/MOD, and the Governor's staff to assist the Governor in this work. Recognizing that the work of the advisory committee was overlapping with the work of the Governor's staff, the committee was removed in 2001.

828. External auditing is performed by Norges Bank's separate Audit Unit, the Central Bank Audit, which reports to the Bank's Supervisory Council, which is appointed by the Parliament. The Central Bank Audit is responsible for the operational auditing of investment management, as well as the statutory financial audit of the Bank's accounts. In its mandate the Central Bank Audit is also asked to do work that is ordinarily considered the responsibility of an internal auditor. The audit is carried out in accordance with recognized auditing standards in Norway, which are based on international auditing standards.

829. The Supervisory Council is responsible for ensuring that the rules for the Bank's activities are observed, including general monitoring and follow-up of the Executive Board. The Executive Board and the Supervisory Council receive a quarterly report on the management of the reserves consisting of detailed reports on each of the sub-portfolios and a concentrated report extracting the most relevant information in the sub-reports (see below). It may also be pointed out that the Governor receives a monthly report from NBIM on the performance of all NBIM portfolios. The Governor also has a special monthly follow-up meeting with NBIM, where performance and other topics relevant for the Governor in evaluating NBIM are addressed.

830. Detailed accounts of the foreign exchange reserves are presented in the Bank's annual report, including book value (i.e., market value) and return in Norwegian kroner (Nkr) of the total reserves and the different sub-portfolios, as well as

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<sup>49</sup>For the reserves, the guidelines prepared by the Governor's staff are set by the Executive Board or the Governor. For the Petroleum Fund the guidelines are given by the Ministry of Finance, except supplementary guidelines for credit risk, which are set by the Governor.

the currency composition of the total foreign exchange reserves. The annual report also contains a separate chapter describing investment management in Norges Bank, including the percentage return attained on each of the sub-portfolios and compared with the benchmark return.

831. Since 2001 Norges Bank has, via the Internet, extended to the public information about the reserves.<sup>50</sup> The reason for the change in policy is that the Norwegian Government applies a principle of transparency to the Bank's management of the Petroleum Fund. The foreign exchange reserves may also be considered as part of public funds subject to openness. The new information includes guidelines for the investment of foreign reserves issued by the Executive Board, as well as supplementary guidelines set by the Governor. In addition, the quarterly concentrated management report mentioned above is presented on the web as of 2000/Q4. This report displays size and return of the different sub-portfolios (and relative return compared to the benchmark portfolio) as well as actual asset class and currency composition, and portfolio risk exposure compared with limits. Returns are measured both in the currency basket of the benchmark portfolio and in Nkr. The more detailed management reports for each of the sub-portfolios in the reserves are not made public.

832. Norges Bank is aware that managing the Government Petroleum Fund and the foreign exchange reserves requires active use of salary and personnel policy incentives. The market for persons with experience in financial and investment management is characterized by a high salary level with an element of performance-related pay in combination with extraordinary demands for focused work. The Bank's success in achieving good management results will depend very strongly on its ability to recruit, develop, and retain highly qualified personnel from this market. The Bank is very conscious of developing the competence of its own employees.

833. Part of the salary of employees with responsibility for the results of investment decisions is based on performance. In 2001, this was the case for more than one third of the NBIM employees. This pay system has been extended to key personnel in investment support functions.

834. To a lesser degree, NBMP/MOD has implemented a payment structure where payment partly is based on performance (on a broad basis).

835. It is part of the IT strategy that top skills are bought where they are found, whether by own employees or outsourcing. All technical support and a large part of systems development and applications support are performed by external suppliers, both outside and inside Norges Bank's premises. NBIM has defined the type of core competence the unit would like to have. Other functions will be outsourced if possible.

## **Establishing a Capacity to Assess and Manage Risk**

### **Benchmark portfolio**

836. The level of risk derived from the investment strategy comes from two sources: the long-term strategy specified by the benchmark portfolio and the short-term strategy or the permissible deviations from the benchmark. By far the most important is the benchmark portfolio. The level of risk in the benchmark is determined by the currency distribution, asset classes (equities, bonds), type of securities, and duration of bonds. The benchmark for the liquidity portfolio reflects that the portfolio is to be used for interventions: high liquidity, short duration. The benchmark for the long-term portfolio reflects the intention of managing wealth (high return): bonds and equities, global diversification. Risk is also affected by the maximum allowable deviations from the benchmark. This is handled in the strategic guidelines by specifying limits for tracking error, asset class mix, currency and market distribution, duration, and minimum level of ratings, etc. See our website for the detailed benchmarks and limits.

837. The investment strategy for the long-term portfolio (which includes equities) is based on analysis of portfolio return and risk, using an in-

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<sup>50</sup>Most of the web pages are available in English.

house simulation model. In the calculations estimates of expected portfolio return are based on historical data and, alternatively, on simplified subjective judgments. Risk is measured as the annualized standard deviation of the portfolio return, based on a covariance matrix of historical returns. In addition, the probability of having a negative portfolio return in any single year is calculated. The analysis showed that including a small part of equity exposure would enhance the portfolio return without significantly increasing the risk.

838. The asset weights of the benchmark portfolio float with the market prices, and rebalancing the benchmark weights means that managers will incur transaction costs in the actual portfolio. A specific risk analysis has therefore been performed to determine optimal rules for rebalancing the benchmark.

839. The liquidity portfolio is to be used in connection with the conduct of monetary policy. It is important that the portfolio is invested in liquid currencies. The euro is the most relevant currency for interventions and the U.S. dollar is the most relevant currency for operations in currency swaps to influence liquidity and interest rates in the Norwegian money market. Currency swaps are only a supplementary instrument in domestic liquidity operations. Because of diversification purposes the liquidity portfolio is also invested in sterling and Japanese yen. The distribution of the liquidity portfolio is as follows: 50 percent in euros, 25 percent in U.S. dollars, 20 percent in pounds sterling, and 5 percent in Japanese yen. The managing wealth motive of the long-term portfolio means more emphasis is placed on global diversification, with eight currencies in the fixed income benchmark and 12 currencies (22 markets) in the equity benchmark.

### Instruments

840. The guidelines set by the Executive Board specify the allowable asset classes for each portfolio. Within the asset classes there is no list of allowable instruments, given that certain general requirements are fulfilled: Sound risk systems and control routines must exist for the instruments used in the management of the foreign exchange

reserves. In addition, it must be ensured that there is sufficient expertise in all areas of activity.

841. Interest-bearing securities in the liquidity portfolio shall be issued by nation states, enterprises with government guarantees, or international organizations with a high credit rating. Investment is also permitted in bonds from other issuers related to the public sector, which may be included in the Lehman Global Aggregate Government Index. Permissible interest-bearing securities in the long-term portfolio are bonds that may be included in the Lehman Global Aggregate Index (investment grade), including corporate bonds, mortgage-backed, and asset-backed bonds. Bond issuers and counterparts in bank deposits etc. are subject to a minimum rating level. Equities in the long-term portfolio must be listed on a stock exchange in one of the countries listed by the Board.

842. Before trading in a new instrument commences, documentation must be available that identifies the various types of risk associated with use of the instrument, and that confirms that provision has been made for adequate expertise, risk systems, and control routines. Derivatives may be used to the extent that the ensuing financial exposure does not exceed the exposure that would have resulted from investing directly in the underlying instruments. Overall risk management is to be undertaken in which the exposure in derivatives is integrated with the exposure from underlying instruments.

843. In practice it will be up to the leader of the respective wing to specify a list of allowable instruments.

844. Both interest rate and equity derivatives have been used extensively to attain desired positions in a cost-effective manner. In the transition in 2001 from 0 to 20 percent equities within the long-term portfolio, equity index futures were applied before converting the equity exposure to physical shares. Interest rate derivatives include bond futures, LIBOR futures, options on futures, and interest rate swaps. Activity in derivatives must obey the rules mentioned above.

### Risk and performance measurement

845. As mentioned, the objectives of holding reserves are multiple. Therefore the reserves are

divided into four different sub-portfolios, and separate guidelines are drawn for each portfolio.

846. Market risk is calculated as the expected annual standard deviation of the portfolio returns based on portfolio holdings and time series of historical market prices. Credit risk is primarily measured by the ratings from the leading rating agencies.

847. Interest rate risk is measured by modified duration. The liquidity portfolio has a short duration (about 1.5 years). The level of duration for the long-term portfolio (approximately 5.5 years) mirrors the duration of the market (indices), and reflects both the long-term investment horizon and the fact that in some bond markets empirical studies indicate that the maturity premium has been positive and rising for durations up to 2–3 years, with the rise in premium slowing thereafter and even stabilizing.

848. The reserve portfolios are, as mentioned, split between two different wing leaders, and the responsibility for managing risk in Norges Bank is with the wing leader. Therefore we do not quantify the expected return and risk for the total reserves. Instead, the Bank's return/risk objectives are reflected in the way reserves are divided into different sub-portfolios and the way the separate guidelines are designed.

849. The main strategic choices for both the liquidity and the long-term portfolio are defined by means of benchmark portfolios. These are constructed portfolios with a given country distribution and specific securities from the various sub-markets. A benchmark portfolio is used to manage and monitor risk exposure, and also serves as a point of reference for evaluating the actual return achieved on the reserves.

850. We use external benchmarks (Lehman Brothers for bonds, FTSE for equities). For ease of comparing portfolios the policy is to use the same index provider for the various portfolios unless we have good reason to deviate. Benchmarks for the liquidity portfolio and the long-term portfolio are defined by the Executive Board and are to some extent made more precise by the Governor. The wing leaders are measured against the "official" benchmark, but they are free, of course, to apply sub-benchmarks for their different sub-activities.

851. Possible criteria for choice of an index are ease of access, transparency, clarity of selection criteria, investibility, breadth of coverage, quality of data, availability of historical data, customer service/support, quality of analytics, and ability to customize.

852. The Executive Board has stipulated that management of the foreign exchange reserves shall be aimed at achieving the highest possible return within the limits set out in the guidelines. Far the most important factor influencing returns is the benchmark portfolio. There are two reasons for allowing deviations from the benchmark portfolio. One is cost-effective management (index-related). The other is active management.

853. An upper limit has been set for the actual portfolio's deviation from the benchmark. This limit is a measure of relative risk (tracking error). In practice, this means that the difference in returns on the actual portfolio and the benchmark will normally be small. The upper limit for expected tracking error is 0.5 percentage point for the liquidity portfolio and 1 percentage point for the long-term portfolio.<sup>51</sup>

854. In NBIM, internal fixed income management is divided into two main areas: indexing and other index-related management on the one hand, and active management on the other. Within these two areas, activities are further divided into various special functions.

855. The objective of index management is to efficiently purchase the benchmark, while taking advantage of special pricing situations to achieve some excess return (enhanced indexing). The earnings potential of lending fixed income instruments from the portfolio is utilized. Another important task is to correct undesirable deviations from the benchmark in the most efficient way possible.

856. One objective of active management is to take advantage of systematic price differences between bonds with almost identical properties in order to achieve an excess return. Another strategy

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<sup>51</sup>In simplified terms, a tracking error of 1 percentage point means that the actual difference between the returns on the benchmark and the actual portfolio will be between -1 and +1 percentage points in 2 out of 3 years on average.

for achieving an excess return is to take positions that depend on future interest rate movements. An important objective of management is to ensure breadth in the active fixed income management positions so that the return will not be overly dependent on individual explanatory variables.

857. The equity portfolio of the long-term portfolio was established in 2001. The entire portfolio has until March 2002 been managed internally as an enhanced index portfolio, taking advantage of special pricing situations, as for example in relation to the significant changes in the FTSE-index that occurred in June 2001. As for fixed income the earnings potential of lending equities is utilized. In March 2002 part of the equity portfolio was converted to external equity mandates. See below for a discussion of external management.

858. The total level of active risk within the long-term portfolio has until now been quite modest, mostly within the interval 20–40 basis points as measured by expected tracking error. In practice the liquidity portfolio has tracked the benchmark portfolio very closely, around 10 basis points as measured by expected tracking error.

859. Returns on the actual portfolio and the benchmark portfolio are calculated according to the market value principle.<sup>52</sup> For the long-term portfolio multiple historical performance horizons are applied to measure the average excess return. Monthly data go back to the beginning of 1998 when NBIM was established. An information ratio is calculated for the long-term portfolio.<sup>53</sup>

860. Management costs for the sum of the three reserve portfolios managed by NBIM are presented in quarterly reports. The costs incurred by NBIM's management activities consist partly of fees to external managers and custodian institutions, and partly by Norges Bank's internal operating costs. Similar calculations of the costs of managing the liquidity portfolio have not been made. One of

the reasons for this is that portfolio managers in NBMP/MOD perform other tasks in addition to investment management.

861. For the long-term portfolio the Governor has set a target (in basis points) for the yearly excess return above benchmark. When compared with the target, the actual excess return is adjusted for taxes and transaction costs that may have resulted from changes in investment strategy. In the management of the liquidity portfolio, a part of the narrow risk limit of 50 basis points is utilized. It is set a target (internally) for yearly excess return that reflects the use of tracking error.

862. In Norges Bank's accounts, foreign exchange reserve items are valued based on their "fair value," i.e., their market value in Norwegian kroner. The accounting profit/loss includes both unrealized and realized gains and losses (in Nkr). This means changes in market prices of currencies, bonds, and equities will impact the Bank's profit/loss account and the Bank's own capital. Though Nkr is the relevant currency in the accounts, the return on the long-term portfolio and the liquidity portfolio is measured both in Nkr and by local currency (weighted by the benchmark portfolio's currency basket). The reason is that return measured in Nkr is not relevant to an evaluation of developments in the international purchasing power of reserves, which is of particular interest for the long-term portfolio.

### External managers

863. According to the guidelines, external managers may be used in the management of the long-term portfolio. Such managers must have adequate internal ethical guidelines for their own activity.

864. In NBIM there was internal fixed income management from the start, while equity management on behalf of the Petroleum Fund was outsourced to external managers. Subsequently, external managers have been assigned responsibility for portions of the fixed income management (both on behalf of the Petroleum Fund and the long-term portfolio), while internal equity management has been built up. Today NBIM manages equities internally on behalf of the Petroleum Fund and the long-term portfolio.

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<sup>52</sup>The detailed methodology for calculating the returns on the various portfolios Norges Bank manages are described in the appendix of the Government Petroleum Fund quarterly report. The report is accessible on our website.

<sup>53</sup>We define "information ratio" as the average monthly excess return over time divided by the standard deviation. This figure is annualized.

865. At the end of June 2002 about 10 and 47 percent of the long-term portfolio's fixed income and equity portfolios, respectively, were managed externally. These are all active mandates, except for one enhanced index equity mandate. The reason for using external managers in the reserves is to contribute to the objective of maximizing returns (above benchmark). It is natural to take advantage of the experience Norges Bank has gained in selection and follow-up of external managers in the Petroleum Fund also in the management of the reserves. When selecting individual managers Norges Bank applies the same general standards for the managers in the reserves as for the Petroleum Fund.

866. Requests for applicants are posted on the Internet. Manager selection is based on a four-stage process: (1) screening of applicants by 10 criteria (based on questionnaire one), which results in a short list of candidates; (2) analysis and selection by four groups of criteria (based on questionnaire two and interviews) give a further reduction to the finalists; (3) optimization process to select the managers (by a manager combination tool); and (4) ongoing monitoring and control.

867. The external portfolios form an integral part of the risk management of the long-term portfolio, and are subject to the following principles of monitoring: (i) performance and risk positions are monitored daily; (ii) all transactions are monitored weekly; (iii) monthly analysis of risk profile, value statistics, and earnings expectations; (iv) monthly/quarterly transaction monitoring (trading, momentum, and liquidity risk); and (v) yearly due diligence.

### Management information systems

868. An integrated risk measurement system is used to assess and monitor relative and absolute risk. Expected annualized tracking error is calculated weekly for the long-term portfolio and the liquidity portfolio, to keep risk exposure within the limits. The system is also used to measure absolute risk (standard deviation) of the actual portfolio and the benchmark portfolio, as well as the modified duration of the fixed income portfolio.

869. Important elements in the Norges Bank's use of management information systems are:

(i) daily updated information on holdings and prices in both internal and external portfolios; (ii) daily measurement of performance relative to benchmark; and (iii) daily/weekly monitoring of risk. Information on all internal and external managed portfolios is updated daily in the central data warehouse.

### Stress tests

870. Apart from the quantitative analysis performed when strategy is reviewed, we do not use formal ongoing stress tests for the potential impact of specific scenarios. If we judge that a change in market conditions may have a negative impact on the reserve portfolios, we are prepared to amend investment strategy to protect the reserves from potential losses.

### Operational risks

871. The degree of operational risk will depend on the organizational structure chosen (as described above), the procedures and technical systems used, and the expertise in the organization. Norges Bank places emphasis on managing this type of risk by establishing sound internal control procedures, a sound organization of activities with clear authorizations and a clear distribution of responsibility, recruitment of specialists with practical and theoretical qualifications, satisfactory training of personnel, technical standby solutions, and a sound set of legal agreements.

872. Once a year each wing makes a special report to the Governor's staff on the quality of the internal control. The objective is to detect major risks that may potentially be an impediment to the wing in reaching its goals, and to ensure that management is focused on managing those risks. An example of a risk that is given attention is NBIM's follow-up of external suppliers of various services.

873. Examples of measures established to reduce operational risks are routines for preventing unauthorized transfers and securities transactions, guidelines for staff involved in investment management to restrict their personal affairs and potential conflicts of interest, and contingency plans (e.g., in case activities at the head office in

Oslo should be prevented, NBIM's management office in New York is prepared to step in and undertake simplified management services).

### **Efficient markets**

874. The part of the reserves that is the first to be drawn upon in interventions—the liquidity portfolio—is invested only in the very liquid currencies/markets: euro, pound sterling, U.S. dollar, and Japanese yen. The 50 percent weight in euros in the benchmark portfolio is split equally between the liquid bond markets of Germany and France.

875. Liquidity is of less importance for the long-term portfolio, but even this portfolio should be available for interventions. Compared to the liquidity portfolio, the fixed income part of the long-term portfolio has a few additional, minor currencies, considered to have liquid bond markets.

876. The equity part of the long-term portfolio is invested in 22 markets, which are all classified as developed markets (i.e., they all meet some specified minimum standards related to settlement systems, legislative regulation, size, and liquidity). As for bonds, the liquidity of equity investments depends both on the possibility of selling large amounts in a short time, and the possibility of using repo markets. The opportunity for selling shares on short notice without impacting prices depends, inter alia, on the turnover in the secondary market. It is not easy to judge precisely the liquidity of equities vs. bonds. Normally a diversified bond portfolio will be more liquid than a diversified equity portfolio. A moderate proportion of reserves invested in equities spread among many markets would not, to any substantial degree, weaken the possibility of raising liquidity when needed.

# 17

## Oman

### Governance and Institutional Framework

#### Reserve management objectives and coordination

877. The objectives of management of reserve are three-fold:

- Provide liquidity for intervention in the local foreign exchange market.
- Earn reasonable rates of total return without exposing the reserves to excessive credit and market risks.
- Earn good current income so as to achieve healthy accounting profit.

878. Oman is a small oil exporting country with its currency pegged to the U.S. dollar. Maintenance of the credibility of the fixed peg is of paramount importance for macroeconomic stability. The reserve management policy objectives have been designed primarily with a view of optimizing U.S. dollar resources to provide a credible cushion against current and capital account shocks, while at the same time clearing the local foreign exchange market on a day-to-day basis. These objectives have remained in place since the inception of the Central Bank of Oman (the Central Bank) over 25 years ago.

879. The Central Bank does not target any particular level of reserves. The current level of for-

eign exchange reserves at around US\$2.5 billion provides import cover of about 4.5 months, which is considered adequate, given the fact that external debt of Oman is very low and is declining.

880. The scope of reserve management activity is confined to achieving the objectives of liquidity and growth/current income.

881. For the Central Bank, the most important monetary policy goal is to maintain the fixed peg of the rial Omani with the U.S. dollar. This is recognized as such in reserve management policy. Moreover, reserve management operations take notice of domestic liquidity conditions and the position of government balance with the Central Bank. Local banks are allowed short-term U.S. dollar-rial Omani buy-sell swaps as a mechanism for augmenting rial Omani liquidity, in case of need.

882. The imperatives of the monetary policy are reflected in the manner in which the foreign exchange reserves portfolio is structured. Currently, the external reserves are divided into four sub-portfolios or tranches:

- (i) **Liquidity Tranche:** This is an all U.S. dollar portfolio that is meant for providing liquid resources for market intervention. As such, this tranche is invested in very short-term high-quality instruments, such as deposits and CDs of top-class banks and U.S. Treasury Bills. All inflows/outflows (which do not represent income/realized

profit) with respect to the external reserves take place in the Liquidity Tranche.

- (ii) **Bridge Tranche:** This is also an all U.S. dollar portfolio that is intended to provide support to the Liquidity Tranche in case of need. The size of the Bridge Tranche is generally kept within a maximum of 25 percent of the external reserves, excluding gold and SDRs. This tranche is invested in short- to medium-term high-quality instruments, such as deposits and CDs of top-class banks and U.S. Treasury Bills as well as U.S. Treasury notes with remaining maturity up to and including three years.
- (iii) **Income Tranche:** This represents the stable portion of the reserves, which is a multicurrency portfolio, with the neutral share of U.S. dollar at 75 percent. The other permissible currencies are euros and pounds sterling. Until recently, the Japanese yen was also a permissible currency for this tranche. However, effective January 1, 2002, Japanese yen ceased to be a permissible currency in light of the continuing weakness of the Japanese economy. The permissible instruments for the Income Tranche include bank deposits, CDs, treasury bills, and dated securities representing debt obligations of top-quality sovereign and supranational institutions whose residual maturity does not exceed 10 years.
- (iv) **Bullion Tranche:** This tranche contains the gold holdings of the Central Bank, which currently constitute around 3 percent of the external reserves. The gold, which is located at an overseas center, is placed in short-term lease (deposit) with top-quality banks.

883. There are performance benchmarks for the Liquidity, Bridge, and Income Tranches, which take into account investment objectives, liquidity requirements, and constraints. The investment policy with respect to the external reserves is reviewed

from time to time, taking into account, among other things, fixed income and foreign exchange markets outlook.

### Institutional framework

884. Reserve management activities of the Central Bank are carried out under the overarching provisions of the Banking Law, which also covers other activities of the Central Bank. The Law mandates a fixed par value for the rial Omani and also stipulates maintenance of a minimum ratio between external reserve and currency in circulation. This Law has specific provisions regarding eligible currencies and instruments for deployment of reserves. The Law also mandates that international accounting standards be applied for accounting purposes with respect to the external reserve. The Board of Governors of the Central Bank is the highest body for policy decisions with respect to management of external reserves. The relevant provisions of the Banking Law with regard to the above are quoted below:

### Level of external reserves

885. Article 31 states that the Central Bank shall at all times maintain a reserve of external assets that shall be related in value to the value of currency notes and coins in circulation in such ratio as may be prescribed from time to time by the Board of Governors, subject to approval of His Majesty, The Sultan.

### Categories of external assets

886. As per Article 32, the reserve of external assets may consist of any one or more of the following, provided they adhere to all limits, classifications, constraints, restrictions, and qualifications whatsoever laid down by the Board of Governors:

- a. Gold or silver coins, which are legal tender.
- b. Bullion of gold, silver, or such other precious metals as may, from time to time, be utilized as a monetary asset and freely traded on international exchanges.
- c. Foreign currencies or basket of currencies.

- d. Bank demand and time deposits, certificates of deposit, and acceptances denominated in freely convertible foreign currencies.
- e. Treasury bills, commercial paper, and any other short-term money market instrument denominated in freely convertible foreign currencies and issued by foreign banks, foreign governments, foreign public agencies, or supranational organizations.
- f. Floating rate notes denominated in freely convertible foreign currencies and issued by foreign banks, foreign governments, foreign public agencies, or supranational organizations.
- g. Fixed interest securities and notes denominated in freely convertible currencies and issues guaranteed by foreign banks, foreign governments, foreign public agencies, and supranational organizations.
- h. Any internationally recognized reserve asset, including SDRs issued by the IMF.

### Accounting

887. Article 38 provides that the amount of profits, losses, credits, debits, depreciation, funded and unfunded reserves, and other financial analysis . . . shall be determined according to the generally accepted principles of accounting, including the International Accounting Standards insofar as they do not contradict any provisions of the Law, agreed by the Auditors appointed pursuant to Article 18(c) of this Law and approved by the Board of Governors.

### Parity

888. Article 41 specifies that:
- a. The par value of the rial Omani shall be determined from time to time by His Majesty, The Sultan.
  - b. The par value of the rial Omani, or any change thereof, shall be declared in terms of gold, units of SDR, a foreign currency, or a basket of currencies or an internationally recognized unit of account for cur-

rencies, provided, however, that any such determination shall be in accordance with the conditions of any international monetary agreement to which the Sultanate (of Oman) is then a party.

889. In Oman, foreign currency revenues of the government, arising mainly out of export of oil and gas with unit sales realization up to the price of oil and gas fixed annually for budget purpose (the *budgeted price*) are generally sold to the Central Bank against rials Omani, which serve as inflows into the reserves and are thus monetized. Any revenue of the government in excess of the budgeted prices of oil and gas are kept separately in a fund to be utilized if there is a budget shortfall subsequently. This portion of the external reserve of the country is owned and managed directly by the government. The name of the fund is State General Reserve Fund (SGRF). There is an institutional arrangement for consultation between the Central Bank and the SGRF on various investment-related issues, such as composition of benchmark, portfolio performance, etc.

890. There is a well-defined organizational structure within the Central Bank for all decisions regarding the external reserves. As mentioned earlier, the Board of the Central Bank is empowered to make all decisions with regard to investment policy and investment guidelines, including performance benchmark, etc.

891. The highest decision-making body for all investment decisions, in terms of the policy/guidelines approved by the Board, is the Reserve Asset Management Committee (RAMC), which is chaired by the Executive President (CEO of the Central Bank). The composition of this Committee is detailed in Table 21.

892. The RAMC decides on all issues concerning reserve management, including fixing of medium-term strategic (MTS) benchmarks with regard to currency allocation and duration.

893. The responsibility of the Central Bank with regard to management of external reserves arises exclusively out of the provisions of the Banking Law. The external reserves are owned by the Central Bank and as such there is no agency arrangement between the government and the Central Bank for this purpose.

**Table 21. Committee Composition**

Executive President	Chairman
Senior Vice President	(In charge of Treasury, Investment, and Settlement Departments)
Manager	(In charge of Treasury and Investment Department)
Senior Manager	(In charge of Financial Management Department, which is responsible for maintenance of accounts for the Central Bank)
Senior Manager	(In charge of Systems, Procedure, and Operations Department, which performs management service functions)
Investment Expert	In-house consultant on reserve management

894. The three main aspects relating to investment of external reserves, namely, guidelines, decision-making process, and procedure for operations with respect to transactions in the front office and their follow-up at the back office, have been established and documented. There is a system for periodic review of these documents.

895. There is a good deal of decentralization of decision-making power for risk decisions. The Central Bank has adopted a document delineating the powers and responsibilities of officials at various levels connected with decision making. The delegation of power and the chain of authority are well documented.

896. Internal control and audit systems for the reserve management functions and operations have been designed on sound governance lines. Major elements of the internal control systems are:

- (i) Management Information Reports with respect to transactions, risk exposure, and exceptions (breach of guidelines, delegated powers, and procedure for operations) have been prescribed. These are intended to cause flow of critical information from the reserve management departments to the senior management (including CEO) on a regular basis. The Board of Governors is kept informed at

periodic intervals about all important aspects of reserve management, including portfolio performance vis-à-vis benchmark.

- (ii) There is an internal audit system that periodically examines the operations at the front office and the back office and reports to the CEO. Compliance with audit observations within a time frame is ensured.

897. Financial accounts of the Central Bank, including accounts relating to reserve management, are audited by external auditors at least once a year. Effective January 1, 2002, the Central Bank has implemented the provisions of International Accounting Standards 39 with respect to all its financial assets and liabilities, which are in conformity with the Banking Law referred to earlier. The audited accounts and the findings of the external auditor are reported to the Board of Governors. The Central Bank's policy and procedure with respect to internal control and audit are well documented.

898. Information on foreign exchange reserves is provided in annual audited accounts and reports of the Central Bank. The present policy of the Central Bank does not envisage more disclosure with respect to reserve management.

899. Staff involved in reserve management are subject to a code of conduct and guidelines on conflict of interest regarding the management of their personal affairs.

900. The staff of the departments responsible for reserve management are all well trained and experienced. New staff are taken on the basis of very strict criteria for academic qualification and after thorough and comprehensive screening. The Central Bank devotes considerable resources to upgrading the knowledge and skill of its personnel. The Central Bank has not found feasible the idea of offering a better compensation package to reserve management personnel in order to attract and retain reserve management specialists. The present policy of uniform service rules and compensation packages for staff of all the departments of the Central Bank is working satisfactorily.

901. Retention of experienced staff has not been a problem so far, although some movement

of staff, in search of better and well-paid jobs in the private sector, has been noticed in recent years. The present policy is to offer better career opportunities in the Central Bank for the talented and well-performing staff.

### Establishing a Capacity to Manage Risk

902. The external reserves are exposed to currency, credit, liquidity, as well as interest rate risks. The approach toward risk exposure has been shaped by the following elements:

- Provisions of the Banking Law with regard to currency diversification and choice of instruments.
- Low appetite for downside risk with regard to currency revaluation, mark-to-market portfolio valuation, and income.
- An empirically observed fact with respect to interest rate risk that the expected risk-adjusted return is optimal around a portfolio duration of 2.5 years for major markets.
- Aversion to credit risk so as to keep the probability of getting involved in any default to a minimum.

903. The current investment guidelines embody the above approach with regard to prescriptions for the different types of risk exposures. The relevant provisions of the investment guidelines are as follows:

#### Currency diversification

904. In the Income Tranche, the proportion of holdings in the approved currencies shall always remain within the maximum and minimum limits as indicated in the table below.

Approved currencies	Neutral (percent)	Maximum (percent)	Minimum (percent)
U.S. dollar	75	100	60
Euro	20	30	0
Pound sterling	5	10	0

#### Duration

905. The neutral duration of investments in the Bridge Tranche shall be one year around which a maximum deviation of plus or minus six months will be permitted. The neutral or benchmark weighted-average duration of investment in the three approved currencies (in the Income Tranche) shall be as indicated in the table below:

Approved currencies	Benchmark (in years)	Maximum (in years)	Minimum (in years)
U.S. dollar	2.5	3.5	2
Euro	2.5	3.5	0
Pound sterling	2.5	3.5	0

#### Credit risk

906. At the time of purchase, short-term money market instruments shall be rated not lower than F3 and the issuing banks rated not less than C (individual) and 3 (legal) by FITCH-IBCA or their equivalent. At the time of purchase, long-term instruments shall not be rated lower than A by Moody's or its equivalent.

907. The current thinking with regard to the Income Tranche envisages a gradual elimination of diversification into non-U.S. dollar currencies and non-U.S. markets over a period of time. This is driven by a desire to stabilize earnings in U.S. dollar terms, with low downside risk.

908. Forward foreign exchange contracts are the only permissible derivative instruments. Short sale is prohibited. Further, although repo is a permitted instrument, it has not been used so far. However, in recent years bond lending activity has been undertaken for a large portion of the external reserves, including lending against cash collateral for the U.S. Treasury portfolio. The objective here is to earn additional income, while keeping the risk exposure at a low level. The approach with regard to any new activity has been to first understand and internalize the risk characteristics, put in place the necessary IT systems and internal controls, and then undertake it. This has been followed in the case of bond lending against cash collateral by ensuring that the risk on investment

of cash collateral is always at an acceptably low level by prescribing suitable investment guidelines for this purpose.

### Liquidity risk

909. Liquidity risk has been addressed by creating a three-tranche structure, as described earlier. In creating this structure, historical inflow/outflow data were analyzed to find out the liquidity requirement for undertaking intervention in the domestic market under a “worst-case” scenario. Further, to avoid issue concentration, which can have adverse liquidity implications, maximum holdings for individual issues of debt securities have been prescribed.

### Benchmarks

910. There are performance benchmarks for Liquidity, Bridge, and Income Tranches. All of these have been constructed on the basis of publicly available market indices. For the Liquidity Tranche, the benchmark is the one-month U.S. Treasury Bill rate. For the Bridge Tranche, as also for the Income Tranche, the performance benchmarks are a composite of market indexes, reflecting the neutral currency and duration configurations. The criteria for selection of the performance benchmarks are the following:

- The benchmarks should correspond to the passive or neutral risk profile.
- The benchmarks should reflect the broad pattern of investments.
- The benchmarks should not have any inherent bias for over/under performance.

911. The performance benchmarks are prescribed in the investment guidelines for external reserves, which have been approved by the Board of Governors.

912. For the purpose of calculation of rates of return, the U.S. dollar acts as the base/numeraire currency. Calculation of return with respect to the investment portfolios and also the benchmark is outsourced at present. This is done primarily with a view to ensuring that the returns are calculated

independently by an external agency. Return calculation is accompanied by full attribution analysis once in a quarter to highlight the factors responsible for over/under-performance vis-à-vis the benchmark.

913. Active risk taking for value addition vis-à-vis passive configurations with respect to currency and duration is also undertaken. For this purpose, there are two levels of decision making. At the level of the Reserve Asset Management Committee (RAMC), monthly currency and duration benchmarks (known as Medium-Term Strategic Benchmarks or MTS) are set, which are intended to beat the neutral performance benchmarks. At the level of the Department, deviation from the MTS benchmarks is permitted within prescribed limits in order to add value vis-à-vis the MTS.

914. Although the Central Bank is essentially a long-term investor, especially with respect to the Income Tranche, the investment horizon for all intents and purposes is one year at a time, reflecting the accounting year (January to December). The broad accounting principles currently applied in terms of IAS 39 with respect to the Liquidity, Bridge, and Income Tranches are the following:

- All coupon and discount earnings as well as realized profit/loss on sale of securities are taken to the P/L.
- All unrealized gain or loss on currency revaluation is booked under an equity head.
- All unrealized gain/loss on mark-to-market valuation of securities/outstanding forward exchange contracts is booked under another equity head.

915. Premiums/discount on bonds and Treasury Bills at the time of purchase are amortized following an effective interest rate method.

916. Interest earnings on gold deposits and realized gain/loss (against cost price) on the sale of gold are taken to the P/L. Unrealized gain/loss on revaluation of gold holdings is booked under the same equity head as for currency.

917. As the rial Omani is pegged to the U.S. dollar, rates of return in terms of domestic currency are similar to those in U.S. dollar terms.

918. Gist of quarterly performance and attribution analyses is reported to the Board of Governors.

919. The Central Bank has a policy of engaging external managers for discretionary management of a small segment (there is a ceiling of 10 percent for this purpose) of the external reserves. The investment guidelines prescribed for the external managers have been given higher duration and also different performance benchmarks. External managers can hold debt securities with remaining maturity up to and including 30 years. This has been done on the basis of the fact that they have the requisite expertise and advantage of location to assume higher interest rate risk for the purpose of value addition.

920. A management information system to assess and monitor risks consists of the following:

- A daily statement showing the portfolio summary with respect to the three tranches, which provides details, such as duration and currency composition vis-à-vis their respective neutral and MTS benchmarks, aggregate investment pattern, etc.

- A monthly statement giving a stress test for interest rate risk.

921. There is a plan to set up an independent Middle Office with well-defined responsibilities for managing various risks with respect to external reserves. Also, steps have been taken to identify operational risks for the Central Bank as a whole for setting up appropriate systems and mechanisms for managing them. At present, custodial risks are minimized by appointing only the most reputable institutions as custodians.

922. For the purpose of undertaking buy/sell transactions in currencies and securities and for placement of deposits, etc., there are approved centers, most of which are in major OECD countries. Also, there are concentration limits for exposure to banks located in different centers. Moreover, transactions in currencies and securities are required to be undertaken only with approved counterparties, which are selected on the basis of their credit, reputation, market share, and relationship with the Sultanate of Oman in general and the Central Bank in particular.

# 18

## Tunisia

### Developing a Sound Governance and Institutional Framework

#### Objectives and coordination

923. The strategic reserves management objectives of the Central Bank of Tunisia (CBT) are based on the following key points:

- Guarantee of the external liquidity of the economy;
- Preservation of the reserves holdings; and
- Maximization of return on reserves.

#### Liquidity

924. Liquidity of reserves is the main management objective of the CBT. Liquidity is required to ensure financing of external payments imbalances and to intervene in the local exchange market, in order to avoid sharp adjustments of the Tunisian dinar exchange rate.

925. The liquidity objective is met by targeting appropriate investment instruments and currency structure. The currency structure of reserves is set in accordance with the currency structure of the settlement balance as well as CBT and government liabilities.

#### Security

926. In order to safeguard reserves, the CBT has implemented a rigorous selection policy of markets,

assets, and counterparts. In addition, an operating control system is in place to monitor exposure limits for credit and market risks. Furthermore, the CBT has forbidden short position taking and financial instrument short sale practices. The use of derivatives is only allowed for hedging needs.

#### Return

927. The CBT aims to maximize reserves portfolio return subject to its liquidity and security constraints. Investment policy focuses on a dynamic allocation of reserves, using permissible instruments, in line with international capital markets outlook.

928. Tunisia has low foreign exchange intervention needs, given the floating managed exchange rate regime of the Tunisian dinar and capital movement restrictions. This provides some flexibility in reserves investment policy. Thus, the CBT has stretched the upper limit on money market from three to six months and has extended investment activity to international bond markets. In an attempt to limit the exposure to bond market risks, especially with respect to the two primary objectives of liquidity and security, the investment scope has been limited to government and supranational bond markets with a deep and liquid secondary market, which guarantee the highest level of security (i.e., U.S., German, and French government bond markets).

## Institutional framework

929. According to Tunisian law, management of foreign reserves comes under the Tunisian Central Bank's purview. There is no other independent entity in charge of it. Governance, management, and surveillance of the Central Bank of Tunisia are undertaken by the Governor appointed by the President of the Republic, the Board of Directors, and a censor who is appointed by decree, respectively. The Governor sets the bank's organization. The latest administrative chart gives the following configuration of the reserves management department:

- Governor
- Deputy Governor
- General Manager of External Finance
  - Deputy General Manager charged with Payments and Follow-Up
    - Manager of External Financing and Market Operations*
  - Deputy Manager of Market Operations
    - Department of International Market Operations
    - Department of Domestic Market Operations
      - Deputy Manager of External Financing
    - Department of Private Financing and Specialized Organizations
    - Department of Public Financing
  - Manager of International Relations and Treasury*
    - Deputy Manager of International Relations
      - Department of International Organizations
      - Department of Banking Relations and Counterparts Follow-Up
    - Deputy Manager of Treasury
      - Back Office
        - Department of Treasury Projections
  - Manager of Payments and External Debt*
    - Deputy Manager of Current Payments
    - Deputy Manager of External Debt
  - Manager of External Transactions Follow-Up*
    - Deputy Manager of External Payments Follow-Up
      - SWIFT and Messages Unit

930. Strategic decisions on overall objectives and principles of reserves management policy are set by the Governor on proposal of the concerned departments (currency distribution, asset classes, limits, risk monitoring, etc.).

931. The operational framework of the policies adopted, and all decisions regarding investment

strategy, currency exposure, credit risk, dealing counterparties, custodian arrangements, permissible instruments, etc., have to be approved by senior managers and by the Governor, on proposals of the concerned departments.

932. The managers of the reserve management department ensure that all operational guidelines are followed, and senior management is kept informed of all deals done, on a daily basis. Portfolio position is communicated daily to senior management, and weekly to the Governor.

933. There is an explicit separation among the front office, back office, and the entity responsible for SWIFT and messages. Pursuance of Treasury orders is immediately checked by the back office. Observance of limits (credit limits, permissible instruments, etc.) is checked through controls from the chief dealer, the back office, senior management, the banking relations department, and through frequent reporting to the Governing Board.

## **Management of operational risk and controls**

934. Supervision of risks is conducted through a system of formal limits and several controls.

935. First, dealing is centralized in a single location: the dealing room. Dealing risks are minimized by a formal separation between the front office, back office, and SWIFT and messages unit. Formal deposit limits are set for each counterparty in terms of amounts and maximum deposit periods. Settlement risk for bond operations is reduced through a systematic and immediate checking of a counterparty's confirmations (security type, accrued interest, nominal and net amounts, value date), prompt processing, and settling through receive (or deliver) against payment settlement procedures. Custodial risk is reduced by choosing good international clearing institutes (Federal Reserve Bank of New York, Euroclear, Clearstream, Bank of Tokyo Mitsubishi), and by undertaking a thorough custodian follow-up and systematic control of custodian statements.

936. Information technology risk is reduced by limiting access to data files and information system,

a daily backing up of data files, and similar precautions. Financial errors are minimized through prompt transaction processing and recording, back office control measures, as well as accounting checks on a daily basis.

### **Transparency and accountability**

937. To enhance the efficiency of reserves management policy and to trim down operating risks, the CBT has implemented an appropriate operational system based on risk exposure limits, cautious and prompt settlement processing, control measures, and frequent reporting. This operational system is managed by means of a computer system.

938. Regarding settlement processing, short-term investment operations on the international money market are generally settled the next day. Long-term deposits and foreign exchange transactions are treated on a spot value date basis. Concerning securities, transactions are done on a three-day settlement basis. Nevertheless, instructions of all the transactions have to be processed the same day in order to provide the required time to follow up on the settlement and to intervene in case of misstatement.

939. In other respects, the CBT has centralized settlement processing through the main correspondent for each currency to have standard settlement instructions. This has allowed cutting the misstatement risk, especially from the counterparty's side. The CBT has also diversified custodial risk by holding three security custody accounts with different institutions (Federal Reserve Bank of New York, Euroclear, Clearstream, Bank of Tokyo Mitsubishi). The terms and provisions governing the relationship of the CBT with these correspondents and custody institutions point out clearly their responsibilities vis-à-vis the CBT and the reporting arrangements.

940. To improve the reserves management operational efficiency (either at the processing level or at the monitoring one), the CBT has implemented an integrated computer system. This system integrates the management of front and back office functions, and accounting of the

operations in international capital markets. The system guarantees real-time transaction processing. It produces all the required statements to confirm and settle the transactions done by the front office, updates the treasury statements, generates book entries, and manages formal limits. The system also produces a variety of reporting statements for control and follow-up of the commitments.

941. The system also provides a large range of activity, treasury, and statistical reports. These reports allow control of transactions processing, and follow-up of risk and return management tools such as limits, duration, and performance.

942. The system structure separates front and back office functions. At the front office level, transactions done are booked into the system. The back office has the charge of checking the deal's accuracy and entries before the final validation of the transaction. The SWIFT and messages unit is independent from the back office, offering thus an additional way to reduce settlement risks. The back office also copes with the follow-up of accounting records, and the reconciliation of all received reports from correspondents and custodians.

943. This computer system provides a hierarchical authorization system, based on passwords and random codes access controls, which restrict the scope of access of operators according to their function needs. Besides, the system referential is centralized and managed exclusively at the back office level.

944. Data backup is performed on a daily basis into the general specified server and periodically on separate magnetic supports. Furthermore, the system is highly protected with sophisticated virus detection software, and with an auxiliary server. In addition, the CBT dealing room is protected with a card access system and equipped with fire detection instruments.

945. Audit function is led by an internal entity. This entity undertakes periodic missions in order to assess reserves management operations processing, in accordance with objectives, principles, and operational procedures approved by the Governing Board of the Bank. No external auditing has until now been undertaken.

## Establishing a Capacity to Assess and Manage Risk

### Risk management

#### *Liquidity risk*

946. Liquidity is guaranteed through an appropriate asset allocation and an adequate time horizon for investment operations. About 5 percent of foreign currency reserves is maintained liquid to meet unanticipated treasury needs. Excess liquidity is invested daily in short-term bank deposits (TomNext or OverNight). About 65 to 70 percent of the reserves are invested in the money market, through bank deposits of 1-week to 6-month periods, on the basis of anticipated fund flows. The remaining 25 to 30 percent of the reserves are invested in AAA sovereign government and supranational bonds.

#### *Credit risk*

947. Credit risk is managed through an adequate choice of counterparties with sound financial backgrounds. These counterparties are constantly followed, especially through several rating agencies reports. Quantitative limits on deposit amounts and investment periods are set for each counterparty according to its rating. A continuous follow-up of the counterparties is ensured by an independent department, and limits are updated

accordingly. Credit risk is controlled through constraints on permissible investment instruments. Only sovereign AAA government and supranational issues are allowed. Agencies and corporate bonds are excluded from the bank's assets.

#### *Market risk*

948. Foreign exchange risk is managed by matching the structure of reserves currencies to the currency structure of the balance of settlements. Adjustments are made when major discrepancies from the objective structure arise, or to take profit from substantial differentials in interest rates, or following the Governor's decision after proposals of the reserves management department. Equities are completely excluded from the asset portfolio, making the portfolio immune from stock market risks.

949. Interest rate risks are diminished through a choice of double duration limits: one on the global portfolio of reserves (nine months), and the second on the bond portfolio (two to three years). Long-maturity bonds (above 10 years), which are most sensitive to interest rate movements, are excluded from the portfolio. Constraints on permissible instruments are also a factor diminishing interest rate risks.

950. The use of financial derivative instruments (swaps and options) is made only for hedging purposes.

# 19

## Turkey

### **Developing a Sound Governance and Institutional Framework**

#### **Reserve management objectives and coordination**

951. Before 1980, Turkey had a fixed exchange rate regime with strict foreign exchange controls. Reserves were used mainly for current needs. With the liberalization policies of the early 1980s, exchange controls were eliminated and banks as well as other institutions and individuals were allowed to hold foreign exchange. With these changes, reserves began to serve additional purposes, such as intervention in domestic currency and providing a level of confidence to domestic and international markets.

952. The accumulation of foreign reserves during the second half of the 1980s made clear the need to improve portfolio management skills at the Central Bank of Turkey (the Central Bank). To this end, the Central Bank employed a few external fund managers to manage fixed income portfolios as part of the learning and training process for its own staff. The main function of those managers was training and providing advisory services about the developments in international markets. External manager services were discontinued in 1995.

953. With the liberalization of the Turkish economy, there was growing need to keep up with a rapidly changing financial environment and cen-

tral banking principles in the rest of the world. Accordingly, the reserve management concept has fully evolved into a new stage at the Central Bank with the implementation of modern management principles. The Central Bank takes into account the priorities of safety, liquidity, and return, in that order, while managing reserves. Risk awareness and management have become primary concerns.

954. Reserve assets managed by the Central Bank consist of readily available and marketable foreign assets that are controlled completely by the Central Bank.

955. The reserve management strategies at the Central Bank are influenced by different factors. One such factor is the Central Bank's liability structure, which is somewhat different from most central banks. The Central Bank carries a relatively large amount of liabilities in foreign exchange, which consists of savings deposits opened by Turkish citizens living abroad. These accounts were opened in the late 1970s to help Turkey overcome foreign exchange bottlenecks. They proved to be a stable source of foreign exchange over the years, even in times of financial crises. The Central Bank also has other liabilities in foreign exchange to domestic (e.g., reserve requirements) and international institutions. These liability accounts have a major impact on the design of the reserve management strategies.

956. Another factor that influences the reserve management strategies is the monetary and

exchange rate regimes that are in place. The current Central Bank Law dictates that reserves should be managed in line with the monetary policy objectives. In the last 20 years or so, Turkey adopted different forms of intermediate exchange rate regimes between fixed and floating, all of which needed liquid reserves to be sustained. Therefore, providing liquidity for intervention had been the driving factor in designing reserve management strategies. At the end of 1999, Turkey announced a disinflation program, supported by the IMF. Under this program, the Central Bank started implementing a preannounced crawling peg and a rule-based monetary policy. During that period, reserve management was structured in such a way that the liquidity aspect of reserves was even more pronounced because of the need to defend the crawling peg. Hence, the reserve management strategy was based mainly on liquidity. However, the crawling peg regime had to be abandoned in the aftermath of the two crises and the Turkish lira was floated on February 22, 2001.

957. Under the current floating exchange rate regime, the Central Bank is committed to intervene only to smooth out extreme movements in exchange rates, which allows for a more efficient liquidity management of the foreign exchange reserves portfolio.

958. Another important factor that influences the reserve management strategies is the external cash flows that arise mainly from foreign debt payments executed on behalf of the Turkish Treasury, which is responsible for debt management. Under the current institutional framework, asset and liability management functions rest with different institutions. While the Treasury manages the government's foreign debt, the Central Bank is responsible for the management of foreign reserves. This framework makes sovereign risk management a challenging task. However, the Central Bank solves this problem by taking expected foreign debt payments within the next year into account when designing the global benchmark and by establishing close coordination with the Treasury. The coordination between the two institutions is expected to develop even further with the new Debt Management Office, which has recently been set up within the Treasury. The Debt

Management Office is responsible for managing the government debt and associated risks.

### **Legal and institutional framework**

959. The current legal framework of reserve management is defined by the Central Bank Law, which gives the Central Bank the authority and the responsibility to manage the country's foreign exchange and gold reserves. The Law, which was recently amended in order to strengthen the Central Bank's independence, cites the reserve management objectives as safety, liquidity, and return in that order, and authorizes the Central Bank to do transactions in international financial markets.

960. The Central Bank is the only institution authorized to manage the official foreign reserves of the country, with principles and investment criteria determined by the Bank Board. The Central Bank acts as a financial agent for the Government. In this capacity, the Central Bank accepts foreign exchange deposits from and executes payments on behalf of the Government.

### **Organizational Structure**

961. The Central Bank Law defines the Central Bank's Board as the highest decision-making body within the Bank. Based on this authority, the Central Bank's Board has made several decisions in the past with regard to the reserve management operations, including the current investment guidelines. The Investment Guidelines include allowable financial instruments and transactions, minimum external credit ratings, and transaction limits for different groups of counterparties.

962. Following recent trends in international markets, the Central Bank restructured its reserve management process in 1998 in order to separate risk and investment management functions. The Foreign Exchange Risk and Investment Committee was set up to shape the strategy and to make first-layer strategic investment decisions in reserve and risk management. The Committee is composed of a Vice Governor, the General Manager, and the two Assistant General Managers of the Markets Department, who are responsible for reserve and

risk management. The Committee approves the global benchmark, sets and monitors risk limits, and reviews performance reports.

963. Also in 1998, the Foreign Exchange Risk Management Division was created within the Markets Department to be responsible for managing financial and operational risks inherent in reserve management operations. Based on the Board's and the Committee's decisions, Foreign Exchange Transactions and Foreign Exchange Risk Management divisions of the Market Department carry out front, middle, and back office functions.

### **Transparency and accountability**

964. Transparency and public disclosure of the Central Bank operations have gained importance in recent years. Turkey provides weekly data on reserves through weekly balance sheets, monthly information on foreign currency reserves, and short-term possible drains through the IMF's Special Data Dissemination Standards (SDDS), the Reserve Data Template, and annual reports. Additionally, the Central Bank has had its financial statements audited by an external auditor according to internationally accepted accounting standards since 2000.

965. Finally, the Central Bank is currently working on an entirely new approach to internal auditing, which will include the reserve management operations in the regular audit reports, as an effort to further improve the reserve management accountability. This project is planned to be put into practice in late 2002.

## **Establishing a Capacity to Assess and Manage Risk**

### **Sources of risks**

966. Considering the management policy objectives and the financial markets that the Central Bank is involved in, liquidity, credit, and market risks have been identified as major financial risks inherent in the reserve management process. It has also been accepted that the Central Bank is exposed to certain operational risks during this process.

967. For most central banks, especially in emerging market countries such as Turkey, it is very difficult to estimate the timing of a possible run on foreign reserves, which makes liquidity management very difficult. Therefore, liquidity is a required criterion for any instrument to be included in the reserve portfolio. The Central Bank faces credit risk in the form of direct credit risk, settlement risk, and replacement risk arising from its operations in international money, currency, and securities markets. As for the market risk, fluctuations in foreign exchange rates and interest rates constitute the two main sources of risk for the Central Bank.

### **Risk management**

968. The Central Bank Law dictates that foreign reserves should be managed with safety and liquidity objectives ahead of return. To this end, the Central Bank has adopted an asset-liability matching strategy for minimizing currency and interest rate risks in reserve management operations. Although this may not be the best option for every central bank, it provides a good approximation toward a minimum risk exposure portfolio for the Central Bank since its balance sheet is somewhat different from that of a typical central bank in that it carries a relatively large amount of savings deposits in foreign exchange that belong to Turkish citizens living abroad. However, the Central Bank has also considerable amounts of external cash flows such as foreign debt payments executed on behalf of the Treasury, foreign exchange inflows from the Treasury's borrowings, and foreign exchange interventions that make asset-liability matching somewhat difficult. This obstacle is overcome to a certain extent by treating such outflows as if they were liability accounts. The currency distribution and duration target of the global benchmark are set to match the currency distribution and maturity structure of the on-balance-sheet liabilities and expected external cash flows within the next year. Duration and currency limits are used to control deviations from these targets. An overall bank limit is also included in the global benchmark to control the credit risk.

969. The global benchmark also includes the eligible instruments and transactions that can be used in reserve management. These instruments and transactions currently include:

- Sovereign bonds with minimum AA or equivalent credit ratings and maturities up to 10 years,
- Suprationals and BIS instruments with maturities up to 10 years,
- Time deposits placed with central banks and commercial banks with minimum A1/P1 or equivalent credit ratings,
- Spot and forward foreign exchange transactions with commercial banks with minimum A1/P1 or equivalent credit ratings.

970. The Central Bank is currently in the process of expanding the range of products used in reserve management to achieve more diversification.

971. The liquidity risk is also addressed within the global benchmark in two steps. First, considering the extremely high costs of possible liquidity shortfalls, only the most liquid instruments such as certain government obligations and very short-term bank deposits are included in the global benchmark as permissible asset classes. Second, the reserve portfolios in major reserve currencies are divided into “tranches,” each providing liquidity in different time horizons. While the operational portfolios meet day-to-day liquidity or working capital needs, the liquidity portfolios provide liquidity in the short term. Although they are relatively small in size, the investment portfolios are managed with a return maximization objective while staying within the overall risk limits.

972. Once the global benchmark is determined as a long-term passive investment strategy, the sub-portfolio benchmarks are constructed in order to communicate the risk/return targets of the global benchmark to the investment unit (Foreign Exchange Transactions Division). The sub-portfolio benchmark compositions are determined with optimization of return and risk (return volatility) based on historical return statistics of external indices.

973. Portfolio managers are allowed to deviate from the target duration to reflect their market strategies. However, such deviations are controlled through the use of portfolio duration limits, which are set in accordance with the global benchmark limits.

974. In order to further control the credit risk, the overall bank limit set within the global benchmark is distributed into individual credit limits for each counterparty. These limits are determined using an Internal Scoring Model. The Internal Scoring Model incorporates information about the counterparties, such as external credit ratings by different rating agencies, financial data, country ratings, and support status of the institution, in order to calculate a composite score. Based on this score and the capital size, each counterparty is assigned a certain credit limit.

975. The custodial risk is also addressed within the credit risk management. The Central Bank prefers other central banks and international custodians for safekeeping its reserve assets.

976. In recent years, the Central Bank has paid special attention to eliminating any deficiencies that may create operational risks. Within this context, the Central Bank restructured its existing back office in order to prevent possible operational losses due to human or system errors. As an additional measure against operational risks, the Central Bank has recently set up a “Disaster Recovery Site” that could become operational in a very short time in case the current systems become unusable for any reason. Finally, the risk management unit is working on issuing a “Code of Conduct” for reserve management staff.

### ***Reporting and monitoring***

977. Once the overall level of risk that the Central Bank is willing to bear has been decided on through the global benchmark, current risk exposure is measured, monitored, and reported on a regular basis. As mentioned before, the portfolio managers are allowed to take positions against their benchmarks based on their short-term investment strategies. However, these positions should not go beyond the preset limits both on the sub-portfolio and the global levels. The currency risk is

monitored through the use of currency limits, which are set within the global benchmark in order to control deviations from the target currency composition. The interest rate risk is controlled through duration limits that are set both at the global and the sub-portfolio levels. The usage of these limits is reported to the Foreign Exchange Risk and Investment Committee on a regular basis.

978. As a future step, the Central Bank is planning to use Value-at-Risk limits to improve the market risk control. Value-at-Risk has been used at the Central Bank for reporting purposes for the last couple of years.

979. The monitoring of credit risk is done by the “*Real Time Limit Monitoring System*,” which is developed in-house. This system is designed to warn traders if the trade exceeds the remaining limit and captures each deal in terms of amount and exposure period by counterparty. The system not only takes into account the direct credit risk arising from deposit transactions but also considers “replacement risk” and “foreign exchange settlement risk.” The system tracks limit usage and violations, and produces related reports by counterparty, rating category, and country.

980. As for the performance measurement, the Central Bank has adopted a risk-adjusted performance measurement methodology that considers additional risks taken to achieve the realized return.

## **Human resources**

981. The Central Bank employs highly qualified staff in the reserve and risk management area and gives considerable importance to further training of the staff. In addition to the in-house training programs, the staff benefits from seminars held by other central banks and major financial institutions. The Central Bank has also adopted a policy of providing selected staff members with scholarships for postgraduate programs at major universities abroad.

## **Information technology**

982. As for the information system needs, the Central Bank has adopted a policy to develop its own systems where possible. The Central Bank has a relatively large IT Department with highly qualified staff. The IT Department has developed the current systems used in reserve and risk management. However, for meeting sophisticated and specific software needs, such as certain risk measurement tools, developing products in-house may not be the most efficient option. In such cases, the Central Bank prefers outsourcing this service by trying to search for the most suitable product in the market.

# 20

## United Kingdom

### Reserve Management Objectives and Coordination

983. United Kingdom official holdings of international reserves are owned by Her Majesty's Treasury (HMT) and comprise gold, foreign currency assets, International Monetary Fund (IMF) Special Drawing Rights (SDRs), and the U.K.'s Reserve Tranche Position (RTP) at the IMF. With the exception of the RTP, these reserves are held in the Exchange Equalization Account (EEA). The Bank of England manages the reserves as agent for HMT, as well as providing advice on reserves management issues, including liability management.

984. The EEA was established in 1932 as a fund for stabilizing the exchange value of sterling. Any U.K. government exchange rate intervention would therefore be conducted through the EEA.<sup>54</sup> The EEA also provides foreign currency services to Government Departments and Agencies, i.e., sales of foreign currency to Departments with foreign currency obligations and purchases of foreign

currency from Departments with foreign currency receipts.

985. The U.K. Government has published a Service Delivery Agreement (SDA) target to minimize the cost of holding reserves while reducing risk. The performance relative to this target is reported in detail in HMT's annual report on the expenditure plans of the Chancellor of the Exchequer's Departments.

### Institutional framework—the annual Remit

986. The Bank of England manages the reserves in accordance with criteria set out by HMT in an annual Remit, the main text of which is published in the Debt and Reserves Management Report, which is published by HMT at the time of the Budget. The Remit summarizes the benchmarks that the reserves are actively managed against; the investment constraints within which the Bank operates; the framework for risk control; and the arrangements for the audit of the EEA. The Bank is also set a profit target, net of management costs, for active management against the benchmark; this target is not published.

### Administration and control

987. The Bank reports to HMT on investment performance at a monthly meeting chaired by the head of HMT's Debt and Reserves Management

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<sup>54</sup>In addition to the United Kingdom's Official Reserves, the Bank of England manages its own holdings of foreign currency assets and gold. As set out in the Chancellor of the Exchequer's letter of 6 May 1997 to the Governor of the Bank of England, the Bank can intervene in support of its monetary policy objective using the Bank's own resources rather than those of the EEA. The Bank of England Act 1998 sets out rules governing the disclosure of any such intervention.

team. The Bank's Foreign Exchange (FED) and Risk Analysis and Monitoring (RAMD) divisions account for the returns made, and for market and credit risks incurred. Any outstanding operational or policy issues are also discussed. Every six months, there is a meeting at which the EEA Accounting Officer and the Bank of England's Executive Director for Market Operations or delegated senior officials review investment performance, discuss strategy, and agree upon analysis to be commissioned by HMT and undertaken by the Bank. Meetings to discuss individual issues, including changes to the Remit, may be proposed at any time by HMT or by the Bank.

988. Every quarter, an independent opinion of the adequacy and effectiveness of the system of internal and financial control is provided to the Bank's Executive Director for Market Operations by the Head of the Bank's Internal Audit. The Bank's Executive Director sends these reports to the EEA Accounting Officer. At the same time, the Executive Director provides the Accounting Officer with a management report on the operation of the control framework. Separately, the U.K. National Audit Office undertakes an external audit of the EEA on an annual basis.

### **Bank of England reserves management structure**

989. The reserves management operation is ultimately headed by the Executive Director for Market Operations, to whom the heads of FED and RAMD report. It is an important principle that neither the middle office (RAMD) nor the back office report to the front office (FED).

990. FED and RAMD senior management are responsible for implementing and reporting the results of the strategy agreed between HMT and senior management at the Bank. Decisions on specific investments and the degree of latitude for individual portfolio managers, in addition to general staffing and budget issues, are taken at this level.

991. Dealers and portfolio managers within FED provide active day-to-day management of the foreign exchange and asset portfolios, involving tactical positioning and direct contact with market counterparts. Market positions and overall invest-

ment performance are formally reported to senior management and to HMT on a monthly basis.

992. This delegation of responsibilities and decision making is captured within the formal benchmark process, where higher levels of management shape the benchmark for the next level down. This approach enables the attribution of overall returns to the decisions taken at each level and provides a direct and highly *visible* link between decisions made and profits earned. This gives essential feedback in analyzing performance and acts as an important motivator for reserves managers.

993. As well as reporting directly to the Executive Director for Market Operations, RAMD has a reporting line to the Deputy Governor for Financial Stability in the latter's capacity of Chairman of the Bank's Asset and Liability Committee. This reinforces the independence of the middle office. The operational independence of RAMD is considered to be an important prerequisite for its effectiveness.

994. RAMD is responsible for legal, regulatory, and ethical issues of compliance (external control) as well as risk measurement and monitoring (internal control). It ensures that detailed benchmarks, limits, and controls are in place that are consistent with the risk limits set by HMT in the Remit. It also establishes the compliance and reporting procedures that managers should follow and sets up all the necessary legal agreements and documentation.

995. Operational procedures are documented in a handbook that is frequently updated and made available to all staff involved in the management of reserves. These include new products procedures, to ensure that investment managers and dealers trade only in instruments that can be handled by settlement, risk, accounting, and IT systems. The rules governing insider dealing and the declaration of personal financial transactions are also circulated. All staff employed in the management and control of the reserves are required to sign these declarations on a frequent basis.

996. RAMD is responsible for ensuring that investments are correctly recorded and for monitoring any breach of limits, controls, or other elements of compliance. All breaches are reported to senior management. In addition, RAMD calculates

the profit and loss figures, which are reported to senior management and HMT.

### **Training and retaining staff**

997. The Bank of England devotes considerable resources to training its staff in the specialist skills required for reserves management. This includes regular participation in internal and external courses in finance and portfolio management techniques. Like other bank employees, staff involved in reserves management have their basic salary structure enhanced by a flexible package of financial and nonfinancial benefits, and individual effort is rewarded through a system of discretionary bonuses (though as a considerably smaller proportion of total remuneration than in the private sector).

### **Transparency and accountability**

998. The presentation and accounting basis of the U.K. reserves has changed radically in recent years. The United Kingdom has been at the forefront internationally in promoting openness and transparency in reserves data. In September 1997 the Chancellor of the Exchequer announced that he was “opening up the books” on the U.K. reserves of foreign currency and gold. The ensuing quarterly report, which was initially published with a two-month lag, provided a breakdown of assets and liabilities into broad currency blocs, SDRs, and gold. Since April 2000, reserves data have been published on a monthly basis in accordance with the IMF/G10’s Special Data Dissemination Standard (SDDS). Data from July 1999 onward can be found on the Bank of England website. These data record the value and composition of the U.K.’s gold and foreign currency assets, liabilities, and derivatives on a “marked-to-market” basis (that is, using current market valuations). The press release also reports the size(s) and date(s) of any intervention in the foreign exchange markets, either by the EEA or by the Bank of England, and gives an explanation of any intervention carried out.

999. As a further enhancement of transparency, in January 2000, the first set of EEA

annual accounts was published, covering 1997–98; these financial statements are audited by the National Audit Office. HMT now has a statutory obligation, as set out in the Finance Act 2000, to publish a full set of financial accounts for the EEA every year and, after examination and certification by the Comptroller and Auditor General, to lay the accounts before each House of Parliament by the January 31 following the end of the financial year to which the accounts relate. The financial accounts for 2000–01 were the first to be published within this framework. Although this is the fourth year for which the accounts have been published, it is the first time they have been published under accruals accounting consistent with U.K. Generally Accepted Accounting Practice (U.K. GAAP).

## **Establishing a Capacity to Assess and Manage Risk**

### **An asset/liability approach**

1000. HMT’s foreign exchange assets and liabilities are managed jointly on a day-to-day basis by the Bank of England. However, whereas the assets are held in the EEA the liabilities are liabilities of the National Loans Fund (NLF), which funds the EEA’s assets through a combination of sterling and foreign currency borrowing. The Exchange Equalization Account Act does not permit the EEA to borrow.

1001. Any NLF exposures relating to the foreign currency reserves are managed alongside those of the EEA by the Bank of England, which also acts as HMT’s agent for foreign currency liability management. For example, when the NLF borrows in a foreign currency to fund the reserves it assumes the currency and interest rate risk as it sells the foreign currency to the EEA for sterling. Through its investments the EEA will take an offsetting currency and interest rate position so that the government’s exposures as a whole are hedged.

1002. EEA reserves fall into two differently funded categories: “borrowed reserves” on which the currency exposures have been hedged and “net reserves,” which are funded out of unhedged sterling.

### **Funding the borrowed reserves**

1003. The “borrowed” reserve assets are financed both by foreign currency and sterling-denominated liabilities, the latter swapped into foreign currencies. Cost is the main determinant of whether the foreign currency reserves are funded by issuing foreign currency liabilities or by sterling swapped into foreign currencies. The least-cost method of funding can be determined by comparing, on a swapped basis, the cost of issuing bonds of a given maturity and nominal amount in dollars, euros, and yen with the cost of issuing a similar bond in sterling. The EEA seeks to control the exposure in these borrowed reserves by matching the risk characteristics, for example maturity, of its foreign currency assets to those of the foreign currency liabilities. Any residual risk is managed by swapping the exposure of the asset into that of the liability through currency or interest rate swaps.

### ***Recent trends in financing the borrowed reserves***

1004. Since March 2000 a program was implemented that replaced maturing foreign currency debt issues with sterling debt swapped into foreign currencies to finance the reserves. At prevailing interest rates and swap rates this offered a more cost-effective means of financing than borrowing directly in foreign currency. As central government net cash requirements for 2000–01 were revised down substantially, further swaps were undertaken to prefinance some of the foreign currency debt maturing in 2001 to 2003. This policy continued through 2001–02.

1005. Prefinancing led to a temporary rise in the gross reserves but did not increase the U.K.’s net foreign currency exposures, because all transactions were hedged. As the prefinaanced liabilities are redeemed, the level of gross reserves will fall back. Redemption of the longest-dated prefinaanced foreign currency obligation in January 2003 is expected to bring the level of gross reserves down to \$35 billion by the end of March 2003, from a recent high of \$43 billion at the end of September 2001.

### ***Net reserves***

1006. The net currency reserves are effectively financed by unhedged sterling, and by the EEA’s net SDR liability. HMT sets a benchmark for net currency exposures that takes into account past patterns of risk and return, as well as other macroeconomic factors such as trade flows and the likely currencies used in any intervention. In 2001–02, this was 40 percent U.S. dollars, 40 percent euros, and 20 percent Japanese yen (excluding SDRs), which has been unchanged since accounts were first published in 1997–98.

1007. Interest rate risk in the net reserves has largely been managed by investing in short-dated instruments. Recently, however, the duration of some of the net reserves benchmark has been extended to reflect a revised view about the best trade-off between risk and return.

### **Composition of reserve assets**

1008. Under the Exchange Equalization Act, funds in the EEA may be invested in any assets denominated in the currency of any country; in the purchase of gold; or in the acquisition of SDRs.

1009. In May 1999, the Government announced a restructuring of the reserves involving a program of gold sales by auction to achieve a better balance in the portfolio by increasing the proportion held in currency. This program continued until the end of 2001–02. Following each auction, the proceeds of gold sales were invested in foreign currency interest bearing assets and retained in the reserves broadly in the proportion of 40 percent dollars, 40 percent euros, and 20 percent Japanese yen.

### **Securities and other eligible instruments**

1010. The statutory obligation of the EEA dictates that investments must be highly liquid, so they may be made available quickly for intervention purposes if necessary. They must also carry acceptable credit risk. Essentially this means that the bulk of the assets are securities issued by the national governments of the United States, euro area countries, and Japan.

1011. The EEA also makes use of other instruments, however, including:

- (i) Bonds issued by highly rated supranational organizations and selected official sector agencies;
- (ii) Foreign currency spot, forward, and swap transactions;
- (iii) Interest rate and currency swaps;
- (iv) Bond and interest rate futures;
- (v) Forward rate agreements;
- (vi) Gold deposits, gold loco, and gold quality swaps;
- (vii) SDRs;
- (viii) Certificates of deposit and bank and corporate commercial paper; and
- (ix) Bank deposits.

1012. Options are not currently permissible investments for the EEA.

### Liquidity policy

1013. To determine the benchmark asset allocation for the EEA, the Bank employs an asset allocation model that explicitly trades off liquidity and return: the model determines an asset mix that maximizes expected return for given levels of expected liquidation costs. Potential liquidation costs include both bid-offer transaction costs, which are dependent on the size of liquidation, and price movements, which are primarily driven by market conditions at the time of liquidation. Liquidation costs are incurred only if there is a call on the reserves. A “call” on the reserves is defined by three parameters: the size of the call, the probability of the call occurring, and the length of time available to meet the call. In the absence of such a call, the reserves are assumed to be held to maturity and yields between asset classes can be compared on a spread-to-LIBOR basis (taking into account the basis swap if assets are denominated in different currencies). Various call scenarios are assumed, based on historic events and future potential needs. A core level of liquidity is also specified in the model, leading to minimum holding thresholds in particular asset classes such as U.S. Treasury bonds.

1014. The results of the liquidity model are used to determine the neutral position of the borrowed reserves, and this forms the benchmark for active management.

### Active management benchmarks

1015. The Bank actively manages both the borrowed and net reserves in order to enhance returns relative to benchmarks. Deviations from benchmarks are capped by the VaR limits set each year by HMT in its annual Remit. The benchmark returns on borrowed reserves comprise the returns to the hedge portfolios held against the NLF foreign currency and returns generated by the sterling swaps program.

1016. The benchmarks for active management are adjusted for any positions taken by higher levels of management such that the returns to active risk taking are properly identified for each portfolio. Such management positions count against the overall VaR limits.

### Active management

1017. Portfolios are divided into major currency blocs—dollars, euros, and yen—and portfolio managers establish tactical positions by buying and selling securities against their individual currency benchmarks. They are also permitted to establish positions using derivatives including futures and swaps although not, currently, options.

1018. A range of positions including outright longs and shorts, curve positions, spread switches, and relative value switches are taken at the active level. The decision to take profits on trades and to unwind loss-making positions, in most instances, belongs to the portfolio manager although, exceptionally, senior management may ask for positions to be closed in order to avoid a buildup of unacceptable risks. Positions are monitored on a frequent basis by the direct line management of the active traders.

### Market risk

1019. Market risk is the exposure to movements in market variables. For the EEA, these vari-

ables are primarily interest rates and exchange rates. Since 1999 the Bank has monitored and controlled market risk using a VaR model, which predicts, at a specified confidence level, the maximum likely loss for the portfolio over a certain time period. The Bank applies a 99 percent confidence interval and a ten-day holding period, which predicts that in 99 ten-day periods out of a hundred, losses should not exceed those suggested by the model. These VaR estimates are based on the past volatility of returns on different asset classes and on how the returns on each asset class are correlated with other positions held in the portfolio.

1020. The Bank measures the EEA's VaR exposure on a regular basis throughout the day. It also calculates the Delta exposure at the same frequency. Delta measures the change in value of the portfolios for each one-basis-point shift in the relevant yield curve. It supplements the VaR measure, and helps to test the sensitivity of the portfolio to changes in interest rates. Market risk reports are produced daily.

1021. Furthermore, the Bank conducts regular stress tests, to explore the vulnerability of the EEA to hypothetical severe market movements and to estimate the potential losses in these extreme conditions. The results of these tests are reported to senior management.

### ***Credit risk***

1022. The management of the reserves involves exposure to the creditworthiness of banks

and of the issuers of sovereign, supranational, or commercial paper. The creditworthiness of these banks and issuers is subject to regular scrutiny by the Bank. Although the Bank takes account of published Agency ratings, it sets its own internal limits, which limit the maximum exposure to each bank and issuer in terms of both amount and maturity. Such exposures are monitored in real time against the limits. A report of any limit excesses is sent to HMT each month. In addition, there are limits to contain exposure to each country's banking system and on instrument types.

1023. Where bonds are owned by the EEA, but held by custodians, these custodians may be authorized to use them in their bond lending programs. These programs involve lending the bonds against collateral consisting of either other bonds or cash. The authorized custodians are permitted to invest cash collateral in money market instruments. The investment of this cash collateral is subject to credit limits determined by the Bank. The amounts delegated to the custodians are deducted from the limits available to the Bank for its own EEA management activities. Any maturity mismatch between the collateral held and the corresponding investments is strictly limited. Daily reports are received by the Bank, which allows compliance with the investment constraints to be checked.

1024. The EEA also exercises its right to call collateral each time exposures to swap or repo counterparties rise above contractually defined thresholds. Unsecured credit risk on such transactions is thereby kept to a minimum.