INTERNATIONAL MONETARY FUND

Establishment of the Investment Account

Prepared by the Finance Department

In consultation with the Legal Department and other departments

Approved by Michael G. Kuhn

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I. INTRODUCTION

1. This paper summarizes the relevant considerations and presents decisions for the establishment of an Investment Account (IA). Executive Directors considered an analysis of the establishment and operations of an IA in September 2005. During the discussion in March 2006 of the medium-term outlook for the Fund's income, Directors requested staff to return to the Board with a paper proposing decisions on the establishment of an IA.

2. The Fund's Articles of Agreement authorize the establishment of an IA whose income may be used to meet the expenses of conducting the business of the Fund. The total amount that may be transferred to the IA is equivalent to the Fund's general and special reserves at the time of the decision to make the transfer. These reserves, projected to total SDR 5.9 billion at the end of the current fiscal year, represent the Fund's accumulated retained income. These reserves have not been invested. They have instead formed part of the currency balances kept with creditor members, thereby reducing remunerated positions. As a result, the Fund's reserves have served to reduce the cost of Fund borrowing and their implicit return has been the SDR interest rate.

3. Investing currencies equivalent to the Fund's accumulated reserves would bring Fund practice more in line with the normal operations of other financial institutions. Staff has proposed a strategy for investing these balances in a portfolio of fixed income securities that would be consistent with the limits on the range of investments imposed by the Articles and similar to the approach used for PRGF and HIPC resources. Past experience suggests that the resulting extension of investment maturities beyond the three-month SDR interest rate would generate incremental income over time, albeit with a certain degree of inevitable volatility. Such investments would broaden the sources of Fund income and contribute to its financial resilience.[1]

4. The paper is structured as follows. The key steps and decisions needed to establish the IA are outlined in Section II. Section III and Annex I set out the rules that would govern the operation of the IA. These include its investment authority and eligible investments, investment objective and range of benchmarks, risk controls, the structure of investment management, custody and other administrative arrangements, and the scope and timing of reports on its operations. Decisions to establish the IA, transfer currencies from the GRA to the IA, and adopt the the IA's rules and regulations are proposed in Section IV. Annex II updates the analysis of alternative investment strategies provided in the 2005 consideration of the IA.

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[1] See *Review of the Fund's Income Position for FY 2006 and FY 2007*.

II. Steps to Establish the Investment Account

5. Three key decisions are needed to make the IA operational: (i) a decision to establish the IA, which may be taken by a majority of the votes cast; (ii) a decision to adopt the rules and regulations of the IA, which may be adopted by a 70 percent majority of the total voting power; and (iii) a decision to transfer to the IA for immediate investment currencies held in the GRA, which may be adopted by a 70 percent majority of the total voting power. It will also be necessary to secure the concurrence of the members whose currencies will be used to make investments.[2]

6. The funding of the IA through a transfer of currencies from the GRA will be effected within the context of the normal operation of the financial transactions plan (FTP). The quarterly FTP would be set to accommodate the transfer of currencies from the GRA equivalent to the Fund's general and special reserves, projected to amount to SDR 5.9 billion at the end of the current fiscal year.[3] As is the case in the UFR context, a range of participants in the FTP will be drawn upon to fund the IA.

III. Rules and Regulations of the Investment Account

7. The rules and regulations of the IA specify the purpose of the IA and the broad principles that would govern its operations, including in particular its investment authority and eligible investments, investment objective, risk controls, administrative arrangements, and reporting procedures. The proposed rules and regulations are set out in Annex I. They may be adopted by a 70 percent majority of the total voting power.

A. Investment Authority and Eligible Investments

8. The investment authority of the IA is specified in Article XII, Section (6)(*f*)(iii) of the Fund's Articles of Agreement and is identical to that governing the investment of SDA resources:

> *The Fund may invest a member's currency held in the Investment Account in marketable obligations of that member or in marketable obligations of international financial organizations. No investment shall be made without*

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[2] The range and currency denomination of eligible investments are discussed further in Section III.

[3] The current quarterly FTP covers the period through end-May 2006. Staff would propose an amendment to this plan to accommodate transfers to the IA following the adoption by the Board of the requisite decisions and the concurrence of members whose currencies will be used for investment.

> *the concurrence of the member whose currency is used to make the investment. The Fund shall invest only in obligations denominated in special drawing rights or in the currency used for investment.*[4]

9. The portfolio will be limited to eligible obligations denominated in SDRs or in the currencies included in the SDR basket, as agreed by Executive Directors during the September 2005 Board meeting on the establishment and operation of an IA.[5] Moreover, to minimize residual foreign exchange rate risk, holdings of the constituent currencies of the SDR will be weighted to reflect the share of each currency in the SDR basket.[6]

10. Specifically, eligible investments will comprise:

- domestic government bonds of countries in the euro area, Japan, the United Kingdom, and the United States;
- bonds of eligible national agencies and international financial organizations;[7] and
- claims on the BIS, including BIS deposits and medium-term instruments (MTIs).[8]

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[4] The Commentary to the Second Amendment specifies the World Bank and regional development banks as being among the international financial organizations in whose obligations investments may be made. It further clarifies that permissible investments include obligations of the central banks and official agencies of members whose currencies are used for the investment, and notes that whether an obligation is "marketable" is a determination to be made by the Fund. See *Proposed Second Amendment to the Articles of Agreement, A Report by the Executive Directors to the Board of Governors,* p. 58.

[5] The concurrence of countries in the euro area, Japan, the United Kingdom, and the United States will be needed, as the currencies of these members would be used to effect the IA's investments in securities denominated in the respective constituent currencies of the SDR basket.

[6] Some Directors saw merit in considering, in the future, the possibility of including currencies that are not part of the SDR basket but offer higher yields, despite the unhedged currency exposure that would result. This possibility will be kept under review.

[7] As noted above, eligible national agencies are central banks and official agencies of members. However, an obligation issued by a member country (or its central bank or official agency) in a foreign currency is not an eligible investment, as the Articles require that investments be dominated in SDRs or in the currency used for investment.

[8] MTIs are obligations of the BIS whose yield is based on the AA-rated swap yield curve.

In addition, the uninvested residual cash balances held by external bond managers will be swept by the custodian bank into short-term instruments consistent with the IA's investment authority.

B. Investment Objective and Benchmark

11. The investment objective of the IA is to add value over the implicit current rate of return on the Fund's reserves, while keeping within prudent risk limits. Specifically, and as endorsed by Executive Directors during the September 2005 Board discussion, the investment objective will be to exceed the SDR interest rate, while minimizing the frequency and extent of negative returns and underperformance over a 12-month investment horizon.

12. The investment objective will be achieved chiefly through the judicious extension of duration. Duration will be increased above the SDR interest rate, which is based on three-month instruments, through investments in eligible longer term government bonds and other fixed income securities. The investment authority also affords some limited scope to attempt to benefit from credit spreads largely through the investment in the MTIs and deposits of the BIS, as well as securities issued by eligible international financial institutions and certain national agencies. These instruments are obligations of eligible issuers that typically provide higher ex ante yields than comparable government securities.

13. The duration of the IA's portfolio will be limited in order to strike a prudent balance between returns and the volatility of returns arising from changes in market interest rates. Benchmarks that have in the past displayed an efficient tradeoff of risk and return consistent with the investment objectives of the IA include the 1–3 year and the 1–5 year government bond indices.[9]

14. As detailed in the updated analysis of alternative investment strategies in Annex II, the 1–3 year and the 1–5 year government bond indices weighted to reflect the currency weights of the SDR basket would represent a prudent balance between risk and return. These indices have, over time and in most periods, yielded higher returns than the SDR interest rate, without exposure to undue risk. Moreover, they have consistently earned positive returns in every rolling 12-month period over the past 16 years. Nevertheless, the inherent risks to the investment strategy proposed cannot be eliminated, and some periods of underperformance and even negative returns should be anticipated.

15. It appears preferable to adopt the 1–3 year benchmark index over the 1–5 year index as the benchmark to guide investments. This judgment is based on the relatively modest increase in ex ante yield that would result from the adoption of the slightly longer duration

[9] These indices are constructed using Merrill Lynch government bond indices for the euro, the yen, sterling, and the U.S. dollar, weighted to reflect the weights of each currency in the SDR basket.

index in the current relatively flat yield curve environment. Term premiums on government bonds above two-year maturities are particularly narrow at present, and have narrowed considerably since the previous analysis of alternative investment strategies. In addition, the 1–3 year maturity sector is favored by a number of reserve asset managers. Moreover, the shorter duration of the 1–3 year benchmark appears prudent given the possibility of further increases in yields.

C. Risk Controls

16. Interest rate risk will be the main risk to which the portfolio will be exposed, as the incremental return of the IA will be derived largely from extending maturities. The portfolio will also be exposed to credit risk, mainly through investments in MTIs, and some residual currency risk. Operational risks will be mitigated in line with the risk controls that are applied to other financial transactions.

17. Interest rate risk—the risk of fluctuations in the portfolio's market value due to changes in interest rates—will be controlled by the duration of the benchmark indices selected for the government bond and MTI portfolios. As discussed above, the 1–3 year benchmark index appears to represent an acceptable level of interest rate risk that is consistent with the IA's investment objective. This benchmark embodies a level of interest rate exposure that has in the past provided an efficient tradeoff between risk and return, and resulted in returns that exceeded that of the official SDR rate in most market conditions. This benchmark will guide the composition of the portfolio in most market conditions.

18. Tactical changes to this benchmark will be considered on an exceptional basis in light of market developments as a means of further controlling the risk of loss in unusually volatile markets or when sharp increases in interest rates appear likely. Such tactical benchmark changes will be based on periodic evaluations of market conditions that will include an assessment of the probability of loss to the portfolio over a 12-month horizon, yield levels and spreads, and yield volatility.

19. The IA's assets would be exposed to limited currency risk as the portfolio will include securities denominated in the constituent currencies of the SDR, rather than being limited to investments denominated in SDRs. To control currency risk, the weight of each currency in the portfolio will be adjusted to reflect its weight in the SDR basket. However, because securities included in the portfolio will change in value over time and generate cash flows, the weight of each currency in the portfolio will differ slightly from the weights in the SDR basket, generating some residual currency risk and necessitating regular rebalancing of the portfolio. The experience of investing PRGF-HIPC assets has shown that this residual currency risk can be kept low and that the amount of rebalancing needed to contain currency risk is manageable.

20. Liquidity risk is judged to be small given the low likelihood of an unanticipated call on the IA's assets and the inherently liquid nature of the planned portfolio. Investments will

consist primarily of readily marketable obligations of the BIS and short- and medium-term government securities.

21. Credit risk is similarly limited in a portfolio that features BIS deposits, MTIs, the securities of highly rated international financial organizations, and the domestic government bonds of countries whose currencies are included in the SDR basket. Eligible securities will be limited to those rated A or higher by a major credit rating agency such as Standard and Poor's, Moody's, or Fitch.

22. Operational risk arising from errors or compliance failures will be controlled by carefully structured due diligence reviews of external managers and custodians, the checks and balances provided by the reconciliation of portfolio valuation by managers and the custodian, stringent performance measurement and reporting requirements, and the internal controls on the Fund's operations. There are also controls in place to mitigate operational risks from actual or apparent conflicts of interest associated with the Fund's investment activities. Finance Department staff responsible for investments are guided by a set of policies and procedures that complement the Fund's Code of Conduct.[10]

D. Administrative Arrangements

23. During the September discussion of the establishment and operation of an IA, Executive Directors agreed that it would be appropriate to use the current administrative arrangements already in place for investments.[11] External asset managers—including the World Bank and private managers—will be entrusted with buying and selling individual securities in accordance with the IA's investment authority, guidelines, and benchmark. In addition, staff will place deposits with the BIS and structure a portfolio of MTIs.

24. External managers will be given a mandate consistent with the rules and regulations of the IA, its investment authority, and investment objective. This mandate will specify the securities eligible for investment, the acceptable market exposure of the portfolio, and limits on risk. Each manager will be given an investment benchmark—the 1–3 year government bond index described above—to guide its investment strategy and serve as a measure of performance. The benchmark will, in particular, provide the manager with the target duration of the portfolio and thus establish the desired sensitivity of the portfolio to interest rate

[10] These policies and procedures specify standards of professional conduct in the investment process, measures to restrict access to and avoid discussion of material non-public information, disclosure requirements for actual or potential conflicts of interest, and the application of financial disclosure requirements.

[11] During that meeting, a few Directors considered that in-house asset management could result in cost savings and provide other operational advantages as well. At this stage, no change to the current approach of external investment management is planned.

changes. Managers will be given some latitude to deviate from the duration of the benchmark index as a means of adding value over and above the return of the index. Managers will be required to provide monthly valuations of portfolio assets and more detailed quarterly reports on the structure of the portfolio, the sources of return, and investment prospects.

25. The IA will also use the custody arrangements that are already in place. Investments in MTIs and BIS deposits will be held in custody by the BIS. In the case of investments in government bonds and other eligible securities undertaken by external managers, the current custodian will be retained. The custodians' chief responsibilities will include holding assets in safekeeping, settling trades, capturing income, valuing assets, maintaining records, measuring performance, and monitoring compliance with the investment mandate. The portfolio will be valued on a daily basis with a full reconciliation of manager and custodian mark-to-market valuations undertaken each month. Compliance with investment guidelines will be on a continuous basis. In addition, the custodian will sweep idle cash balances into a short-term fund consistent with the investment authority to which the IA is subject.

E. Reporting Procedures

26. Semiannual reports on the operations of the IA will be provided to the Executive Board. These reports will assess the operations of the IA in the context of the Fund's overall financial position, including in particular its contribution to the Fund's income. These regular reports will provide an analysis of changes in the valuation of IA assets, the investment guidelines and benchmark being followed by asset managers, an evaluation of the adequacy of established risk control procedures, and an assessment of market conditions that may affect the valuation of the IA's assets. In addition, ad hoc reports to the Executive Board will be prepared as warranted by market or other developments.

IV. PROPOSED DECISIONS

27. Three decisions are proposed for adoption by the Executive Board. Decision 1, which may be adopted by a majority of the votes cast, establishes the IA. Decision 2 adopts the rules and regulations for administration of the IA set out in Annex I, and may be adopted by a 70 percent majority of the total voting power. Decision 3, which may be adopted by a 70 percent majority of the total voting power, provides for the transfer of currencies from the GRA to the IA.

Decision No. 1

Establishment of the Investment Account

1. The Fund hereby establishes within the General Department an Investment Account as provided for in Article XII, Section 6(f)(i).

2. The assets of the Investment Account shall be kept separately from the other accounts of the General Department.

Decision No. 2

Adoption of Rules and Regulations for the Investment Account

1. Pursuant to Article XII, Section 6(f)(vi), the Fund adopts the Rules and Regulations for administration of the Investment Account that are set forth in Annex I of EBS/06/57 (4/17/2006).

Decision No. 3

Transfer of Currencies to the Investment Account

1. Pursuant to Article XII, Section 6(f)(ii), the Fund shall transfer from the General Resources Account to the Investment Account established pursuant to Decision No. 13710-(06/40) IA [Decision 1 above] currencies in an amount equivalent to the amount of the Fund's general and special reserves at April 30, 2006. This transfer of currencies to the Investment Account shall be effected in the context

of the Financial Transactions Plan for the quarterly period March through May 2006 and June through August 2006.

2. The currencies transferred to the Investment Account pursuant to this decision shall be used for immediate investment in accordance with the provisions of Article XII, Section 6(f), and in accordance with the Rules and Regulations for administration of the Investment Account adopted pursuant to Decision No. 13711-(06/40) [Decision 2 above].

Rules and Regulations for Administration of the Investment Account (IA)

Objective of the Investment Account

1. The objective of the IA is to provide a vehicle for the investment of a part of the Fund's assets so as to generate income that may be used to help meet the expenses of conducting the business of the Fund.

Sources of Investment Account Assets

2. The IA will be funded initially through the transfer of currencies from the GRA in an amount equivalent to the total amount of the Fund's general and special reserves at the time of the decision authorizing the transfer. In addition, and subject to paragraph 3 below, the IA may retain or invest the income from its investments, and may also reinvest the proceeds of assets that mature or that it sells.

Uses of Investment Account Income

3. The IA's income from investment may be invested, retained in the IA, or used to meet the expenses of conducting the business of the Fund. The Fund will decide on the use of the IA's income for each financial year, including whether any portion of such income should be transferred to the GRA for use in meeting the expenses of conducting the business of the Fund.

Termination or Reduction of the Investment Account

4. The IA shall be terminated in the event of liquidation of the Fund and may be terminated, or the amount of the currency transferred to the IA may be reduced, prior to liquidation of the Fund by a 70 percent majority of the total voting power. The procedures specified in Article XII, Sections 6(f) (vii), (viii) and (ix) will apply in the event of the termination of the IA or a reduction in its assets.

Guidelines for Investing Investment Account Assets

Investment Objective

5. The investment objective of the IA is to achieve investment returns that exceed the SDR interest rate over time while minimizing the frequency and extent of negative returns and underperformance over a 12-month investment horizon. Achieving this objective would help diversify the sources and increase the level of the Fund's income, thereby strengthening its finances over time.

Eligible Investments

6. The assets of the IA may be invested only as specified in Article XII, Section 6(f) (iii) of the Fund's Articles of Agreement. Accordingly:

- A member's currency held in the IA may be invested only in marketable obligations of that member or in marketable obligations of international financial organizations, provided that the IA may invest only in obligations denominated in special drawing rights (SDRs) or in the currency used for investment.

Marketable obligations of a member shall include the obligations of its central bank and official agencies. Marketable obligations of international financial organizations shall include without limitation SDR-denominated deposits with the Bank for International Settlements.

- The IA's investment in the instruments specified above may only be made directly in the cash markets. Derivative securities—including forwards, futures, options and swaps—may not be used to establish or hedge positions in eligible investments.

- Only long positions may be established in eligible investments. Short selling or any form of leverage is not permitted.

7. The IA's portfolio will be limited to eligible investments, as described above, that are denominated in SDRs or in the currencies included in the SDR basket. No investment shall be made without the concurrence of the member whose currency is used to make the investment.

Supervision of the Investment Account's Investment Activities

8. The Managing Director will provide for the supervision of the IA's investment activities. Such supervision will include negotiating agreements with external investment managers and with custodial agents; ensuring that the IA's investment and other activities conform with the relevant provisions of the Fund's Articles of Agreement and with these rules and regulations; establishing investment benchmarks and guidelines for investment managers; placing investments in eligible BIS deposits and in the BIS' Medium-Term Instruments (MTIs); monitoring the structure and evaluating the performance of the IA's assets; supervising the management of the IA's assets, including the hiring and firing of external investment managers and assessing their performance; supervising the custodial arrangements for IA assets; adjusting the allocation of the portfolio in response to market conditions and the Fund's financing needs; and preparing regular reports to the Executive Board on the investment activities of the IA.

Custody Arrangements

9. The assets of the IA may be held in safekeeping by one or more custodian banks. The custodian(s) will hold the assets of the IA in safekeeping, periodically value the assets held, and hold and invest short-term residual cash balances.

Risk Controls

10. In keeping with the IA's investment objective, the Managing Director will establish specific risk control procedures and put in place a mechanism to monitor their observance by asset managers. The investment guidelines and benchmarks established for asset managers will set explicit limits for the exposure to interest rate, foreign exchange, liquidity, credit and operational risks.

Reporting Requirements

11. The Managing Director will provide semi-annual reports to the Executive Board on the operations and investment activities of the IA. These reports will analyze the operations of the IA in the context of the Fund's overall financial position and income, including in particular an assessment of the appropriate size of the IA and the disposition of its assets and earnings. These reports will include an analysis of changes in the valuation of IA assets, the investment guidelines and benchmark being followed by asset managers, a discussion of the applicable controls and evaluation of the adequacy of established risk control procedures, and an assessment of market conditions that may affect the valuation of the IA's assets. Ad hoc reports will be prepared as warranted by market or other developments. The assets of the IA will be audited by the Fund's external auditors and included in the Fund's financial statements.

Consideration of Alternative Investment Strategies

A. Introduction

The investment objective of the IA is to broaden the sources of Fund income while minimizing the risk of loss and underperformance over a one-year horizon. Given the IA's investment authority, the main tool to achieve this objective is the duration decision, although there is also some scope to invest in credit spread instruments.

This annex updates the analysis of past risk and return characteristics of SDR-denominated bond portfolios of various maturities to assess which maturity range offers the opportunity to earn more than the SDR interest rate in most market conditions.[1] The analysis includes a value at risk (VaR) assessment as well as stress tests considering past periods in which fixed income investments have performed poorly (Section B). The implications of the current level and volatility of yields for prospective returns are also considered to help gauge the range of outcomes that can be expected from various investment strategies (Section C). The diversification and yield benefits offered by the MTIs issued by the BIS are analyzed to judge the appropriate weight of such instruments in the portfolio (Section D). The main conclusions of the analysis, and the investment strategy and the performance benchmark selected for the IA, are presented in Section E.

The analysis confirms the expectation that investing in bond portfolios with maturities above the three-month SDR interest rate has generated higher returns over most past periods. Among the range of portfolio maturities considered, the historical returns of the 1–3 year and 1–5 year benchmarks—with average durations of about 2 and 2½ years, respectively—appear to offer an attractive trade-off between risk and return. The risk of negative returns from either benchmark over a 12-month horizon is quite low. The 1–3 year benchmark is widely adopted by sovereign reserve asset managers.

However, care should be taken when using past performance to form expectations for prospective returns. Current bond yields and bond volatility are below their respective long-term averages and the current tightening of monetary conditions by central banks in SDR markets can detract from short-term returns. Accordingly, this annex also highlights the frequency and magnitude of past underperformance as well as the risk of shortfall over the next year.

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[1] The total local currency return of Merrill Lynch government bond indices weighted to replicate the currency composition of the SDR basket were used to construct SDR benchmark indices with maturities of 1–3, 1–5, 3–5, 5–7, and 7–10 years. The long-term analysis covers the 16-year period of 1989–February 2006, with the start date determined by that of the indices.

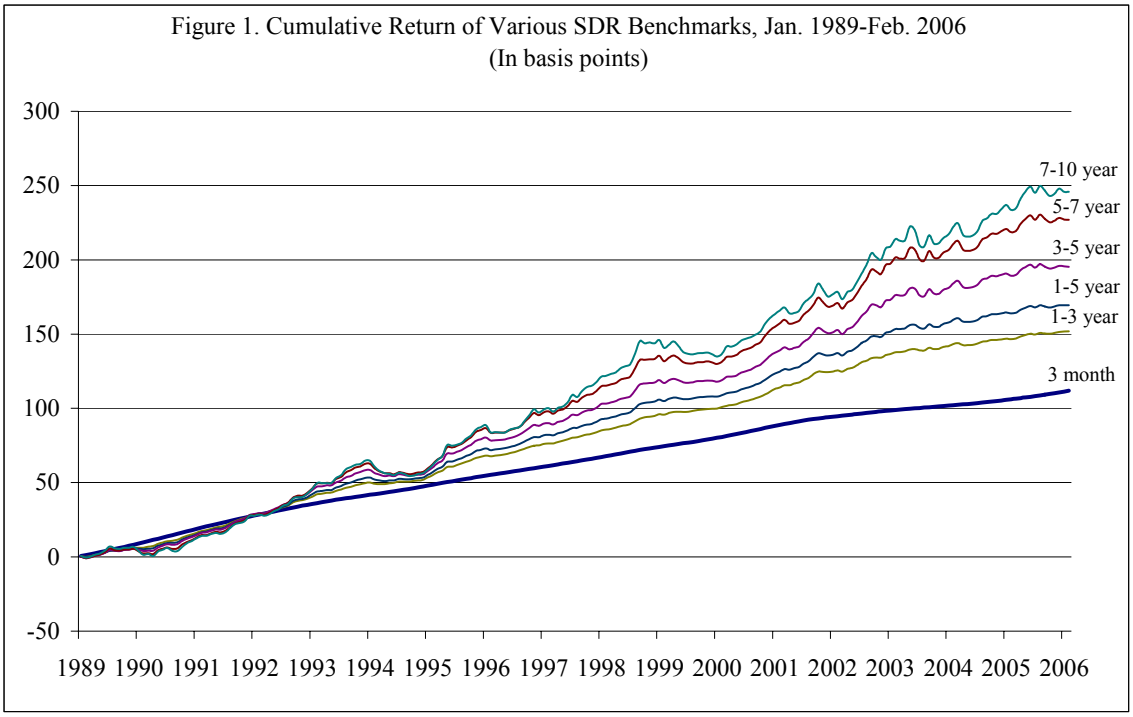
B. Historical Risk and Return Characteristics of SDR Bond Portfolios

Absolute return and volatility

With an upward sloping yield curve, extending the maturity of a bond portfolio can increase its average annual return, but also broaden the dispersion of those returns. The increase in average return reflects the term premium typically embedded in government yield curves, while the increased volatility associated with maturity extension reflects the higher sensitivity of the price of longer duration bonds to changes in market interest rates.

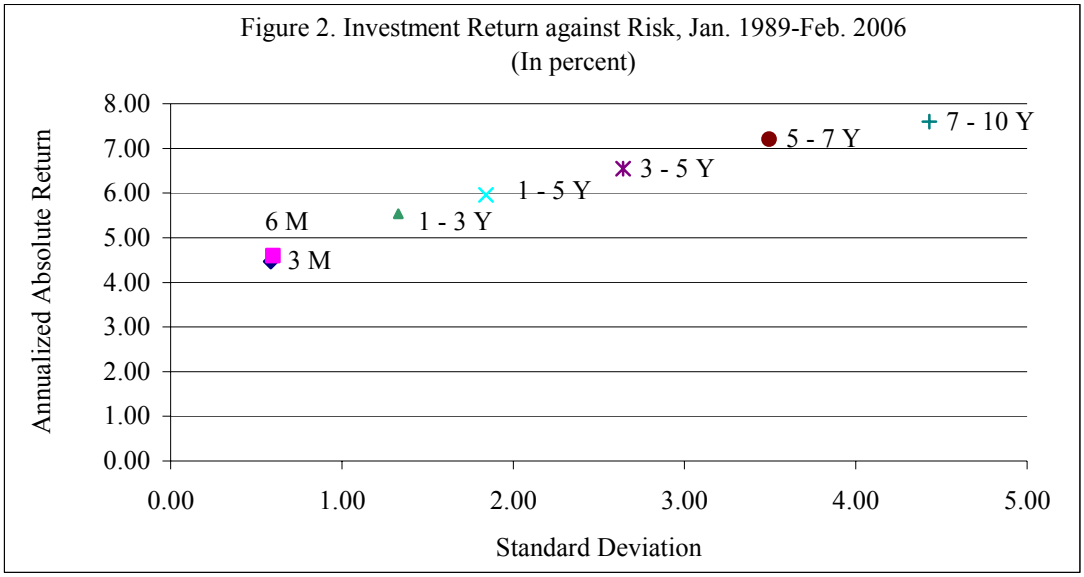
Historical observation shows that, over time, longer duration bond portfolios tend to generate higher cumulative returns than those with shorter durations (Figure 1).

Figure 1. Cumulative Return of Various SDR Benchmarks, Jan. 1989-Feb. 2006
(In basis points)

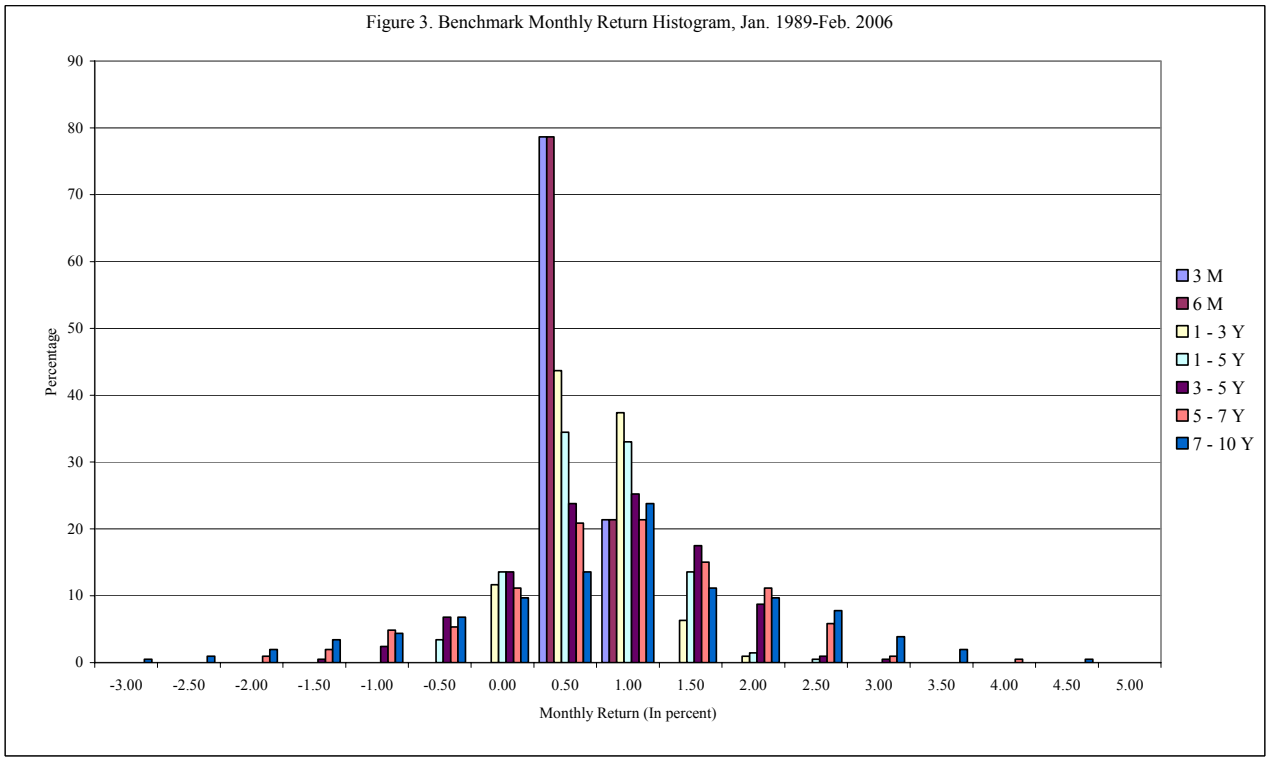


Sources: Merrill Lynch and IMF staff calculations

However, the variability of returns of longer duration bond portfolios is higher, necessitating a judgment on the acceptable trade-off between risk, as measured by return volatility, and return. The past trade-off between risk and return for various portfolios is illustrated in Figure 2, and a picture of the probability distribution of monthly returns based on historical observations over the past 16 years is provided in Figure 3. As expected, longer duration portfolios are characterized by a wider distribution reflecting the higher standard deviation of returns.



Sources: Merrill Lynch and IMF staff calculations



Sources: Merrill Lynch and IMF staff calculations

Past performance relative to the three-month SDR rate

Since 1989, each of the bond portfolios under review has outperformed the three-month SDR interest rate (Figure 4). The average annual excess return increased with maturity, ranging from 0.10 percent for the six-month portfolio to 3.30 percent for the 7–10 year portfolio during 1989–2006.

Intermediate and longer-term portfolios have also provided superior risk-adjusted returns than short-term rates (Figure 5). The 1–3 year and 1–5 year portfolios exhibit significantly higher Sharpe ratios[2] than the six-month SDR rate.

Figure 4. Rolling one-year Excess Returns over 3M SDR rate of SDR Portfolios (In percent)

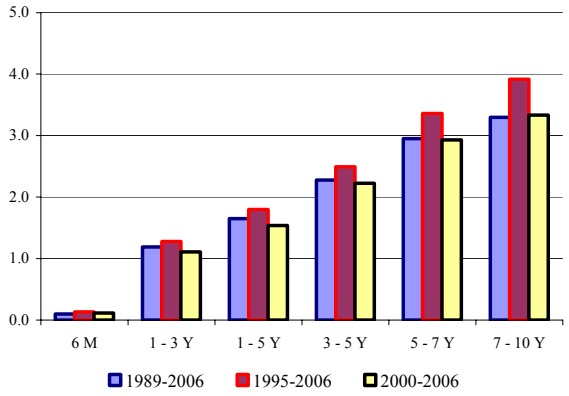
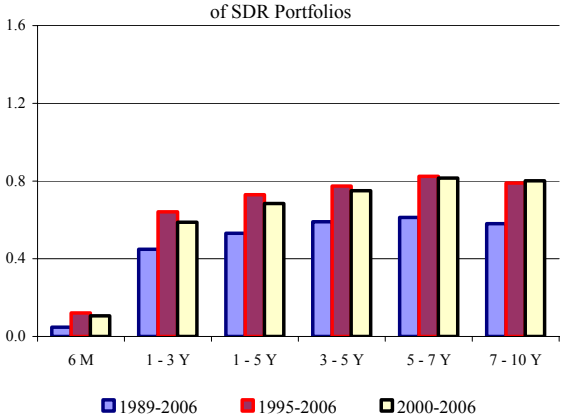


Figure 5. Sharpe Ratio of SDR Portfolios



Sources: Merrill Lynch and IMF staff calculations

Frequency and extent of negative returns and underperformance

Periods of rising interest rates have led to a greater variability of bond portfolio returns for longer duration portfolios and to a number of periods of underperformance relative to the SDR interest rate as well as negative returns (Appendix Table 1).

However, portfolios with a maturity of 1–5 years or lower have not experienced negative returns in any rolling one-year period since 1989, as their incremental yield was sufficient to compensate for the price movements they experienced. Longer maturity portfolios experienced periods of negative returns, with the frequency and magnitude of losses increasing with duration.

[2] The Sharpe ratio measures the incremental return over the three-month SDR rate as a percent of the standard deviation of returns.

The return on the various bond portfolios fell short of the three-month SDR interest rate in about 23 to 28 percent of the rolling one-year horizons during January 1989–February 2006. While the frequency of underperformance was very similar across portfolio maturities, the magnitude of underperformance increased with maturity. Periods of underperformance occurred when yield curves were inverted, and during episodes of monetary policy tightening.

Episodes of monetary policy tightening

Tightening cycles typically detract from absolute and relative bond portfolio performance as the yield increases boost the return on short-term investments while triggering losses on longer maturity bonds. Nonetheless, portfolios with a maturity of up to 1–5 years have generated positive returns during past monetary tightening episodes (Appendix Table 2). In contrast, portfolios with longer maturities experienced negative returns during tightening cycles, especially during 1994–95 when the pace and extent of the increase in the U.S. Fed funds rate was much higher than expected.

Value-at-risk and stress test

A value-at-risk (VaR) analysis based on historical observation of the level of yields since January 1989 confirms that portfolios with an average duration of two to three years are likely to preserve their capital most of the time. This analysis, based on the distribution of returns over that period, was undertaken to estimate the risk and magnitude of loss over a one-year horizon assuming an initial portfolio value of SDR 1 billion (Table 1). Separate confidence intervals of 95 percent and 99 percent are used.

Table 1. Annual VaR by Historical Performance, 1989-2006
(Capital of SDR 1 billion)

Portfolio	Average Return	Standard Deviation	Confidence level	
	(In percent)		95%	99%
			(In millions of SDR)	
6 M	4.54	2.05	12	-2
1 - 3 Y	5.68	2.66	13	-5
1 - 5 Y	6.15	3.12	10	-11
3 - 5 Y	6.81	3.87	4	-22
7 - 10 Y	7.86	5.70	-15	-54

Sources: Merrill Lynch and IMF staff calculations

Using this approach, it is estimated that there is a 1 percent chance that in any year the 1–3 year portfolio of SDR 1 billion could lose more than SDR 5 million (0.5 percent of its value).

A stress test based on a one and two standard deviation increase in two-year government yields over the period 1992–2006 was also performed. For a one standard deviation shock occurring at the start of the period, the 1–3 year portfolio would initially lose SDR 23 million, or 2.27 percent of its value, but would still generate 1.6 percent in annualized return if the investment is carried over a period of 12 months (Table 2).

Table 2. Stress Test on Selected Benchmarks in SDR
Instantaneous Average Capital Loss and Expected Annualized Return over One Year
For a Capital of SDR 1 billion
(In percent)

	Portfolio	
	1-3 year	1-5 year
Instantaneous average return	3.71	3.77
Average duration	1.7	2.5
1/ Expected Annualized Return with a 1 Standard Deviation shock	1.60	0.63
Instantaneous capital loss (in SDR millions)	-23	-33
Capital loss in percentage of portfolio's size	-2.3	-3.3
2/ Expected Annualized Return with a 2 Standard Deviation shock	-0.62	-2.64
Instantaneous capital loss (in SDR millions)	-45	-67
Capital loss in percentage of portfolio's size	-4.5	-6.7

Sources : Bloomberg data and IMF staff calculation.

Note: Standard deviation is calculated on daily return of relevant government benchmarks since January 1, 1992 in 1/ and 2/.

Impact of changes in the investment horizon

The foregoing analysis is based on a standard one-year investment horizon. The frequency of negative returns and underperformance declines with the length of the investment horizon because the longer the portfolio is held, the more likely it is that interest income will compensate for capital losses. Consideration of both shorter horizons—to illustrate intra-year return variability that might be reflected in quarterly or semiannual investment reports—and longer horizons highlights the relatively low risk of persistent negative absolute returns and of returns that fall short of the SDR interest rate.

The 1–3 year portfolio has generated negative returns in 3 percent of the rolling 3-month periods between January 1989–February 2006 but did not generate a negative performance in any of the rolling six-month periods (Table 3). As noted above, this portfolio did not experience a loss over any one-year horizon. No portfolio experienced a loss in any rolling two-year period.

Table 3. Frequency of Negative Returns of SDR Portfolios over Various Horizons, 1989-2006 1/
(In percent of total)

	Horizon							
Portfolio	3 M	6 M	1 Y	2 Y	3 Y	5 Y	7 Y	10 Y
3 M	0%	0%	0%	0%	0%	0%	0%	0%
6 M	0%	0%	0%	0%	0%	0%	0%	0%
1 - 3 Y	3%	0%	0%	0%	0%	0%	0%	0%
1 - 5 Y	8%	2%	0%	0%	0%	0%	0%	0%
3 - 5 Y	15%	10%	3%	0%	0%	0%	0%	0%
5 - 7 Y	18%	15%	8%	0%	0%	0%	0%	0%
7 - 10 Y	22%	18%	11%	0%	0%	0%	0%	0%

Sources: Merrill Lynch and IMF staff calculations
1/ Data as of 2/28/2006.

Over shorter periods, the frequency of underperformance for the bond portfolios increased, with the bond portfolios underperforming the SDR interest rate in about 30 percent of the rolling semiannual periods and about 37 percent of rolling quarterly periods (Table 4). However, over longer investment horizons, bond portfolios outperformed the SDR interest rate, while the six-month interest rate lagged.

Table 4. Frequency of Underperformance Against the 3-month SDR Rate
of SDR Portfolios over Various Horizons, 1989-2006 1/
(In percent of total)

	Horizon							
Portfolio	3 M	6 M	1 Y	2 Y	3 Y	5 Y	7 Y	10 Y
6 M	30%	31%	26%	20%	15%	1%	0%	0%
1 - 3 Y	36%	30%	24%	9%	1%	0%	0%	0%
1 - 5 Y	37%	31%	24%	9%	1%	0%	0%	0%
3 - 5 Y	37%	31%	23%	10%	0%	0%	0%	0%
5 - 7 Y	38%	29%	21%	10%	0%	0%	0%	0%
7 - 10 Y	37%	30%	21%	14%	1%	0%	0%	0%

Sources: Merrill Lynch and IMF staff calculations
1/ Data as of 2/28/2006.

C. The Current Interest Rate Environment and Prospective Returns

The foregoing analysis considered the range of outcomes suggested by historical data. It sought to put the long-run average performance of bond portfolios in perspective by undertaking a VaR analysis and stress tests, and highlighting the performance of bond portfolios during past tightening cycles. This section considers the implications of the current interest rate environment for prospective returns. This environment is characterized by four noteworthy features.

- Although yields have increased since their trough in mid-2003, they remain below their 1989–2006 averages. As a result, prospective coupon income is likely to be lower than the historical analysis suggests, and longer maturity bonds are susceptible to loss if yields revert to their long-term mean. Current yield volatilities are also below their 1989–2006 averages (Table 5).

Table 5. Average and Current Yield and Volatility Levels, 1989-2006

	Yield (in percent)				Volatility (in basis points)			
	Jan 1989-Feb 2006 Average		Current Feb-06		Jan 1989-Feb 2006 Average		Current Feb-06	
Portfolio	Yield	Standard Deviation 1/	Yield	Standard Deviation 1/	Volatility	Standard Deviation	Volatility	Standard Deviation 1/
1 - 3 Y	4.72	1.91	3.62	-0.58	65	20	48	-0.81
1 - 5 Y	4.87	1.85	3.67	-0.65	67	19	53	-0.76
3 - 5 Y	5.09	1.77	3.71	-0.78	73	19	61	-0.64
5 - 7 Y	5.41	1.63	4.03	-0.85	71	17	55	-0.88
7 - 10 Y	5.62	1.55	3.98	-1.06	68	18	60	-0.43

Sources: Merrill Lynch and IMF staff calculations

1/ Current levels expressed in number of standard deviations below the 1989-2005 average.

- The SDR yield curve is relatively flat—and yield curves in the United States and the United Kingdom have been inverted—reflecting a low term premium, and thus provides little income cushion against further increases in interest rates.

- The recent change in the Bank of Japan's monetary policy increases the risk of rising yields on Japanese government bonds, especially given the current very low level of yields.

- Short-term interest rate futures suggest expectations that the United States, whose currency represents 44 percent of the SDR basket, is approaching the end of its tightening cycle. Financial markets currently expect that the tightening cycle will continue gradually in the euro area. Yields in Japan

Table 6. Yields Expectations as of March 14, 2006
(In percent)

	USD	EUR	JPY	GBP	SDR
Weights	44	34	11	11	
Mar-06	5.05	2.99	0.22	4.53	3.76
Jun-06	5.07	3.19	0.42	4.55	3.86
Sep-06	5.01	3.35	0.63	4.60	3.92
Dec-06	4.94	3.43	0.83	4.66	3.94
Mar-07	4.89	3.49	0.99	4.69	3.96
Jun-07	4.88	3.53	1.14	4.72	3.99

Sources: Bloomberg, IMF staff calculations.

are expected to rise from low levels, while futures markets are pricing yields in the United Kingdom to remain little changed. Based on these expectations, the synthetic SDR interest rate is set to increase by about 20 basis points over the next 12 months (Table 6).

Probability of negative returns in the current environment

Given the expected level and volatility of yields, portfolios with a maturity of up to 1–5 years appear to have a low probability of negative returns.[3] The 1–3 year and 1–5 year portfolios have a one percent chance, or less, of generating a negative return over the next 12 months (Table 7).[4] A probability below five percent is typically viewed as consistent with a low risk tolerance (i.e., one-in-twenty chance of loss).

Table 7. Probability of Negative Returns of SDR Portfolios over a One Year Horizon

	1 - 3 year	1 - 5 year	3 - 5 year	5 - 7 year	7 - 10 year
Yield (in percent)	3.71	3.77	3.83	4.17	4.15
Implied Volatility (in bps)	64	67	68	73	70
Probability of negative returns (in percent)	0.04	1.07	5.30	12.99	19.42

Sources: Merrill Lynch, Bloomberg and IMF staff calculations

The probability of loss has declined significantly in recent quarters, owing to the positive combination of higher yields and low volatility, although there has been a recent pick-up in the latter. The peak ex ante probability of loss (14 percent for the 1–3 year index) was reached during 2002–03 when expected yields were approaching a trough and volatility was relatively high. Since then, the combined effect of higher yields and lower volatility imply very little risk of negative returns on a 1–3 year portfolio (Figures 6 and 7).

[3] The probability of loss is calculated by combining the market's expectations of current bond income with the expected dispersion of bond prices, using the implied volatility of one-year swaptions to measure the expected dispersion of bond prices and forward interest rates to calculate current income.

[4] This analysis assumes that yields increase in one shot at the start of the period, a very conservative approach since rates usually rise gradually over time; a more gradual increase in rates would accordingly lower the probability of negative returns. The estimated probability of negative returns is based on an assumed normal distribution. In practice, returns are not normally distributed and display fat tails, as shown in Figure 3.

Figure 6. 1-3 Year Bond Yields and Volatility

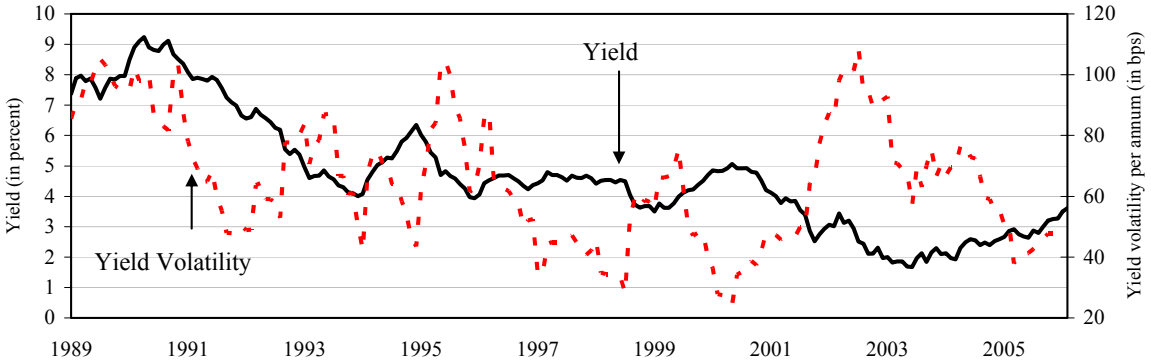
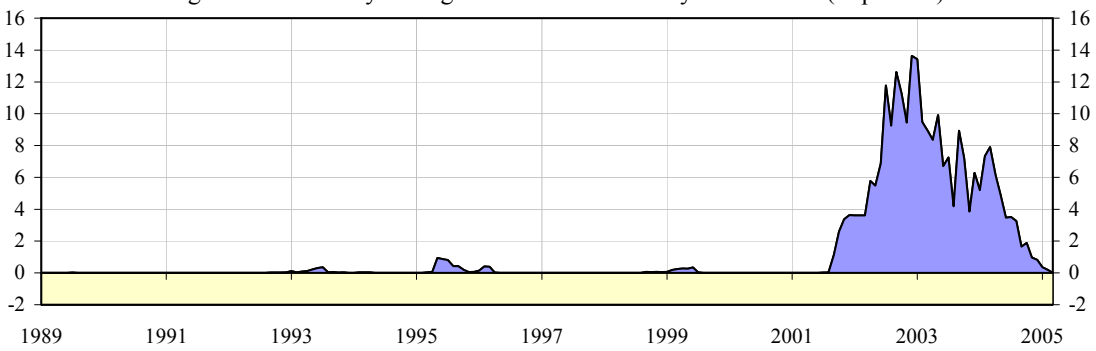


Figure 7. Probability of Negative Returns of a 1-3 year Portfolio (In percent)



Sources: Merrill Lynch and IMF staff calculations

D. Diversification into Medium-Term Instruments

An MTI is a fixed income security issued by the BIS whose yield is based on swap rates minus a fixed margin.[5] MTIs are a spread product with two sources of return (and risk): the return associated with underlying movements in government bond yields and that arising from the credit spread on MTIs. The additional return offered by the MTIs over government bonds aims at compensating the investor for taking on this small credit risk. MTIs perform relatively better than comparable government bonds when swap spreads narrow and vice versa.

Past MTI performance

During the period of April 2000 to January 2002, some PRGF-HIPC assets were invested in 1–3 year MTIs and generated an annualized excess return of 0.57 percent over the 1–3 year

[5] The swap yield curve is based on AA-rated credits.

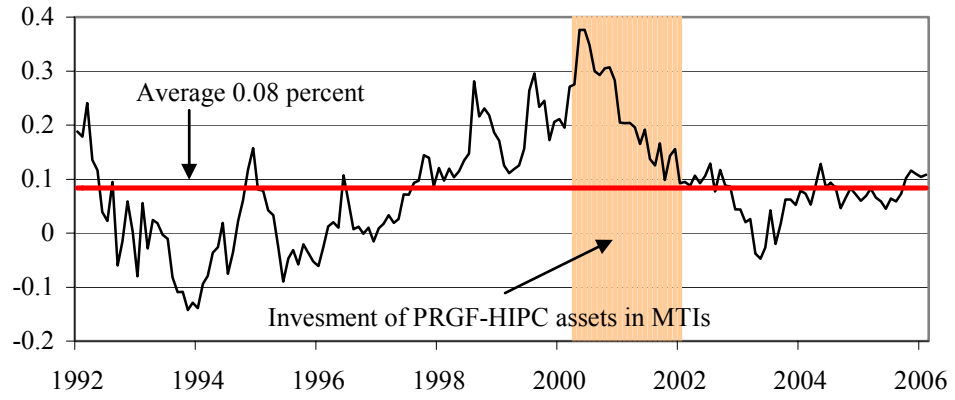
government bonds (Table 8). This strong performance was driven by a sharp narrowing of the credit spread (Figure 8). Additionally, the imperfect return correlation between MTIs and the 1–3 year government bond benchmark (with a correlation coefficient of 0.89 during the period under review) brought some diversification gains.

Table 8. MTIs and Government Bond Performance, April 2000-January 2002 1/
(In percent)

	Annualized Return	Standard Deviation	Risk-adjusted Return
1 - 3 Year	6.08	1.12	5.42
MTIs	6.65	1.28	5.20
Excess Return	0.57		
Correlation	0.89		

Sources: BIS, Merrill Lynch and IMF staff calculations
1/ Average monthly return

Figure 8. Two-year MTIs minus Government Bond Yields in SDRs (In percent)



Sources: Merrill Lynch, Bloomberg and IMF staff calculations.

MTIs in the current market environment

Yield spreads between MTIs and government bonds are broadly in line with their long-term average (Figure 8). Although the yield pick-up is currently at average levels, MTIs appear advantageous in terms of risk-adjusted return (Table 9).

Table 9. Performance of MTIs and Comparable Government Securities in the 1-3 year sector
(In percent)

	Sharpe Ratio *Annualized*	Monthly Return *Mean, in percent*
US dollar		
(March 1999-December 2005)		
BIS MTIs	*0.70*	*0.39*
US Treasury	0.53	0.35
Euro		
(March 2000-December 2005)		
BIS MTIs	*0.76*	*0.34*
Germany	0.73	0.34
France	0.73	0.34
Italy	0.87	0.36
Spain	0.80	0.35
Sterling		
(November 1999-December 2005)		
BIS MTIs	*0.68*	*0.54*
UK Treasury	0.49	0.50

Source : BIS
Note: No data is available for MTIs issued in yen.

E. Conclusions and Recommendations

During 1989–2006, all of the bond portfolios analyzed generated substantial cumulative excess returns over the three-month SDR rate. The amount of excess return increased with the maturity of the portfolio. However, longer maturity portfolios were also riskier, measured by the volatility of returns.

The bond portfolios tended to generate excess returns more consistently as the investment horizon was extended. Based on a standard one-year investment horizon, the 1–3 year portfolio outperformed the 3-month SDR interest rate in about three quarters of the rolling 12-month periods over the period 1989–2006. This portfolio did not generate negative returns in any rolling 12-month period. However, over shorter (quarterly and semiannual) investment horizons, the frequency of underperformance increased and negative returns were experienced.

Care needs to be taken when using past bond returns to guide expectations for future performance. This is particularly so in the current environment of tightening monetary conditions, relatively low interest rate volatility, and tight credit spreads. Nevertheless, the analysis of the probability of loss over a one-year horizon, given current expectations for yields and yield volatility, suggests that the risk of loss is low on a 1–3 year portfolio. This

risk could be further mitigated by phasing in any bond investments over a period of months, rather than implementing the investment of the IA in a bond portfolio in one shot.

MTIs have provided an additional return over government bonds and some diversification gain which together have fairly compensated for bearing a small credit risk exposure.

Benchmark recommendation

- Both the 1–3 and 1–5 year bond benchmarks appear consistent with the investment objective of performing better than the SDR interest rate under most market conditions while minimizing the risk of loss in any year. However, the 1–3 year index, which is commonly used by reserve asset managers, appears preferable given the current limited term premium for maturities above two years. This benchmark has consistently earned positive returns in every rolling 12-month period over the past 16 years. Its current low probability of negative returns also appears consistent with the investment objective and risk tolerance of the IA.

- During 1989–February 2006, the average annual excess return over the three-month SDR interest rate was 111 basis points for the 1–3 year benchmark. This index consistently generated an excess return over the three-month SDR interest rate over a two-year horizon. Over shorter horizons, it fell short of the three-month SDR interest rate in about one out of every four years, and in one of every three quarters.

- The 1–3 year benchmark appears to strike a comfortable balance between generating meaningful excess returns over time, while limiting inevitable short-term periods of reversal (Appendix Table 3).

Table 1. Rolling Performance Indicators, 1989-2006 1/
(In percent)

	Rolling Period 2/				
	3-month	6-month	1-year	3-year	5-year
	Absolute Returns				
3-month SDR					
annualized rate of return 3/	4.51	4.54	4.59	4.81	4.85
minimum return	1.52	1.55	1.58	1.91	2.32
Merrill Lynch 1-3 4/					
annualized rate of return	5.60	5.62	5.63	5.85	6.03
minimum return	-2.45	0.24	1.20	1.96	3.31
number of losses 5/	6	0	0	0	0
Merrill Lynch 1-5					
annualized rate of return	6.05	6.06	6.07	6.28	6.48
minimum return	-6.01	-2.19	0.05	2.07	3.70
number of losses	18	5	0	0	0
Merrill Lynch 3-5					
annualized rate of return	6.71	6.69	6.67	6.85	7.08
minimum return	-10.14	-4.83	-1.64	2.24	4.31
number of losses	32	21	5	0	0
Merrill Lynch 5-7					
annualized rate of return	7.48	7.41	7.37	7.48	7.73
minimum return	-14.62	-8.54	-3.39	2.72	4.91
number of losses	38	31	15	0	0
Merrill Lynch 7-10					
annualized rate of return	8.01	7.87	7.78	7.74	7.99
minimum return	-18.55	-11.55	-5.18	2.50	4.95
number of losses	47	37	21	0	0
	Relative to 3-month SDR Rates				
Merrill Lynch 1-3					
months of underperformance	76	66	58	35	19
average underperformance	-1.89	-1.53	-1.38	-0.99	-0.31
maximum underperformance	-6.45	-4.85	-3.67	-1.81	-0.56
Merrill Lynch 1-5					
months of underperformance	77	68	57	35	19
average underperformance	-2.75	-2.17	-1.91	-1.15	-0.31
maximum underperformance	-9.70	-6.62	-4.18	-2.28	-0.64
Merrill Lynch 3-5					
months of underperformance	78	67	56	32	16
average underperformance	-3.97	-3.12	-2.56	-1.40	-0.34
maximum underperformance	-13.67	-9.36	-5.70	-2.85	-0.70
Merrill Lynch 5-7					
months of underperformance	80	64	49	30	16
average underperformance	-5.22	-4.39	-3.74	-1.69	-0.45
maximum underperformance	-18.56	-13.88	-7.65	-3.50	-0.93
Merrill Lynch 7-10					
months of underperformance	78	64	49	30	18
average underperformance	-6.88	-5.59	-4.58	-1.84	-0.67
maximum underperformance	-23.89	-17.94	-9.87	-4.37	-1.34

Sources: Bloomberg and IMF staff calculations.

1/ Data as of end-February, 2006.
2/ The number of periods is 204 for rolling 3-month, 201 for rolling 6-month, 195 for rolling 1-year, 183 for rolling 3-year and 147 for rolling 5-year periods.
3/ Annualized cumulative rate of return.
4/ The Merrill Lynch Index is based on total return indices for the currencies in the SDR basket compiled by Merrill Lynch for the period 1989-2006. The indices cover government bonds of different maturities and are estimated by weighting the returns of the different component indices with the weights of the currencies in the SDR basket.
5/ The number of losses refers to the number of periods of absolute or relative underperformance, out of a total of 206 periods. The longer the investment horizon, the lower the underperformance, since coupon, interest gain and roll down compensate for the capital loss due to unfavorable market movements.

Table 2. Worst Annual Rolling Returns During Tightening Periods
(In percent)

Tightening 1/						Portfolio						
Eurozone 2/	Japan	UK	US	SDR		3 M	6 M	1 - 3 Y	1 -5 Y	3 - 5 Y	5 - 7 Y	7 - 10 Y
January 1989-October 1989												
2.30	2.00	2.00	0.25	1.49	Return	8.39	9.01	5.86	4.68	3.37	0.69	-1.71
					Excess return		0.62	-2.53	-3.71	-5.02	-7.70	-10.10
January 1994-February1995												
-1.15	0.00	1.25	3.00	0.96	Return	4.11	4.24	1.48	0.05	-1.64	-3.39	-5.18
					Excess return		0.13	-2.63	-4.06	-5.74	-7.50	-9.29
June 1999-October 2000												
Eurozone	Japan	UK	US	SDR	Return	3.46	3.62	2.01	0.98	-0.56	-2.35	-4.54
2.25	0.00	1.00	1.75	1.46	Excess return		0.15	-1.45	-2.48	-4.02	-5.81	-8.00
October 2003-February 2006												
0.00	0.00	1.00	3.50	2.30	Return	1.58	1.62	1.20	0.82	0.09	-0.58	-2.06
					Excess return		0.04	-0.38	-0.76	-1.49	-2.16	-3.64

Sources: Merrill Lynch and IMF staff calculations.
1/ Increase in central banks' official policy rates over the period.
2/ Before 1999, reference to the German central bank monetary policy.

Table 3. Details of Investment Performance Indicators, 1989-2005 and first two months of 2006
(In percent)

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Jan-06 1/	Feb-06 1/
3-Month SDR																			
annualized rate of return	8.27	9.09	7.64	6.26	4.63	4.28	4.59	3.90	4.07	4.11	3.48	4.44	3.42	2.24	1.65	1.84	2.63	0.26	0.28
standard deviation of return	0.10	0.02	0.14	0.11	0.14	0.09	0.09	0.02	0.04	0.07	0.05	0.08	0.21	0.03	0.04	0.07	0.07		
Merrill Lynch 1-3																			
annualized rate of return	6.21	8.51	10.66	9.17	7.56	1.48	10.17	4.66	4.96	6.07	2.48	5.75	6.25	5.12	2.31	2.12	2.01	0.12	0.08
standard deviation of return	1.60	1.59	0.77	1.33	0.99	0.92	1.28	0.98	0.67	0.99	0.74	0.80	1.35	1.45	1.18	0.99	0.80		
sharpe ratio 2/	-1.29	-0.37	3.90	2.20	2.97	-3.04	4.36	0.78	1.32	1.98	-1.34	1.64	2.10	1.99	0.56	0.28	-0.77		
Merrill Lynch 1-5																			
annualized rate of return	5.79	7.88	11.68	10.13	9.24	0.06	12.27	4.96	5.68	7.18	1.71	6.49	6.39	6.49	2.42	2.76	2.05	0.02	0.01
standard deviation of return	2.08	2.27	1.31	1.75	1.45	1.41	1.80	1.57	1.12	1.53	1.22	1.09	1.87	2.10	2.01	1.55	1.30		
sharpe ratio	-1.19	-0.53	3.09	2.21	3.17	-2.99	4.26	0.68	1.43	2.02	-1.45	1.89	1.59	2.02	0.38	0.59	-0.44		
Merrill Lynch 3-5																			
annualized rate of return	5.56	7.45	13.08	11.16	11.20	-1.62	15.16	5.02	6.53	8.45	0.53	7.73	6.48	8.89	2.71	3.63	2.08	-0.13	-0.09
standard deviation of return	2.80	3.31	1.95	2.32	2.02	2.01	2.50	2.37	1.75	2.24	1.85	1.63	2.79	3.31	3.47	2.47	2.06		
sharpe ratio	-0.96	-0.50	2.79	2.11	3.25	-2.93	4.23	0.47	1.40	1.94	-1.59	2.02	1.10	2.01	0.31	0.73	-0.26		
Merrill Lynch 5-7																			
annualized rate of return	5.56	5.65	14.81	12.13	13.60	-3.36	18.03	5.50	8.36	10.18	-0.96	9.44	6.35	10.58	2.87	4.76	2.87	-0.36	-0.07
standard deviation of return	3.37	4.83	2.74	2.73	2.89	2.77	3.27	3.44	2.57	3.10	2.73	2.20	3.71	4.19	4.57	3.06	2.84		
sharpe ratio	-0.80	-0.71	2.61	2.15	3.10	-2.76	4.11	0.46	1.67	1.96	-1.63	2.27	0.79	1.99	0.27	0.96	0.08		
Merrill Lynch 7-10																			
annualized rate of return	6.70	4.04	15.44	11.78	15.56	-5.13	19.99	5.35	10.41	12.08	-2.94	10.43	5.55	11.95	2.48	6.19	4.21	-0.60	-0.04
standard deviation of return	3.82	6.87	3.40	3.17	3.46	3.42	3.88	4.68	3.48	4.38	3.59	2.79	4.69	5.01	5.93	3.93	3.81		
sharpe ratio	-0.41	-0.73	2.29	1.74	3.16	-2.75	3.98	0.31	1.82	1.82	-1.79	2.14	0.45	1.94	0.14	1.11	0.42		

Sources: Bloomberg and IMF staff calculations.

1/ Monthly return.
2/ The Sharpe Ratio is derived by dividing the return of the portfolio earned in excess of the risk free rate (SDR 3-month interest rate) by the standard deviation of the portfolio over that time period.