

Bank of Jamaica
Financial Stability Report
2006

Draft

© 2006 Bank of Jamaica
Nethersole Place
Kingston
Jamaica

Telephone: (876) 922 0750-9
Fax: (876) 922 0854
E-mail: library@boj.org.jm
Website: www.boj.org.jm

Contents

▪ Preface	1
1. Financial Stability Overview	2
2. Domestic Macro-Financial Developments	7
3. International Financial Markets	19
4. Financial System Developments	30
5. Banking Sector Exposures	46
6. Risk Assessment of the Banking Sector	58
7. Payment and Settlement Systems	76
8. Special Articles	
<i>An Assessment of Concentration & Efficiency in the Jamaican Banking Sector</i>	83
<i>Calculation of Value at Risk: The Bank of Jamaica Approach</i>	89
Glossary	96

Preface

The maintenance of financial stability by the Bank of Jamaica (BOJ) primarily concerns the safeguard of conditions which ensure the proper and efficient functioning of the financial system and consequently, the promotion of real economic activity. The financial system consists directly of three basic components: institutions, markets and infrastructure.¹ These components interact with each other as well as with other indirect participants in the system – such as households, non-financial corporations and the public sector – to allocate economic resources and redistribute financial risks.

Aside from the supervision of banks, the BOJ is charged with the responsibility of ensuring that the overall financial system is robust to shocks and that participants are assured of its robustness. This entails making sure that financial institutions, in particular banks, are sound. The maintenance of financial stability by the Bank also involves overseeing the efficient and smooth determination of asset prices, making certain that participants honour promises to settle market transactions and preventing the emergence of systemic settlement risk arising from various financial imbalances that may develop within individual institutions or the system.

The Financial Stability Report 2006 provides an assessment of the main financial developments, trends and vulnerabilities

influencing the stability of Jamaica's financial system during the year. The Report covers:

- i) an overall assessment of financial stability;
- ii) domestic macro-financial developments;
- iii) global financial developments;
- iv) financial system developments;
- v) banking system exposures;
- vi) risk assessment of the banking sector; and
- vii) payment system developments.

The Report also includes an appendix containing special articles, prepared by members of the Financial Stability Department, relating to current financial stability issues.

Comments and suggestions from readers are welcome. Please email your feedback on this report to library@boj.org.jm.

¹ Financial institutions include *inter alia* banks, securities firms, insurance companies, unit trusts, mutual funds and pension funds. Financial markets include *inter alia* foreign exchange, money and capital markets. Financial infrastructure refers to payment and settlement systems.

1. Financial Stability Overview

Macroeconomic Environment

A broadly favourable financial environment during 2006 occurred against the background of positive macroeconomic developments for the Jamaican economy reinforced by the absence of significant exogenous shocks. Significant contributors to the favourable environment were sharp declines in headline and core inflation to 5.8 per cent and 3.4 per cent in 2006, respectively, from 12.9 per cent and 5.2 per cent in 2005. These outturns were influenced by a lower rate of depreciation in the weighted average selling rate (WASR) of the US dollar vis-à-vis the Jamaica Dollar by 3.8 per cent relative to 4.6 per cent in 2005. Additionally, significant expansion in domestic agriculture influenced lower aggregate price levels and relatively strong GDP growth of 2.5 per cent for the year compared to growth of 1.6 per cent for 2005.²

The trend decline in inflation throughout the year facilitated the Bank's decision to lower interest rates on its open market instruments on four occasions in 2006. The Bank also removed the 270-day and 365-day tenors from the spectrum of open market instruments and terminated the remaining Special Deposit requirement for banking institutions. Despite a reduction in market-determined interest rates, strong demand for loans by the household sector was the main influence for a marginal increase in commercial banks' weighted-average loan rates for the year.

² Growth in tourism and transportation sectors also contributed significantly to the GDP growth at end-2006.

The fiscal deficit widened to 5.5 per cent of GDP for the period April to December 2006, relative to the budgeted deficit of 4.2 per cent of GDP. However, this deviation did not have a significant impact on the improved investor confidence during the year.

Global Environment

The global economy recorded robust growth in 2006, with the highest level over the last 8 years. This expansion was driven by strong growth in emerging markets. Improvements in other macroeconomic fundamentals helped to strengthen investor confidence in these economies. In conjunction with investors' search for higher return levels than those available in developed economies, there were robust capital flows to emerging markets during 2006. This occurred despite monetary policy tightening in some developed economies; principally the United States of America (US), the European Union (EU) and the United Kingdom (UK).

Despite an increase in interest rates in the major developed countries during 2006, yields on fixed income instruments in these markets remained relatively low. As such, in an attempt to obtain higher yields, investors increased holdings of relatively illiquid asset groups, such as structured credit products.

Greater hedge fund activity during 2006 reflected further evidence of international investors' determination to obtain higher returns. The positive and rising correlation of high returns across funds has increased

the probability of protracted build-up and rapid unwinding of asset price misalignments. Recent evidence suggests that some institutional investors and hedge funds have sought to generate higher profits by earning premiums from actively selling out-of-the money options along with other forms of credit protection.³

For example, the continued 'search for yield' during 2006 drove credit default swap (CDS) prices to record lows during the year. Many commentators on these markets have purported that recently CDS market prices have not, reflected, the underlying credit quality of the borrower, but rather in a number of cases, reflected strong levels of short-term market speculation. Serious concerns have been expressed of an imminent collapse of the credit derivative hedge fund insolvencies, significant financial market volatility and substantial financing difficulties for the more risky international sovereign and corporate borrowers.⁴

Although short-lived, the possibility of a disorderly market adjustment was evident during 2006, when prices of CDSs on emerging market bonds spiked during May and June. This increase in CDS prices reflected a temporary rise in emerging market bond yields that was sparked by

³ See 'Hedge Fund Flurries.' Introductory comments by Mr William R White, Economic Adviser and Head of the Monetary and Economic Department of the BIS, to Session 3 of the Bellagio Meeting, London, 19-20 January 2007.

⁴ Hedge funds are not subject to capital adequacy or statutory reserves requirements.

widespread speculation of further increases in interest rates of developed economies.

Another major concern during 2006 was a possible slowdown in the U.S. economy due to the effects of increases in interest rates enacted by the Federal Reserve. US monetary tightening early in the year spurred an elevation in defaults within the sub-prime mortgage market and a consequent downturn in residential real estate prices that threatened to sharply curtail corporate and consumer spending.

Developments in the sub-prime U.S. mortgage market during 2006 suggest that many borrowers and lenders in these markets ignored or were not aware of the risk, or consequences, of a sharp fall in residential real estate prices.⁵ About 13.0 per cent of sub-prime borrowers had fallen behind with their payments by the end of 2006 and many sub-prime lenders had either ceased operations or continued to suffer major financial losses.⁶

Sub-prime lenders had been very successful over recent years in enticing borrowers with non-traditional mortgage products. These included interest-only loans, for which the amortizing of the loan principal starts only after the initial years of the loan, and adjustable-rate mortgages offering a range of payment options.

⁵ A subprime borrower cannot qualify for ordinary 'prime' financing terms due mainly to low incomes or bad credit scores.

⁶ Source: Mortgage Bankers Association.

Domestic Financial System

The asset base of deposit-taking institutions (DTIs) increased substantially by 16.3 per cent in 2006 relative to 6.0 per cent growth in 2005. This growth was largely driven by commercial banks, primarily due to an expansion in the loan portfolio, with annual asset growth of 17.3 per cent relative to 6.7 per cent in 2005. The asset base of merchant banks, building societies and credit unions also recorded strong growth rates of 3.2 per cent, 18.3 per cent and 18.4 per cent, respectively.

An increase of 17.8 per cent in the stock of security investments by DTIs in 2006 was also a major contributor to asset expansion in the system. However, DTIs continued to realign asset portfolios towards higher yielding loans, evidenced in a lower ratio of investments to assets (34.3 per cent) relative to loans to assets (37.9 per cent.)⁷

Despite the robust growth in assets, net profits for DTIs increased marginally by 3.2 per cent, relative to the 22.1 per cent growth recorded in 2005. This slower growth was in a context of the relatively lower interest rate environment which primarily impacted the institutions' security investment portfolios. However, the spread between interest income on loans and interest expense on deposits widened in 2006, largely due to the maintenance of relatively high weighted-average loan rates, coupled with the declining interest rate environment. Credit

unions continued to enjoy the highest return on assets (ROA) in 2006, followed by commercial banks, building societies and then merchant banks.

The banking sector continued to be resilient to adverse shocks during 2006. The ratio of capital to risk-weighted assets (RWA) for DTIs increased to 16.0 per cent at end-2006 relative to 13.4 per cent at end-2005.

Credit risk as measured by the ratio of NPLs to gross credit declined to 2.3 per cent at end 2006 from 3.0 per cent at end-2005. Furthermore, the adequacy of loan-loss provisions, measured as the ratio of loan-loss provisions to gross NPLs, continued to record high levels and was 95.9 per cent at end-2006. During 2006, there was further improvement in the banking sector's resilience to shocks affecting corporate and household debt due to continued strengthening in the credit quality of these sectors. Despite relatively strong concentration in household loans, the banking system was resilient to extreme hypothetical 'stress test' shocks to performing loans to the private sector.

Consistent with the strengthening in loan quality, an expansion in credit cards in circulation of 6.2 per cent contributed to a smaller increase in credit card receivables for commercial banks during 2006 relative to 2005.

⁷ At end-2000, the ratio of DTI's loans to assets was 23.7 per cent compared to a ratio of 41.3 per cent for investments to assets.

Additionally, banking system exposures to market risks, including interest rate, liquidity and foreign exchange rates, remained within tolerable limits.⁸ Extreme hypothetical market-related shocks applied in stress testing exercises did not indicate worrying vulnerabilities with regard to individual institutions or overall financial stability in 2006. At end-year, banks' liquidity gap profile for assets and liabilities maturing within one year improved relative to that of the previous year as the banking system became less negatively gapped over the short-term.

Non-bank financial institutions' (NBFIs) assets increased by 14.6 per cent similar to the 14.7 per cent growth in 2005. This reflected growth in the assets of securities firms, life insurance companies and, to a lesser extent, general insurance companies. Securities firms continued to dominate NBFIs assets, accounting for 75.1 per cent, a 2.0 percentage point increase relative to end-2005. This growth was primarily driven by funds under management, which was 64.2 per cent at end-2006, relative to 62.5 per cent at end 2005. NBFIs remained profitable in 2006. However, the decline in domestic interest rates continued to restrain the sector's profits levels, as the sector remained heavily invested in GOJ securities.

Outlook

The major risks to financial stability for 2007 continue to be from the global commodity and financial markets. Similar to developments in 2005, oil prices reached new record levels in 2006 particularly in July. Both demand- and supply-side challenges continue to contribute significantly on the up-side with regard to oil prices. These challenges emanated primarily from excess demand from robust global expansion and recurring geopolitical tensions. Hence, the potential for higher oil prices continue to pose a significant risk to economic growth, international and domestic inflation, as well as greater financial market volatility.

The possibility of an unravelling of global savings-investment imbalances arising from large fiscal and current account deficits in the US could lead to a sharp correction in the value of the US dollar as well as an increase in US interest rates. As previously noted in the 2005 Financial Stability Report, further monetary tightening in the US would constitute a further risk to financial risk to financial stability as it would likely result in a global retreat from emerging market bonds and equities as well as a rise in domestic interest rates. The current protracted slump in US house prices and associated decline in corporate and consumer spending in the US has, so far, reduced the probability of an increase in the US Federal funds rate in 2007. However, these negative 'wealth effects' affecting Jamaica's main trading

⁸ Note that the credit union data is not included in the Bank's stress testing exercises.

partner could have adverse implications for domestic economic activity.

Along with the sustained increase in GDP growth internationally, there has been an even faster expansion in cross-border capital flows and financial assets as investors continue their global 'search for yield.' The rapid rate of growth in assets under management of institutional investors, particularly securities firms, within Jamaica's financial system reflected the expansion in cross-border capital flows in recent years. For example, as noted in this report, securities dealers' 'funds under management' was 64.2 per cent of GDP in 2006, relative to 62.5 per cent recorded at end-2005. In addition, securities firms' funds under management continued to exceed commercial banks' deposits in 2006. Increased access to international financial products has also resulted in increased exposure of domestic institutions and individual investors to derivative markets.

Domestic financial institutions must ensure that they appropriately hedge risks associated with instruments that may offer above-market yields initially but adverse returns under specific market conditions. Households must ensure that they are adequately informed of the increased levels of financial risks that are being transferred to them by financial institutions.

Finally, bank credit to the household and corporate sectors has expanded rapidly in Jamaica in recent years. This expansion is against the background of a refocus of banking institutions toward core business activities to increase profitability in the

context of the lower interest rate environment and declining interest margins on domestic securities during 2006. Despite the fast rise in private sector loan stock, non-performing loans are currently at low and declining levels. However, historical episodes of rapid credit growth both domestically and internationally suggest that banks' must remain very vigilant in the proper screening of potential borrowers and the on-going monitoring of credit risk as the number of defaults could jump substantially at a later stage in the event of negative macroeconomic shocks.

2. Domestic Macro-Financial Developments

2.1 Overview

Domestic financial markets and the banking sector operated within a favourable macroeconomic environment during 2006. Limited market volatility reflected continued investor confidence in the context of improved macroeconomic conditions, most notably higher growth and lower inflation. Stability in the foreign exchange market improved during the year despite sporadic periods of disruption, while domestic bond yields declined. Equity prices also declined during the year in a context of lower than expected corporate earnings.

2.2 General Economic Performance

Investor confidence in the Jamaican economy remained robust throughout 2006 in the context of positive domestic economic performance, strong global economic growth and relative stability in domestic financial markets.

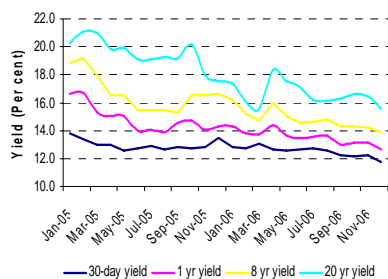
Improvement in domestic macroeconomic conditions was reflected in a substantive decrease in inflation and an improvement in GDP growth, relative to 2005 (see **Table 2.1**).⁹ The improved inflation outturn mainly reflected recovery of agricultural supplies in the absence of serious weather-related shocks and occurred despite higher average oil prices for the year. A shortage of cement,

Table 2.1
Selected Macroeconomic Indicators

	2003	2004	2005	2006
GDP Growth	2.3	1.0	1.4	2.5
Inflation - % Chng pnt to pnt	14.1	13.7	12.9	5.8
Food & Drink - % Chng	11.2	16.2	12.3	5.3
Oil - WTI (ann avg)	31.1	41.5	56.5	66.1
% Chng	19.6	33.1	36.2	17.0
CY Fiscal balance/GDP	-7.8	-4.5	-4.4	-4.4
CA /GDP	-9.4	-5.8	-11.1	-10.6
NIR (US\$BN)	1.17	1.86	2.09	2.32
NIR (wks of goods imports)	18.2	27.3	25.6	25.2
J\$/US\$ (ann wght avg)	57.9	61.3	62.5	65.9
% Chng J\$/US\$	19.3	5.9	1.9	5.4
Private Sector Credit - % Chng	36.2	19.4	13.4	29.6
NIR/M2	57.4	80.8	85.8	88.6

⁹ See Overview section of BOJ Annual Report 2006 for an extensive discussion of economic developments.

Figure 2.1
End of Period Domestic Bond Yields



Source: Bloomberg

which greatly hampered construction activities during the year posed the main challenge to economic growth during 2006.

The Central Government fiscal deficit was higher than budgeted during the year. Despite this deviation, the ratio of public sector loans to total loans declined. Government was unsuccessful in reducing the share of variable rate issues in the domestic debt portfolio but was able to source funding at lower rates relative to 2005 (see Section 5, “Banking Sector Exposures” for further details).

2.3 Bond Market

Monetary policy actions by the BOJ were facilitated by a less aggressive monetary policy stance by the US Federal Reserve and the continued easing of domestic inflation expectations, as the year progressed. In the context of reductions in interest rates by the BOJ, fluctuations in interest rates remained moderate, aside from an increase in the yield on the 20 year tenor during May (see **Figure 2.1**).¹⁰

Net amortization of GOJ US dollar-denominated or linked domestic debt meant that investors had to seek alternative foreign assets if they wished to keep the share of foreign currency investments to total investments constant.

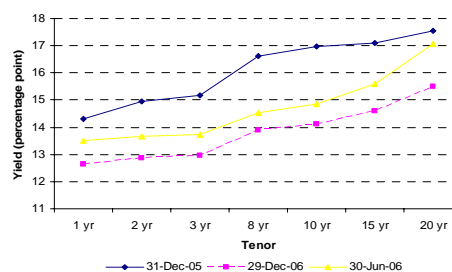
¹⁰ The increase in the yield on the 20-year tenor in May 2006 may have reflected the limited liquidity in domestic secondary market bond market trading which can generate yields that are inconsistent with general investor sentiment.

In this context, foreign currency denominated GOJ and corporate debt issues attracted strong investor interest during the year.¹¹ In particular, the issue of a US\$250.0 million GOJ Eurobond during the March quarter was well received by investors and reflected continued confidence in the economy.

The yield curve for domestic GOJ debt instruments shifted downwards during the year, consistent with interest rate reductions enacted by the BOJ and a reduction in inflation. The slope of the yield curve flattened with greater declines in yields experienced on the longer tenors relative to the one-year tenor (see **Figure 2.2**). There was also a “twist” in the yield curve at end December 2006 relative to end December 2005, as the slope of the curve between the 1-year to 8-year tenors declined while the slope of the curve between the 8-year to 20-year tenors increased.

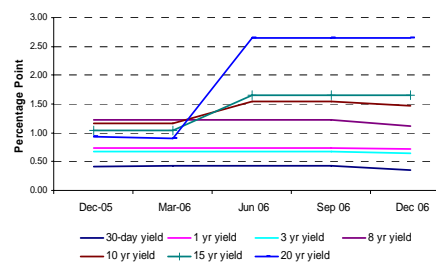
The risk to bond investors of large changes in bond values for domestic GOJ instruments, as measured by the 10-day VaR (Value at Risk) differed according to the tenor of the instrument (see **Box 2.1**). The magnitude of increases in yields for most tenors below 8 years declined at end-2006 relative to end-2005 (see **Figure 2.3**).

Figure 2.2
Domestic Debt Zero-Coupon Yield Curve



Source: Bloomberg

Figure 2.3
99th Percentile 10-day Change in Yields Over Prior 252 Trading Days



¹¹ Foreign currency debt issues included those by Air Jamaica, Clarendon Alumina Partners, Jamaica Public Service Company, among others.

BOX 2.1 Description of Value at Risk (VaR) Computation in the Report¹²

VaR measures the downside risk to an institution's investment portfolio due to changes in market variables, and is usually expressed as a percentage of current portfolio value. VaR specifies the loss a portfolio is expected to experience over a given time horizon, with a specified probability. For example, a VaR estimate of \$2.5 million with a time horizon of 10 trading days and confidence interval of 99.0 per cent, means that there is a 1.0 per cent chance that the portfolio's loss will be greater than \$2.5 million over 10 consecutive trading days.

While VaR takes into account the portfolio composition and changes in underlying risk factors, confidence intervals of the risk factors themselves can be created to give an idea of the risk inherent in particular assets. For a given risk factor, the 99th percentile change over a 10 day trading period during the prior 252 trading days is used as proxy of the "VaR" of the associated asset.¹³ The actual impact

of changes in a risk factor on an institution's profitability will depend on the institution's holdings. For example, institutions with short positions in foreign currency will benefit from an appreciation in the value of Jamaica Dollar while those with long positions will incur losses.

Relevant VaR estimates for banking sector institutions are reported in Section 6, "Risk Assessment of the Banking Sector", while confidence intervals ("VaR") of major asset classes are reported in Section 2, "Domestic Macro-Financial Developments." The construction of VaR estimates in Section 6, follows the procedure outlined below:

- Step 1: Relevant market risk factors are identified and investment portfolio positions for DTIs established. The risk factors used are: the 30-day money market interest rate; selected tenors from the Bloomberg zero-coupon yield curve for Jamaica Dollar-denominated GOJ bonds, an index of GOJ US dollar external bond yields based on a yield curve produced by Bloomberg. The Jamaica Stock Exchange (JSE) Main Index; and the Jamaica Dollar to US dollar exchange rate.

¹² This box gives a very brief general description of the VaR estimates used within this publication. For a more detailed description of VaR and how it is estimated at the BOJ please see special article, "Value at Risk Estimation at the BOJ." For a more detailed description of VaR see Box 4, "Value at Risk", in Bank of Jamaica Financial Stability Report 2005.

¹³ This analysis assumes that the most recent 252-trading days provides a good

estimation of what the tails of the distribution of interest rate changes is likely to be in the near-term.

- Institutions' investment position are discerned from monthly balance sheet data and time to repricing returns submitted by DTIs at the end of each quarter.
- Step 2: Fluctuations in risk factors are computed as the change over the previous 10-trading day interval.
- Step 3: Changes in asset values are simulated by applying pricing formulas to changes in the relevant risk factor. For example, a portfolio duration measure is estimated for each institution and applied to actual changes in interest rates to approximate potential changes in value of an institution's domestic bond portfolio.¹⁴
- Step 4: Historical series of simulated investment dollar returns for each institution is created by combining each institution's portfolio weight with the calculated change in asset value.
- Step 5: The VaR estimate is the loss that corresponds to the stipulated confidence interval. That is, when a 99.0 per cent confidence interval is used, the VaR estimate is the loss that is exceeded only 1 per cent of the time.

¹⁴ Duration approximates the percentage change in the value of a fixed income instrument for a 1.0 percentage point change in the relevant yield.

Figure 2.4
Distribution of Changes in 1-Year Yield
Over 252 Trading days to end-December
2006

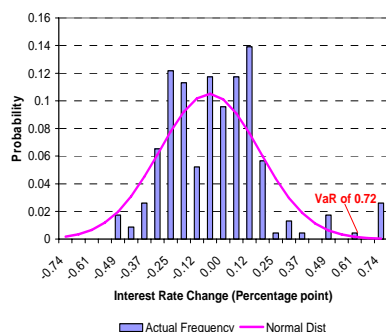


Figure 2.5
Distribution of Changes in 3-Year Yield
Over 252 Trading days to end-December
2006

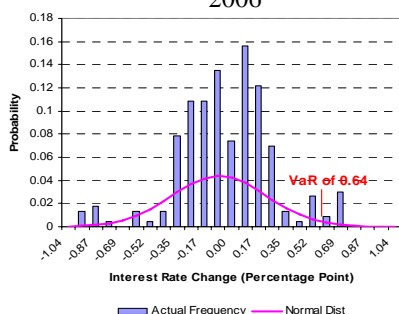
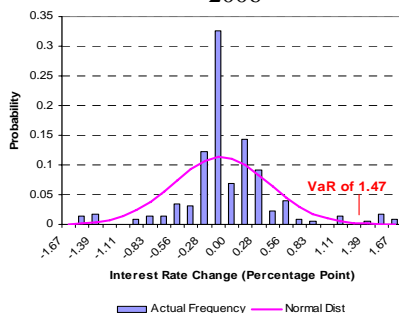


Figure 2.6
Distribution of Changes in 10-Year Yield
Over 252 Trading days to end-December
2006



More specifically, the size of large increases in yields on tenors above 8 years increased.¹⁵ This indicates that the risk of large losses in bond values would have been greater for longer tenors (see **Figures 2.4 - 2.7**).

The banking system reduced its relative exposure to changes in yields on instruments with long (i.e. over 5 years) time to repricing during the year. The lower levels of volatility on short-term and medium-term interest rates augured well for the reduction in the VaR for bond portfolios held by the banking system. The varying degrees of exposure to interest rate risk among sectors within the banking system was influenced by both the currency composition as well as the time to re-pricing for each sector's bond portfolio (see Section 6, "Risk Assessment of Banking Sector" for details on the risk exposures of deposit taking institutions).

In a context of declines in domestic interest rates and increases in US interest rates, banks reduced their short-term net liabilities relative to positions held in 2005, with the greatest reduction occurring for the merchant bank sector. Reduction in the banking sector's negative interest rate sensitive asset-liability gap position over 2006 reduced the exposure of financial intermediaries to positive interest rates shocks (see Section 6, "Risk Assessment of Banking Sector" for further details).

¹⁵ Fluctuations in yield may emanate from low levels of secondary trading in the domestic bond market and the limited market infrastructure for the accurate pricing and recording of such trades. Therefore, yield changes may not accurately reflect investors' expectations of risk or economic conditions.

2.4 Foreign Exchange Market

Overall, there was relative stability in the foreign exchange market during 2006. Compared to 2005, (especially the latter half of 2005), there was a noticeable reduction in the level of volatility of the exchange rate of the Jamaica Dollar vis-à-vis the US dollar (see **Figure 2.8** and **Figure 2.9**). This stability reflected an improved economic outlook, a pause in monetary policy tightening in the US after August and prudent intervention by BOJ during periods of shortfall in the supply of US dollars. Growth in overall foreign exchange inflows reflected buoyant receipts from the tourism sector, remittances and foreign direct investment (FDI).

Periods of relatively high volatility in exchange rate movements during the year corresponded to instances of secondary trading in foreign currency-denominated debt instruments issued by both public and private domestic institutions.¹⁶ Seasonal imbalances in the demand for and supply of foreign currency also engendered volatility. Intervention activities by the BOJ limited the level of volatility and reinforced investor confidence. The substantive NIR levels maintained by the BOJ throughout the year would have engendered investors' perception that the chance of large disruptions in the foreign exchange market occurring was increasingly unlikely (see **Figure 2.10**).

¹⁶ For example, the instability in the foreign exchange market that coincided with the issuance of a US dollar bond by the Jamaica Public Service company.

Figure 2.7
Distribution of Changes in 20-Year Yield Over 252 Trading days to End-December 2006

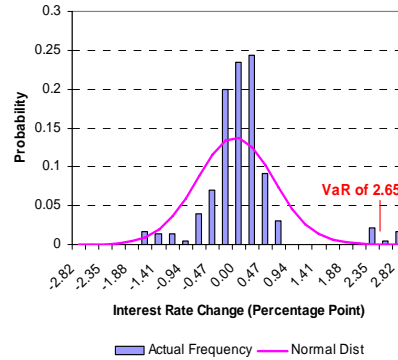


Figure 2.8
J\$/US\$ Foreign Exchange Rate

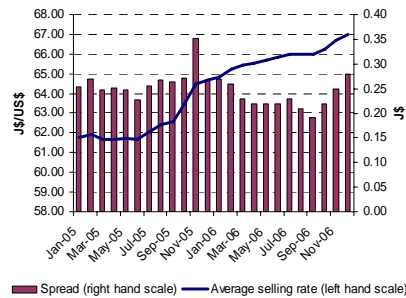


Figure 2.9
Monthly Standard Deviation of Daily Changes in J\$/US\$ Exchange Rate

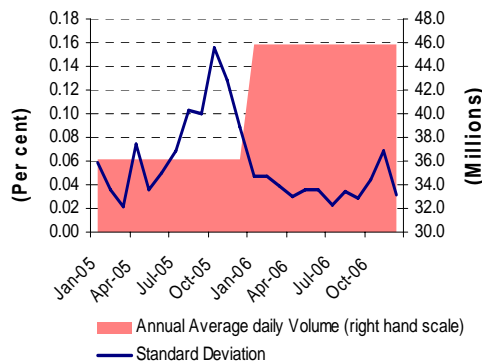


Figure 2.10
99th Percentile Appreciation Over Prior 252 Trading Days

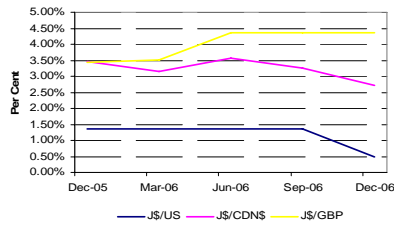


Figure 2.11
99th Percentile Depreciation Over Prior 252 Trading Days

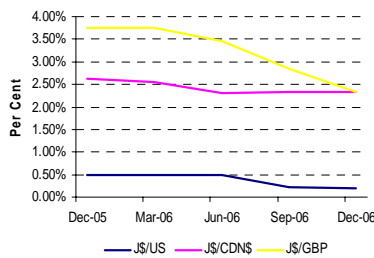


Figure 2.12
Distribution of 10-day Changes in J\$/US\$ Over 252 Trading days to End-December 2006

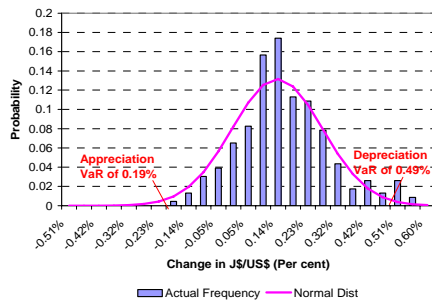
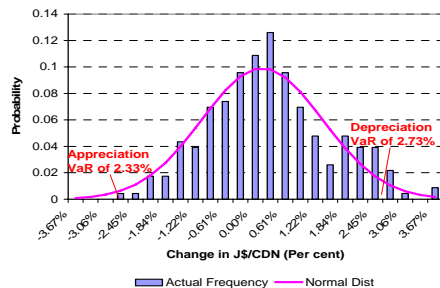


Figure 2.13
Distribution of 10-day Changes in J\$/CDN Over 252 Trading days to End-December 2006



The risk of large appreciations in the value of the Jamaica Dollar relative to the currencies of Jamaica's major trading partners decreased during the year, as measured by 99th percentile appreciation in exchange rates over the previous 252 trading days (see **Figure 2.10**). With respect to the risk of depreciation, risk declined for the US dollar and Canadian dollar but increased slightly for the Great Britain Pound (see **Figure 2.11**).

The risk for the Jamaican banking sector inherent in long positions in foreign currency is historically not as large as the risk due to short positions. That is, the probability of large depreciations in the value of the Jamaica Dollar has been greater than that of large appreciations. Large fluctuations in the value of the Jamaica Dollar against the Canadian dollar and Great Britain Pound were of greater magnitude in comparison to fluctuations against the US dollar for 2006 (see **Figures 2.12 - Figure 2.14**).

The banking sector increased the share of Jamaica Dollar-denominated assets relative to foreign currency-denominated assets at end-2006 relative to end-2005. The main exposure of the banking system to foreign currency movements was from positive net open positions in US dollars which peaked in June 2006 but subsequently declined. Reductions in net open positions in the latter half of 2006 occurred in the context of improved conditions in the foreign exchange market. Supported by the reduction in net open positions, foreign exchange risk was not a significant threat to the banking sector stability (see Section 6, “Risk Assessment of Banking Sector” for a more detailed discussion of the foreign exchange risk exposure of the banking sector).

Liquidity conditions in the foreign exchange market improved relative to 2005, which was conducive to stability within the market. Despite an increase in the level of the exchange rate, there was reduction in bid-ask spread within the market (see **Figure 2.15**). This was corroborated by the decline in the Amihud index for foreign exchange during 2006 relative to the preceding calendar year (see **Figure 2.16**).¹⁷ The narrowing in spreads coincided with increased trading volumes, which suggests greater levels of market depth. During the year up-ticks in the bid-ask spread were associated with declines in average daily sales volume.

Figure 2.14
Distribution of 10-day Changes in J\$/GBP
Over 252 Trading Days to end-2006

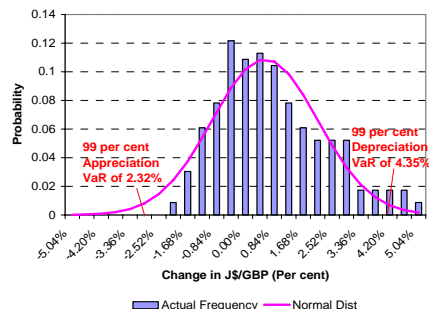


Figure 2.15
Bid-Ask Spreads & Average Daily Sales
Volume- J\$/US\$ Exchange Rate

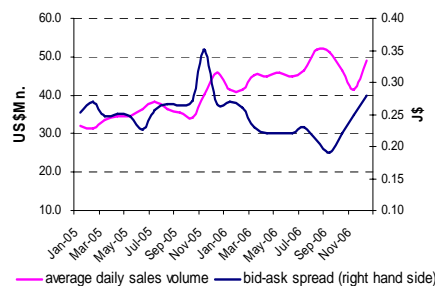
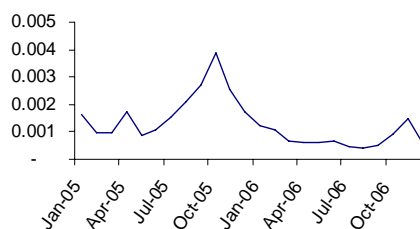


Figure 2.16
Amihud Index of Foreign Exchange
Market Depth (Average Daily)



¹⁷ The Amihud index of market depth is measured by the daily change in asset prices divided by the daily level of trading (turnover).

Figure 2.17
Regional Stock Exchange Indices

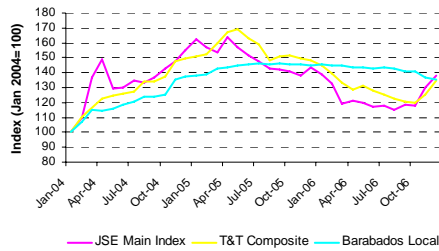


Figure 2.18
Monthly Standard Deviation of Daily Changes in the Main JSE Index

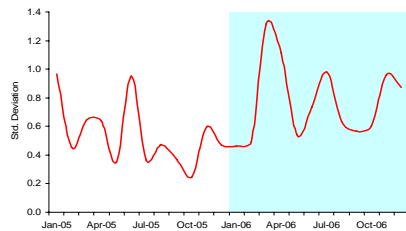
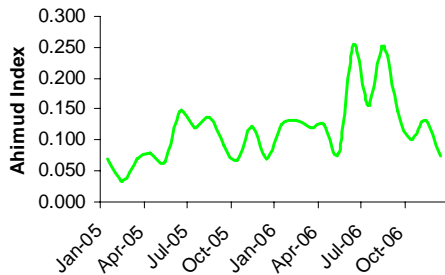


Figure 2.19
Amihud Index of Stock Market Depth



2.5 Stock Market

The domestic stock market continued to reflect an overall lack of investor enthusiasm for equities during 2006 (see **Figure 2.17**). Despite the overall decline for the year, the Main JSE Index registered a noticeable increase during the December 2006 quarter.

The equity market displayed greater volatility in 2006 relative to 2005, with the lowest period of volatility experienced during the September 2006 quarter. Volatility during the first half of the year partly reflected lower than expected corporate earnings and investors' concerns about the impact of a cement shortage on the earnings prospects of companies, especially those in the manufacturing and retail sectors (see **Figure 2.18**). Fluctuations in the value of equities would not have significantly affected the overall risk of the banking sector's investment portfolio, as in accordance with banking regulations, equities account for a relatively small proportion of investments for most institutions (see **Section 4** Financial System Developments). There was an increase in the average Amihud Index of stock market depth for most of 2006, relative to the outturn for 2005 (see **Figure 2.19**). This deterioration in the Index reflected waning investor participation in equities, given the lacklustre performance of the market during 2005 and 2006.

The Sharpe ratio of equity holdings fluctuated during 2006 (see **Table 2.2**).¹⁸ The ratio worsened during the June 2006 quarter, relative to the March 2006 quarter then improved for the rest of the year, with changes following that of returns on the JSE main index. The risk of large losses, as measured by the 10-day VaR, remained constant though notably higher than that of other financial instruments throughout 2006 (cf **Figure 2.4**, **Figure 2.7** and **Figure 2.20**).

Strong declines in interest margins contributed to a sharp reduction in the return on assets for listed companies in the financial sector. The lower than expected earnings performance of financial sector entities had a large impact on overall stock market performance, as these entities continue to account for the bulk of market capitalization. In the context of generally weak profit performance for many listed companies, several companies have embarked on long-term initiatives to restructure their operations and improve efficiency.

2.6 Implications for Financial Stability

The improved macroeconomic environment had an overall positive effect on both the stability and functioning of the banking sector in 2006.

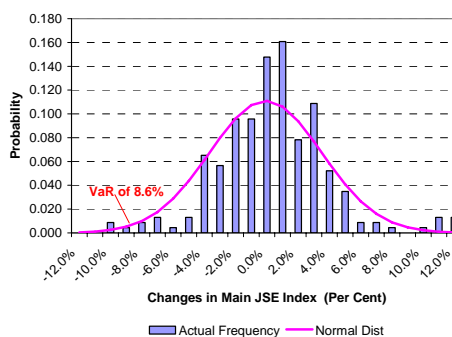
Table 2.2

Stock Performance Measures for 2006				
	Mar-06	Jun-06	Sep-06	Dec-06
Ann. Change in JSE Main Index (Per cent)	-22.4	-23.1	-16.6	-3.7
Std. Deviation of JSE Main Index (annualized)	14.5	11.8	12.7	18.0
Yield on 1 year GOJ instrument ^{1/}	15.3	14.0	14.6	14.3
Sharpe ratio of ann. return	-2.6	-3.1	-2.4	-1.0
99th percentile of 10-day loss (Per cent) ^{2/}	-8.6	-8.6	-8.6	-8.6

1/ Beginning of the yield period

2/ Change over a 10-day trading period, estimated over the prior 252 trading days

Figure 2.20
Distribution of Changes in JSE Main Index Over 252 Trading Days to End December 2006



¹⁸ This is a risk measure that defines “excess return” per unit of risk. Excess return is defined as return on the asset minus the risk free rate, while risk is measured as the standard deviation of returns on the asset. The higher the Sharpe ratio, the better is the risk adjusted performance of the asset.

This was reflected in increased provision of credit, improvements in credit quality and the repositioning of asset portfolios of institutions.

Greater economic activity was the main impetus for higher consumer spending. This was evidenced in the significant increase in average monthly value of ABM and POS transactions, which was not accompanied by a commensurate growth in the number of ABM/POS terminals (see Section 7, “Payment Systems” for further details).

3. Global Financial Markets

3.1 Overview

Conditions in global financial markets continued to be generally positive during 2006. Markets displayed relatively low volatility, excluding a brief period of disturbance in the June quarter. Further declines in yields on emerging market debt securities facilitated stability in Jamaican financial markets. A general increase in global equity prices occurred in the context of strong world economic growth.

3.2 International Financial Markets

Expansion in the global economy was strong in 2006 with the highest level of growth over the last eight years.¹⁹ Among the major developed economies, the United States displayed the strongest level of expansion (see **Figure 3.1**).

Strong growth in emerging markets and improvements in other macroeconomic fundamentals, helped to engender improved investor confidence in these economies. In conjunction with investors search for higher returns than those available in developed economies, there were robust capital flows to emerging markets during 2006. This occurred despite monetary policy tightening in some developed economies; principally the US, EU and the UK (see **Figure 3.2**).

Figure 3.1
Growth Rates of Selected Developed Economies

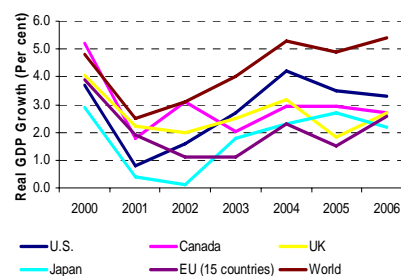


Figure 3.2
Policy Rates in Selected Developed Economies

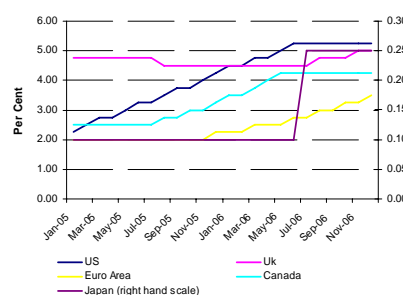
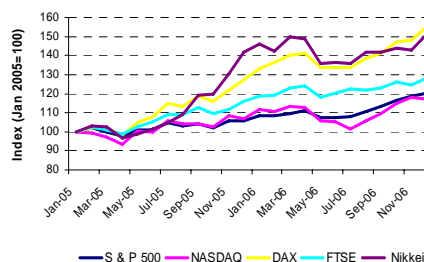


Figure 3.3
Stock Indices of Selected Developed Economies



¹⁹ Both developed and emerging economies grew at a more rapid pace relative to 2005.

Figure 3.4
Comparative Bond Yields

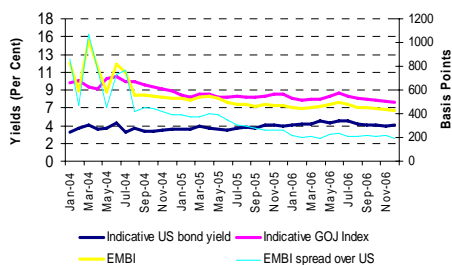
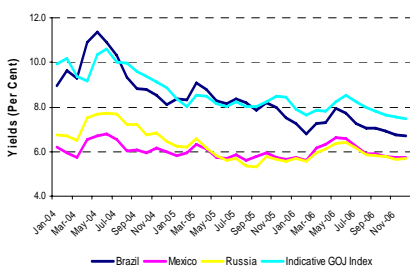


Figure 3.5
Selected Sovereign Bond Yields



In particular, the US Federal Reserve maintained its policy interest rate at 5.25 per cent from July until the end of 2006, only after four increases of 0.25 percentage points earlier in the year. The policy stance at end June was consistent with a moderation in inflation expectations for the US economy which occurred during the latter half of 2006.

Asset prices continued to rise in selected developed economies despite generally more restrictive monetary policy. Equity markets in these economies recorded commendable gains, with the US market increasing in value by 13.6 per cent (see **Figure 3.3**).²⁰ Gains reflected favourable growth prospects, improved corporate profitability, continued relatively low costs of capital and sustained investor confidence.

The gain on the German equity market was noticeably strong, with an increase of 22.0 per cent as measured by the DAX stock index. Despite the increase in asset prices, market commentators generally did not consider equity prices to be overvalued as measured by the favourable directions of relevant financial measures such as earnings relative to prices, profit growth rates, leverage ratios and cost of capital.

Continued increases in asset prices partly reflected robust global growth, historically low levels of volatility intertwined with greater willingness to take risk and a moderation in inflation expectations.²¹

²⁰ Return for US market is based on the S&P 500 index.

²¹ Deceleration in the rate of increase of oil prices, relative to 2005 and monetary policy tightening served to bolster investors' belief that inflation outturns over the medium term would not be unduly disruptive.

The main concern during 2006 was a possible slowdown in the U.S. economy due to the effects of increases in interest rates enacted by the Federal Reserve, the consequent decline in house prices and adverse implications for mortgage backed securities, which created volatility in residential housing markets (see **Box 3.1**). As demand for emerging market instruments increased, yields on emerging market sovereign bonds declined, as measured by the EMBI+ index, which led to narrowing of the spread on such bonds relative to US bonds, when compared to 2005 (see **Figure 3.4**).

Relatively low volatility in the yields on GOJ global bonds would have reduced the estimated risk to domestic institutions' of holding such bonds (See Section 6, "Risk Assessment of the Banking Sector" for further details.)

Despite the overall decline in yields on emerging market debt during the year, May and June were marked by increased volatility and decline in prices of emerging market assets (see **Figures 3.4 and 3.5**).²² The drop in prices occurred in a context where emerging market asset prices had reached new highs and could therefore be considered a market correction. The genesis of the downturn emanated from investor fears that policy rates in the major developed economies were likely to rise due to the inflationary effects of rising oil and other commodity prices.

Volatility in asset prices was greatest in countries highly dependent on external markets, especially commodity markets and private portfolio inflows.²³ Asset price movements in less traditional asset markets would have reflected the actions of hedge funds, which tend to invest actively in such markets (see **Box 3.2**). It is possible that investment firms would have reduced their holdings, after price fluctuations increased risk measures that focus on the volatility during the year, thereby generating further declines in asset prices.

Despite a slight increase during 2006, yields on fixed income instruments in developed markets remained relatively low. In an attempt to obtain higher yields, investors increased holdings of relatively illiquid asset groups, such as complex derivatives. This resulted in a higher probability that a meaningful fall in investor sentiment could generate large declines in prices as investors attempt to unwind positions.²⁴

There was increased activity on international derivative markets during the year, with the continued innovation of new instruments, especially in terms of structured credit

²² Asset prices in developed markets were also negatively affected, but to a lesser extent than those of developing markets.

²³ See IMF, "Global Financial Stability Report, September 2006."

²⁴ Should price decreases originate from some sort of shock, whether changes to investor sentiment or macroeconomic fundamentals, investors would likely try to reduce their positions in the affected assets. Given the limited liquidity, further price decreases would occur, which would motivate a further reduction in positions by investors. Such a situation could quickly lead to large declines in the prices of illiquid assets.

BOX 3.1 Declining US Housing Market

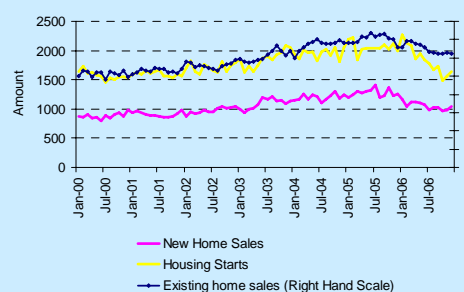
The U.S. housing market experienced a downturn in mid-2005 through to the end of December 2006 (see **Figure 1**). This development constrained U.S. economic growth and resulted in greater credit risk for the mortgage market during 2006. Slow-down in the housing market occurred against the backdrop of the tightening of monetary policy by the US Federal Reserve since 2004. The Federal Funds rate was increased on 17 occasions from **1.0 per cent** in June 2004 to **5.25 per cent** at end December 2006.

The subsequent rise in mortgage rates and associated household debt servicing was not offset by growth in household incomes, leading to a build-up in the inventory of new homes and a slow-down in residential construction. Other adverse effects of the downturn in the US housing market included a reduction in consumer wealth, increased recession concerns in financial markets and greater volatility in the US mortgage market. With the increase in credit risk in the U.S. mortgage market during 2006, the subprime section of the market displayed greater susceptibility, relative to other sections of the market.

Housing prices had experienced buoyant increases over the past few years, with some commentators describing the existence of a possible “housing bubble”. Average house prices appreciated by over **56.0 per cent** for the five-year period ended September 2006. The rapid increase in housing prices over the period 2001 to mid-2005 resulted in an

increase in mortgage debt as consumers refinanced in the context of a low interest rate environment. As a result, homeowners net worth increased, which facilitated higher consumer spending. Property prices in some areas of the US also experienced a decline. Growth in residential property prices slowed to **6.1 per cent** at end 2006, relative to **13.3 per cent** for 2005.²⁵

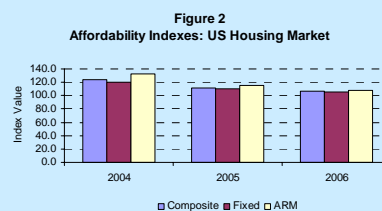
Figure 1:
US Housing Indicators



Source: US National Association of Realtors

Overall, housing has become less affordable due to higher financing costs, which may suggest that weakness in the housing market will continue for some time (see **Figure 2**).

Figure 2:
Existing Home Sales: US Housing Market



Source: US National Association of Realtors

²⁵ Source: Federal Home Loan Mortgage Corporation’s Conventional Mortgages Home Index

The volatility in the US sub-prime mortgage market towards the latter part of 2006 reflected deterioration in the credit quality of lenders. The deterioration partly reflected the more highly leveraged loans, greater proportions of high risk borrowers and lower collateral levels.²⁶ This occurred in the context of lower loan underwriting standards during the period of low interest rates and rapid increases in property prices. Subprime mortgages were more susceptible to deteriorations in credit quality for two main reasons. Firstly, borrowers in this category were more likely to be of marginal or poor credit quality and succumb more quickly to adverse changes in economic conditions. Secondly, approximately 85.0 per cent of subprime loans were Adjustable Rate Mortgages (ARMs), whose payments have increased with the rise in interest rates. Despite tightening of the underwriting standards on non-traditional mortgages by the US regulatory agencies, credit risk exposure could worsen in the short term. Specifically, more stringent underwriting standards have reduced the refinancing options for subprime borrowers at the same time their mortgages are being reset to a higher rate.

Production and employment in housing-related industries have also been adversely affected by the downturn in the housing market. Over the period October 2005 to October 2006 there was a loss of 64 000 jobs in these industries relative to an increase of 352 000 jobs during 2005. Despite this, general labour market conditions in the US remained favourable with an increase of 4.2

per cent in average wage levels during 2006. The overall impact of the downturn in the US housing market is currently limited to housing-related industries, with the fallout therefore expected to be less severe than in previous downturns. The negative impact of the US housing market was offset by growth in government expenditure and net exports. As such, the downturn in the US housing market is not expected to lead to a recession in the US economy.

²⁶ December 2006, "Global Financial Stability Report." pp. 5

Figure 3.6
Prices of Selected 5-Year Credit Default Swaps

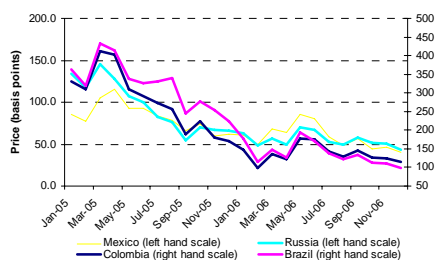
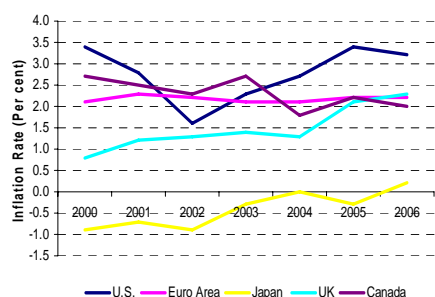


Figure 3.7
Inflation Rates for Selected Developed Economies



products. The growth in derivative instruments partly reflected the desire by investors to actively manage their risk exposures.

Empirical evidence suggests that some financial firms and hedge funds have sought to generate higher profits by earning premiums for selling “out-of-the money” options and credit protection, in the context of relatively low asset price volatility over the last few years.²⁷ While increased use of derivatives that transfer credit risk should decrease overall risk, there is a possibility that the more complex and illiquid instruments could actually increase risk should market conditions deteriorate significantly.²⁸

Investors perceived a further reduction in the possibility of default on emerging market sovereign bonds during 2006, as measured by CDS prices, following on the decline experienced during the last few years (see **Figure 3.6**).²⁹ Prices of CDSs on emerging market bonds spiked during May

²⁷ “Out of the money” options are those where there would be no payout by the option seller if the contract was exercised given the current market price of the underlying asset. See IMF, “Global Financial Stability Report, April 2007.”

²⁸ Increased risk arises from the fact that creators of these products may not have charged adequate premiums to compensate for possible losses on these instruments and that payoffs may be different than expected under stressful market conditions.

²⁹ Credit Default Swaps (CDS) on bonds, provide investors with insurance against default. As in other forms of insurance, a higher premium is charged the greater the risk that is being insured. The price of a CDS on sovereign bonds can therefore be used to infer investors’ perception of the probability that a country will default on its external debt. See Box 1 of BOJ, “Financial Stability Report, 2005” for an explanation of credit default swaps.

and June, reflecting investors' heightened concern about declines in credit quality due to the increased volatility in the price of these bonds.

3.3 Foreign Exchange Markets

The US dollar depreciated relative to the Great Britain Pound and the euro during 2006, partly due to greater interest rate increases in the UK and Euro area (see **Figure 3.8**). However, the US dollar appreciated against the Canadian dollar and Japanese yen.

For the UK and Euro area, continued inflation concerns and monetary policy action gave further impetus to the strengthening of the related currencies against the US dollar. This was in the context of a less aggressive monetary policy stance in the US during the latter half of the year

The Yuan appreciated against the US dollar during the year. This emanated from continued large trade surpluses recorded by China as well as sustained foreign investment flows.

Depreciation in the US dollar, relative to most major currencies, occurred in the context of a slightly higher current account deficit, relative to 2005 (see **Figure 3.9**). However, the interest rate differential on US fixed income securities relative to those in other developed economies, as well as investors' perception of US treasuries as a "safe-haven" during period of market volatility, was sufficient to attract sufficient funds to finance the US current account deficit.

Figure 3.8
Selected Major Economy Exchange Rates

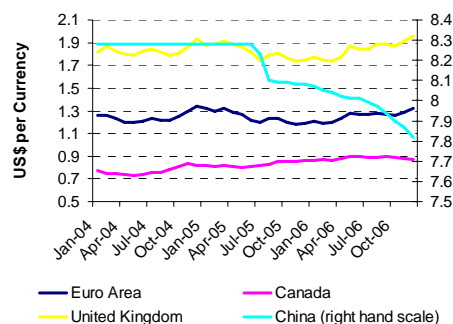
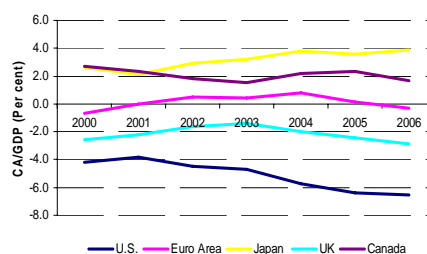


Figure 3.9
Current Account to GDP Ratios



Box 3.2 Regulation of Alternative Investments

Hedge funds have become an increasingly important asset group over the last few years. This box examines some of the implications of the rapid growth in the value of assets managed by hedge funds for financial system stability.

Hedge funds may be described as financial investment vehicles that aim to generate excess return, called “alpha”, using assorted strategies and are subject to less stringent regulation compared to most other financial investment vehicles. The clientele for hedge funds normally consists of high net worth individuals or institutional investors. Trading strategies usually incorporate the use of derivative products and significant use of leverage in an attempt to magnify returns.

The importance of hedge funds has grown in the context of the exponential increase in assets under management (AUM) and the growing share of trading volume attributable to hedge funds.³⁰ These funds have become more visible due to investors willingness to invest in them, in the context of historically low interest rates in developed economies since 2000.

Hedge funds have a beneficial effect on financial markets by providing higher levels of liquidity, due to their greater level of trading. The willingness of these funds to take positions against market consensus also improves liquidity.³¹

Hedge funds also help to eliminate market inefficiencies through seeking to profit from the mispricing of securities. Short sales by hedge funds reduce the net loss to the financial system that occurs when there is an overall decline in asset prices and can provide signals to markets that securities may be overvalued. Also, the use of complex strategies has led to greater demand for new financial products and therefore contributed to the pace of financial innovation.

The activities of hedge funds can however, contribute to the risk of financial instability. In instances where most hedge funds employ comparable strategies or take similar positions, “herding” behaviour may develop. This is especially disruptive during periods of increased volatility or steep declines in asset prices.³²

³⁰ One estimate is that capital under management has grown by 30 per cent annually since 1998, to account for 5 per cent of total capital under management in 2006. See Nyberg, Lars (2006) “Are Hedge Funds Dangerous?”

³¹For example, when market consensus is that a security should be purchased, hedge funds may take the opposite view and therefore be willing to sell the security, providing liquidity. This also assists in limiting price volatility and the effects of “herding” behaviour.

³² “Herding” by hedge funds may be relatively more disruptive, to the extent that during market crises they may take positions consistent with market sentiment and therefore remove the liquidity they provide from taking contrary positions.

To the extent that hedge funds may invest in illiquid assets or instruments with complex payoff structures, any sudden downturn in relevant markets could generate large losses.³³ Some measures indicate that hedge fund returns are increasingly positively correlated, which implies that there could be instances where numerous hedge funds experience difficulties at the same time.³⁴

Concerns also exist that hedge funds have invested in assets that may be “overpriced”, with potential returns not sufficient for the associated level of risk. Some traditional financial institutions face credit risk from hedge funds as they provide them with substantial financing and brokerage services.

In light of these concerns, there has been an increasing impetus to place hedge funds under more stringent regulatory regimes. This has resulted in increased scrutiny by regulators regarding the potential risk of hedge funds to financial systems, as well as extensive discussion in the media and the investment profession about the failure of some large hedge funds.³⁵ The main focus has been to ensure operational integrity of the funds, improve transparency of processes, certify accurate performance reporting and promote prudent

risk management.³⁶ However, serious difficulties exist in achieving these objectives. Creation of uniform standards for valuation of fund assets may be problematic as some assets are not regularly traded and are highly complex in structure, with various valuation models providing different results. Requirements for funds to clearly state investment strategy and publish position data, could allow competitors to copy strategies, to the detriment of the original fund. Also, the great complexity of some strategies used by hedge funds and the rapid speed at which investment positions change make it difficult for regulators to accurately assess risk. Specific regulatory jurisdictions run the risk that imposition of more stringent regulations will simply drive hedge funds to relocated to areas which impose minimal regulations.

Whatever the specific changes to hedge funds regulations that will be applied, there is a general consensus that rules should promote market discipline and avoid the creation of moral hazard.

³³ The considerable use of leverage would magnify losses. If, due to losses and investor uncertainty, hedge funds have to meet margin calls or otherwise have their financing reduced, they may be forced to liquidate their holdings, putting further downward pressure on prices and creating a deleterious cycle.

³⁴ There is the suggestion that current “alpha” earned by some hedge funds actually reflect liquidity risk premiums. See “Hedge Fund Flurries” speech by White, W., at Bellagio meeting, London on 19 January 2007.

³⁵ Two of the most notable hedge fund failures are Long Term Capital in 1998 and Amaranth Advisors in 2006.

³⁶ The valuation of instruments that are not regularly traded is of particular concern, as funds may estimate the value of such assets using methods that overstate realizable value.

The general depreciation in the value of the US dollar during the year, in conjunction with projected higher savings levels, should assist in correcting the US current account deficit in the future.³⁷ To the extent that such correction materializes, stability of the global financial system will be improved as a result of the lower probability of a sudden rapid depreciation of the US dollar.

Given that the US dollar is the predominant foreign currency utilized in domestic financial markets, volatility in other currencies, relative to the US dollar would have contributed to greater risk for assets denominated in Great Britain Pound and the Euro, among others.

3.4 Regional Financial Markets

Regional stock markets recorded declines during 2006, despite positive overall economic performance. Markets for domestic-currency denominated fixed income instruments were adversely affected by increases in interest rates in the major Caribbean economies.

The Trinidad and Tobago Stock Exchange (TTSE) composite index recorded a decline of approximately 9.6 per cent as at end-2006. This performance occurred in spite of strong economic growth of 12.6 per cent, largely attributable to expansion in the energy sector. A factor which contributed to the decline in overall market value of the Trinidadian market was a stipulation by the regulatory authorities that specified financial

institutions limit their equity holdings; this resulted in limited market participation and sale of holdings by these institutions. (See **Figure 3.10**).

The value of fixed income instruments in the Trinidadian market was affected by interest rate increases enacted by the Central Bank of Trinidad and Tobago. These interest rate increases were prompted by domestic inflationary pressures and high levels of liquidity.

The Barbadian equities market, as measured by the Barbados Stock Exchange (BSE) local index, recorded a decline in value of approximately 7.0 per cent as at end-Dec 2006. This outcome occurred despite economic growth of 3.5 per cent, partly driven by construction activities related to world cup cricket in 2007.

The value of fixed income securities were affected by higher yields on the 3 month Treasury bill and the consequent decline in liquidity level. Yields on global bonds issued by Barbados declined during the year, consistent with that of other emerging market countries (see **Figure 3.12**).

³⁷ IMF, "Global Financial Stability Report, 2007" anticipates higher US domestic savings due to improvements in fiscal accounts.

Figure 3.10
Distribution of 10-day Changes in TTSE Composite Index during 2006

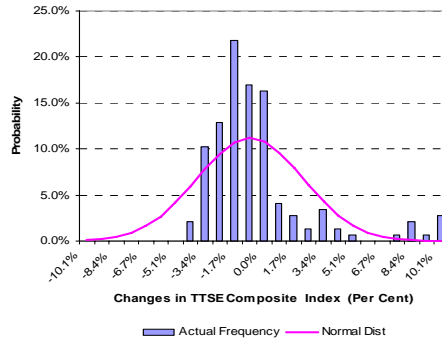


Figure 3.11
Distribution of 10-day Changes in BSE Composite Index during 2006

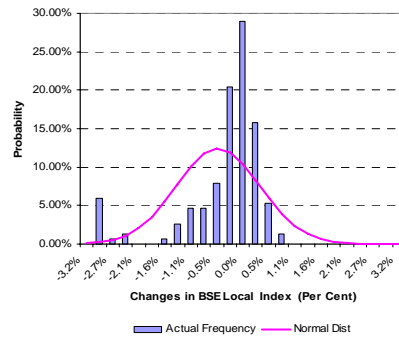
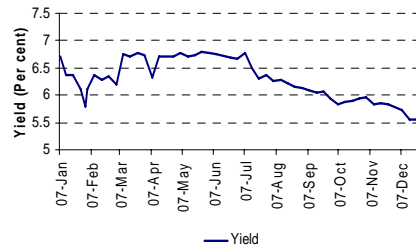
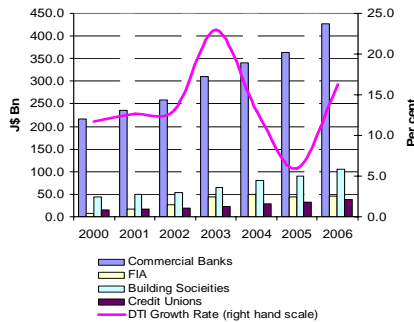


Figure 3.12
Yields on Barbados 7 ¼ per cent, December 2021 Global Bond



4. Financial System Developments

Figure 4.1
Comparative Asset Base of Deposit Taking Institutions



Financial sector experienced a deepening in the intermediation process during 2006

Figure 4.2
DTI Market Share (Total Assets)

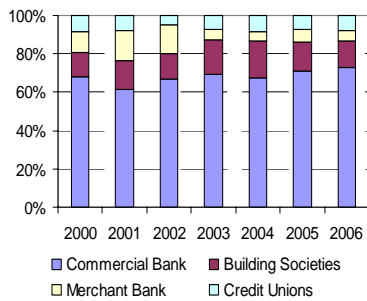
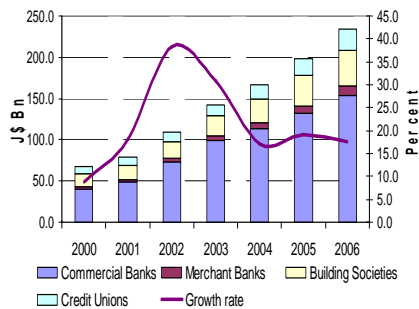


Figure 4.3
Gross Loans by Sector and System Loans Growth Rate



4.1 Overview

The Jamaican financial system was relatively stable during 2006. The intermediation process became more evident, given an increase in loans relative to securities in deposit-taking institutions (DTIs). In addition, there was an increase in the ratio of funds under management to GDP in non-deposit-taking institutions (NDTIs). Given continued declines in interest rates, net profits for DTIs grew at a slower rate, largely reflecting the operations of commercial banks and merchant banks. However, capitalization remained well above regulatory requirements throughout the year as there was strong growth in the asset base of the financial system. This growth in asset base was largely attributed to an expansion in loans extended by DTIs, as well as improvements in the life underwriting and managed funds operations of the NDTIs.

4.2 Deposit Taking Institutions

The asset base of DTIs increased by 16.3 per cent in 2006 relative to 6.0 per cent growth recorded in 2005. All DTIs recorded growth in market share with the exception of the merchant banking sub-sector, which had a 1.0 per cent decline in its market share (see **Figure 4.2**). The growth in total assets was largely driven by commercial banks which recorded an increase of 17.3 per cent in 2006 relative to 6.7 per cent in 2005.

Commercial banks continue to drive DTI asset growth

There was an increase of 3.2 per cent in the asset base of merchant banks, in contrast to the 11.8 per cent reduction recorded in 2005. This turnaround was largely attributed to a significant expansion in the institutions' loan portfolio.

Credit unions and building societies recorded asset increases of 18.4 per cent and 18.3 per cent, respectively.

4.2.1 Asset Positions

The faster growth in the asset base of DTIs in 2006 relative to 2005 was primarily due to the expansion in the DTI's loan portfolio. Loans also accounted for the highest proportion of total assets for the second consecutive year, indicating a further deepening of the intermediation process (see **Figure 4.3** and **Figure 4.7**). Commercial banks continued to dominate the loan portfolio of DTIs, accounting for 65.6 per cent share of the total stock of loans in 2006 relative to 66.6 per cent in 2005 (see **Figure 4.5**).

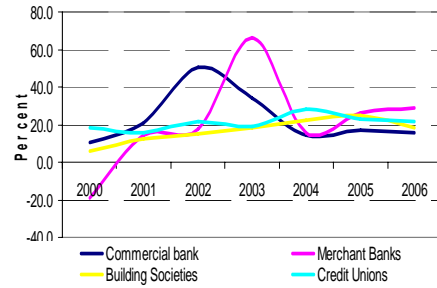
During 2006, the most notable loans growth rate occurred for the merchant banks. Loans extended by merchant banks grew by 28.6 per cent, the highest growth rate since 2000. The loan portfolio of credit unions, building societies and commercial banks continued to record strong growth, albeit at slower rates, increasing by 21.9 per cent, 18.7 per cent and 15.9 per cent relative to end-2005, respectively (see **Figure 4.4**).

Growth in consumer loans continue to outpace credit growth to both the public and corporate sectors

In 2006, household loans recorded the strongest growth followed by loans to the corporate sector. Loans to the household and corporate sectors increased by 31.8 per cent and 12.7 per cent in 2006, compared to increases of 23.8 per cent and 15.8 per cent, respectively, in 2005. There was a decline in loans to the public sector of 15.4 per cent, relative to an increase of 8.6 per cent in 2005 (see **Figure 4.6**).

Figure 4.4

Growth in Gross Loans by Sector



Significant credit expansion fuelled asset growth in 2006

Figure 4.5

Distribution of Gross Loans by Sector

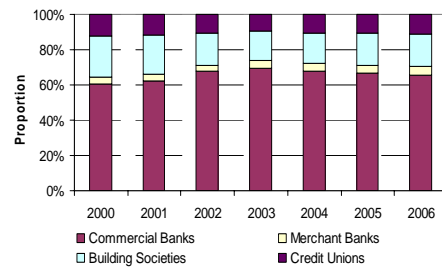


Figure 4.6

Growth in Gross Loans by Type

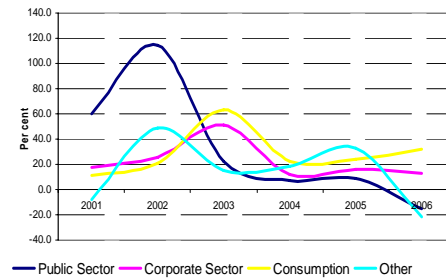


Figure 4.7

Investment and Gross Loans as Percentages of Total Assets

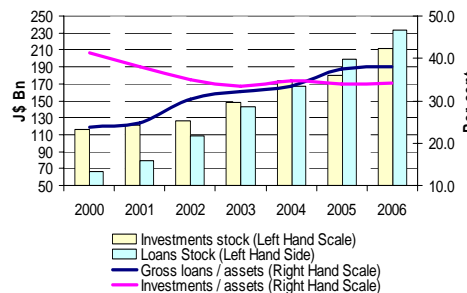


Figure 4.8
DTIs Liabilities and Growth Rate

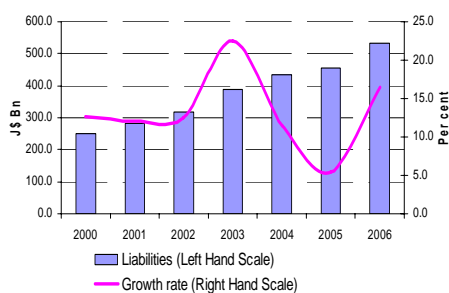
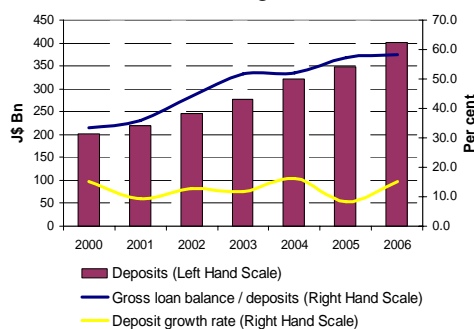
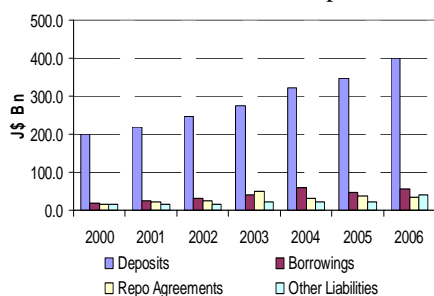


Figure 4.9
DTI Funding Sources



Favourable economic conditions continue to influence strong demand for loans

Figure 4.10
Gross Loans to Deposits



This decline was largely attributed to significant net repayments by Selected Public Entities and Other Public Sector Entities to one institution in the merchant banking sector.

The stock of security investments by the banking system recorded an increase of 17.8 per cent in 2006 relative to a growth of 3.2 per cent in 2005. The faster rate of growth in 2006 was largely reflected in commercial banks. However, DTIs continued to realign asset portfolios towards higher yielding loans. This was evidenced in a lower ratio of investments to total assets relative to loans to total assets. At end-2006, investments accounted for 34.3 per cent of total assets, while gross loans as a proportion of total assets was 37.9 per cent (see **Figure 4.7**).³⁸

4.2.2 Liability Positions

The stock of banking system liabilities increased to \$532.1 billion at end-2006 relative to \$456.7 at end-2005 (see **Figure 4.8**). The increase in 2006 was largely attributed to a faster rate of growth in deposits, which remained the principal source of funding for DTIs (see **Figure 4.9**).

At end-2006, deposits accounted for \$400.9 billion or 75.3 per cent of total liabilities relative to 76.2 per cent at end-2005. The marginal decline in the ratio of deposits to total liabilities in 2006 occurred in the context of an increase in borrowings as a source of financing.

³⁸ Investment stock is largely comprised of Government of Jamaica securities.

Deposits continue to be the main source of financing for DTIs

Deposits grew by 15.2 per cent in 2006 compared with an increase of 8.4 per cent in 2005. The faster rate of growth in 2006 was reflected in all the sectors, particularly merchant banks and credit unions.

There was also a significant increase in non-traditional sources of financing such as borrowings and other liabilities for DTI operations in 2006.³⁹ The stock of these sources of financing increased by 31.5 per cent in contrast to a decline of 4.0 per cent in 2005 (see **Figure 4.10**).

The stock of DTI deposits continued to be dominated by commercial banks. At end-2006, commercial bank deposits accounted for 70.6 per cent of system deposits relative to 70.8 per cent at end-2005. There was an increase in commercial bank domestic currency deposits of 18.0 per cent. At end-2006, domestic currency deposits accounted for 62.2 per cent of total commercial bank deposits relative to 60.5 per cent at end-2005. For 2006, foreign currency deposits grew by 10.0 per cent relative to 9.8 per cent in 2005.

4.2.3 Earnings and Profitability

Net profits for 2006 amounted to \$19.0 billion relative to \$18.4 billion recorded at end-2005. This translated into an increase

Figure 4.11
Profit/Surplus in DTIs

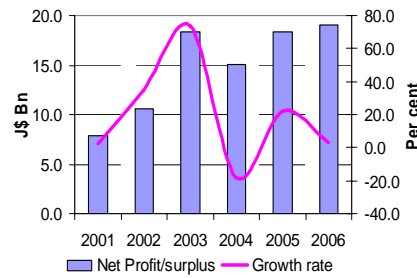


Figure 4.12
DTIs Net Profits/Surplus
(Six Year Trend and Profit Composition at end 2006)

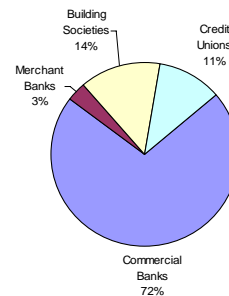
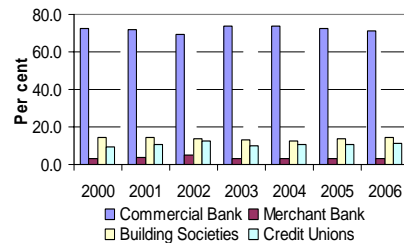
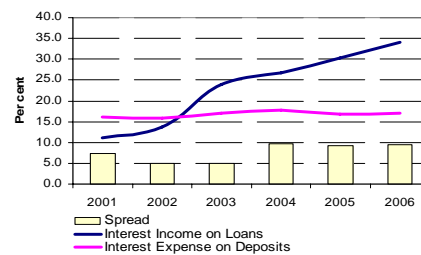
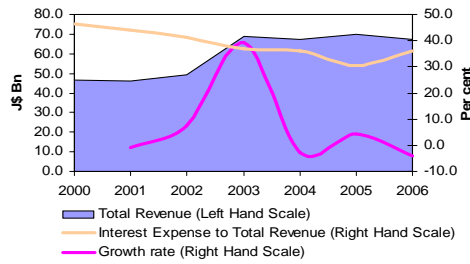


Figure 4.13
DTIs Interest Income/Expense Ratio



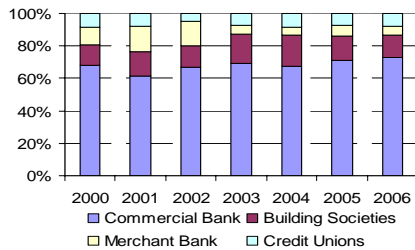
³⁹ Non-traditional sources of funding largely reflected in financial institutions' borrowings, which comprised mainly funds acquired from other financial institutions (domestic and foreign currency).

Figure 4.14
DTIs Revenue Growth and Interest Expense to Total Revenue



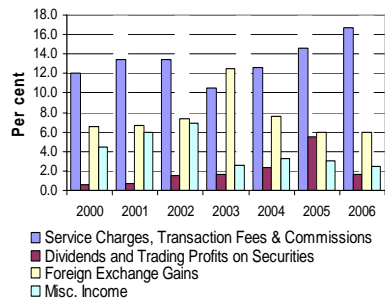
of 3.2 per cent in net profits for 2006, significantly slower than the 22.1 per cent growth recorded in 2005. This slowdown was in a context of the relatively lower interest rate environment (see **Figure 4.11**). The growth in DTIs net profits in 2006 was largely driven by interest income from loans and non-traditional sources (service charges, transaction fees and commissions).

Figure 4.15
Net Interest Income



The *ex post* loan-deposit interest rate spread increased by 0.3 percentage point in 2006, largely due to the maintenance of relatively high loan rates, coupled with the declining interest rate environment (see **Figure 4.13**). Notwithstanding declining domestic interest rates, interest income from investments grew by 5.4 per cent relative to a decline of 23.0 per cent in 2005. Interest income from investments represented 27.3 per cent of total revenue relative to 24.9 per cent at end-2005.

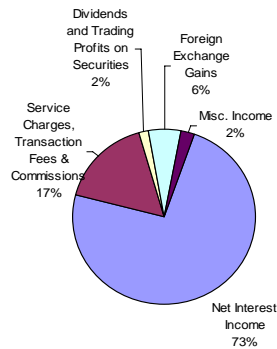
Figure 4.16
DTIs Gross Income
(Six Year Trend in Other Income and Gross Income Composition at end-2006)



DTI profits continue to be dominated by commercial banks and credit unions

Increase in DTIs revenue continues to be driven by commercial banks and building societies

Total revenues of the DTIs amounted to \$67.2 billion in 2006 relative to \$68.8 billion in 2005. This reduction in revenue was accompanied by a smaller decrease in interest paid on deposits. As a result, interest paid on deposits as a percentage of total revenue increased to 35.9 per cent from 30.6 per cent in 2005 (see **Figure 4.14**).



The share of system revenues continued to be dominated by commercial banks, accounting for 72.0 per cent of DTI revenues relative to 72.4 per cent at end-2005. Building societies, credit unions and merchant banks accounted for 14.8 per cent, 8.0 per cent and 5.3 per cent, respectively (see **Figure 4.15**).

The growth in *Other Income* of DTIs slowed significantly to 0.4 per cent relative to 27.4 per cent in 2005. The slowdown in the growth in *Other Income* in 2006 was largely influenced by the fall-off in the gains from securities trading, which recorded a decline of 67.9 per cent relative to the increase of 170.0 per cent in 2005. This decrease was reflected in all sectors, particularly in commercial banks and was primarily attributed to normalization in gains from the equities market. Service charges, transactions fees & commissions grew by 25.2 per cent and continued to dominate non-traditional sources of income, accounting for 62.4 per cent, relative to 50.0 per cent in 2005. Foreign exchange gains, on the other hand, remained relatively constant in a context of lower levels of volatility in the foreign exchange market (see **Figure 4.16**).

Despite the marginal increase in net profits, there was a decline in the key profitability measures for DTIs during 2006. This was evidenced in decreases in return on assets (ROA) and return on equity (ROE). These declines were driven primarily by a reduction in yields on earning assets to 3.8 per cent at end-2006 compared with 4.1 per cent at end-2005 (see **Figure 4.17**).

Credit unions continued to be the most profitable sector in 2006, as evidenced by an ROA of 3.84 per cent. Commercial banks had the second highest ROA of 3.51 per cent, followed by building societies with 2.68 per cent. Merchant banks continued to be the least

Figure 4.17
Yield on Earning Assets

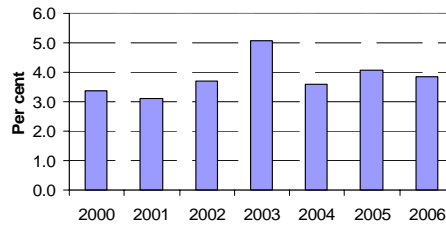
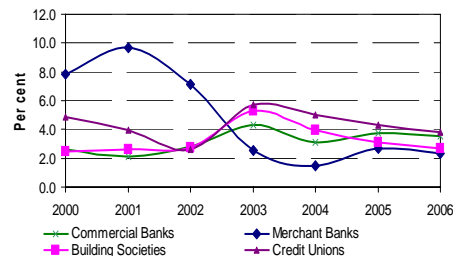


Figure 4.18
Return on Assets for DTIs



Decline in ROA largely reflected reduction in the yield on earning assets

Figure 4.19
Asset Utilization

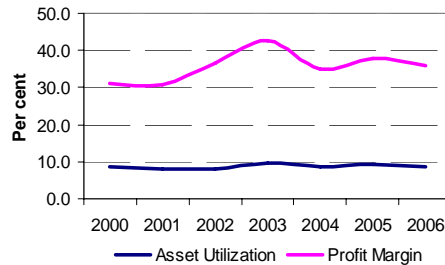


Figure 4.20
Net Interest Margin per Sector

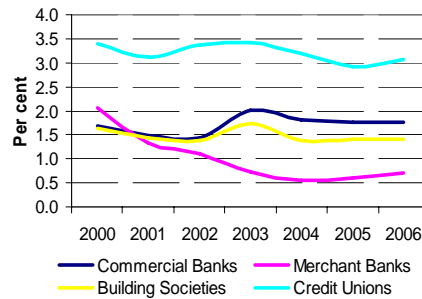


Figure 4.21
Trends in and Decomposition of ROE
for Commercial Banks

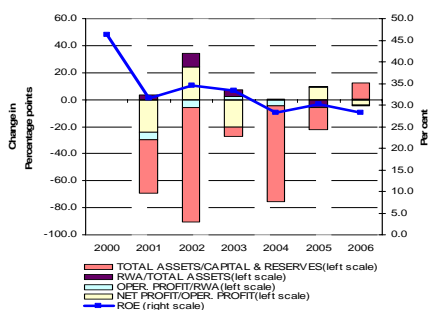


Figure 4.22
Trends in and Decomposition of ROE
for Merchant Banks

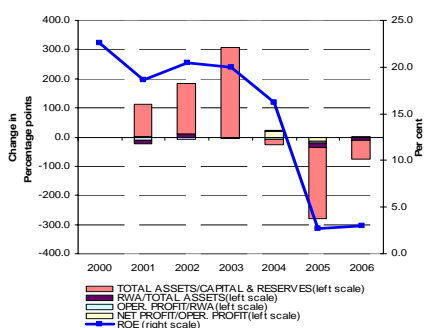


Figure 4.23
Trends in and Decomposition of
ROE for Building Societies

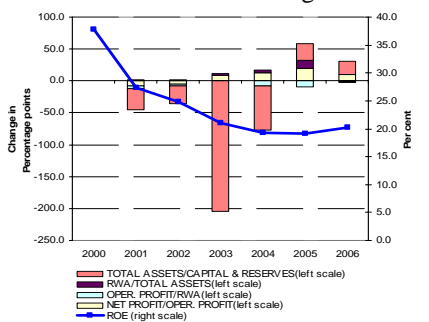
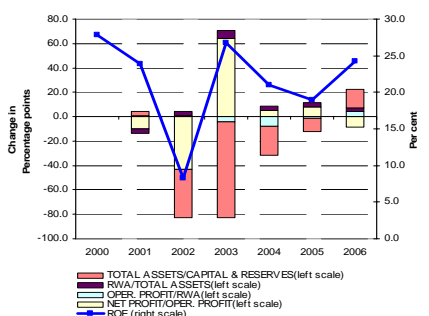


Figure 4.24
Trends in and Decomposition
of ROE for Credit Unions



profitable sector with an ROA of 2.32 per cent (see **Figure 4.18**). Commercial banks had the highest ROE of 28.14 per cent at end-2006. This was followed by building societies, credit unions and merchant banks.⁴⁰

For 2006, commercial banks' ROE fell marginally due to a small decline in profit margins, which was partially offset by an increase in leverage. In contrast, their ROE in 2005 was buoyed relative to the preceding year by increasing margins, in spite of declining use of leverage and lower levels of risk taking (see **Figure 4.21**).

The merchant banks' ROE remained flat relative to end-2005, having declined significantly in 2004. This trend decline occurred in the context of continued reductions in their leverage and risk-weighted assets over the last two years. The decline in risky assets was in an effort to reduce their exposure to market-related risks (see **Figure 4.22**).⁴¹

An increase in pre-tax profit margin was the main contributor to growth in the ROE for building societies during 2006. This was accompanied by an increase in leverage, implying a marginal weakening in financial strength (see **Figure 4.23**).

During 2006, in spite of a decline in profit margins, credit unions managed to improve on the level of ROE recorded at end-2005

⁴⁰ See **Box 4.2** for a discussion on "Decomposition of Return on Equity (ROE) for Deposit-Taking Financial Institutions in Jamaica."

⁴¹ See **Section 6**, "Risk Assessment of the Banking Sector" for more details.

by increasing their propensity for leverage and to a lesser extent, risk. An increase in efficiency also influenced the improvement in ROE for credit unions (see **Figure 4.24**).⁴²

DTIs net interest margin declined in 2006

Net interest margin (NIM) continued to be the main component of the asset utilization ratio. Commercial banks continued to dominate the NIM of DTIs, despite a marginal decline of 0.7 per cent in 2006. The NIM for merchant banks increased by 16.0 per cent in 2006, relative to the 8.4 per cent growth recorded in 2005. The increase in the NIM of credit unions was marginally above that of 2005, while there was a marginal decline in the NIM of building societies relative to 2005 (see **Figure 4.25 a**).

During 2006, the growth in the NIM of DTIs was accompanied by continued improvement in operating efficiency. This improvement was largely due to a decline in the ratio of non-interest expense to gross income for credit unions to 0.54 at end-2006 from 0.74 at end-2005 (see **Figure 4.25 b**).⁴³

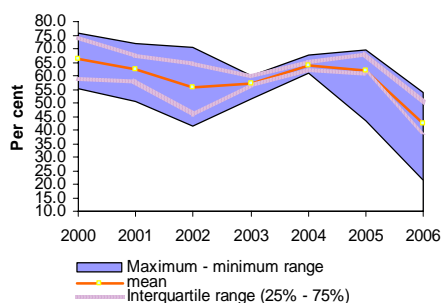
Continued moderation in operational costs resulted in improved efficiency in the banking sector

Non-interest expenses of DTIs continued to be dominated by staff costs, which increased by 9.7 per cent, relative to the 13.6 per cent growth recorded in 2005. The slowdown in the growth in staff costs was largely reflected in commercial banks, primarily in the context of a moderation in inflation expectations.

⁴² Increases in the Operating Profit/RWA ratio indicate improvement in efficiency on a risk-adjusted basis.

⁴³ Operating efficiency is measured by the ratio of non-interest expense to gross income.

Figure 4.25
a) Non-Interest Expense to Gross Income



b) Sectoral Non-Interest Expense to Gross Income

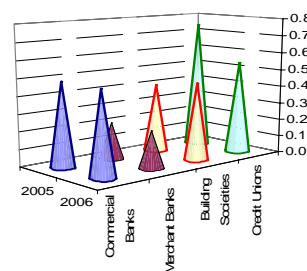


Figure 4.26
Capital Adequacy Ratio

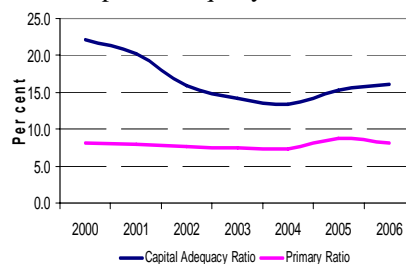


Figure 4.27
Growth in Risk Weighted Assets

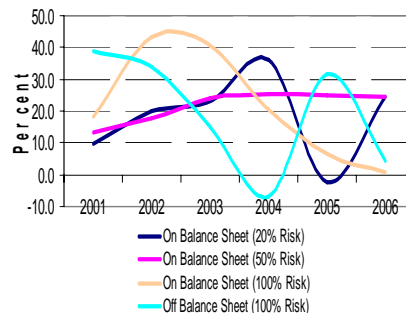
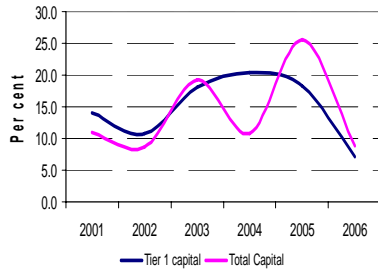


Figure 4.28
Tier 1 Capital and Total Capital Growth Rates



Capital adequacy ratios maintained in excess of regulatory benchmarks

Figure 4.29
Comparative NBFIs & DTIs Total Assets

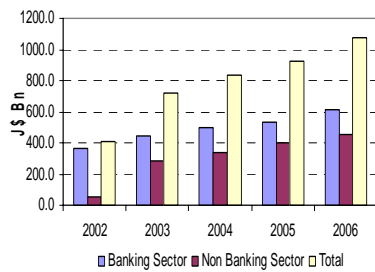
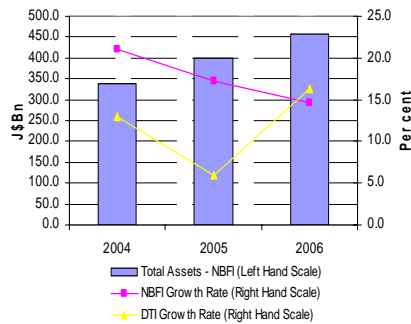


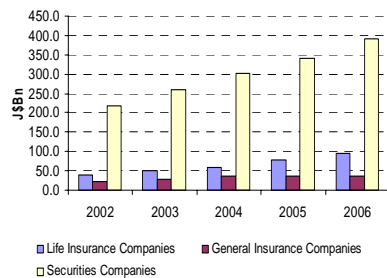
Figure 4.30

NBFIs Asset Size and Growth Rate



Increase in risk weighted assets due to more placement of funds with OFIs

Figure 4.31
NBFIs Asset base



4.2.4 Capital and Solvency

The ratio of capital to risk-weighted assets (RWA) for DTIs remained well above the 10.0 per cent benchmark at end-2006 (see **Figure 4.26**). The ratio was 16.0 per cent at end-2006 relative to 13.4 per cent at end-2005.

The increase in the capital to RWA for DTIs during 2006 reflected a faster rate of increase in capitalization relative to RWA. DTI's capital accumulation remained robust, as evidenced in significant increases in the statutory reserve fund and ordinary shares. The growth in RWA largely reflected growth in assets assigned a 20.0 per cent risk weight and mainly comprised placements with other financial institutions (OFIs) (see **Figure 4.27**).

At end-2006, the ratio of capital to total assets was 8.1 per cent, relative to the 8.7 per cent recorded at end-2005. This decline was attributed to a slowdown in the growth in Tier I capital (see **Figure 4.28**).

4.3 Non Bank Financial Intermediaries (NBFIs)

The number of non-bank financial intermediaries remained at forty seven at end-2006 (see **Table 4.1**).⁴⁴

⁴⁴ Non-bank financial intermediaries include life and general insurance companies, securities companies and exclude pension funds.

NBFIs assets continued to increase in 2006, albeit at a marginally slower rate relative to 2005 (see **Figure 4.30**). At end-2006, the stock of assets of NBFIs was \$522.8 billion, relative to \$456.3 billion at end-2005. Securities firms continued to dominate NBFIs assets, accounting for 75.1 per cent, relative to 74.9 per cent at end-2005.

The growth rate in the assets of NBFIs was outpaced by that of banking sector assets during 2006 (cf. **Figure 4.29**). This reflected the improved level of intermediation in the banking sector, as the loans portfolio continued to record strong growth.

During 2006, the expansion in NBFIs assets continued to be driven by securities firms and insurance companies (see **Figure 4.31**). However, the depth of intermediation in DTIs continued to be marginally higher than funds under management of the NBFIs as reflected in the higher ratio of savings to GDP in 2006 (see **Figure 4.32**).

Securities dealers and life insurance companies driving growth in NBFIs

4.4 Securities Firms

The increase in securities firms' funds under management (FUM) as a percentage of GDP reflected a deepening in the role of securities dealers. As a percentage of GDP, securities dealers' funds under management was 64.2 per cent, relative to 62.5 per cent recorded at end-2005 (see **Figure 4.34**).

Table 4.1
Number of NBFIs in Jamaica

	Securities Dealers	Life Insurance	General Insurance	Total NBFIs
2002	33	8	14	55
2003	33	7	13	53
2004	30	6	13	49
2005	30	6	11	47
2006	30	6	11	47

Figure 4.32
Funds Under Management and Deposits to GDP

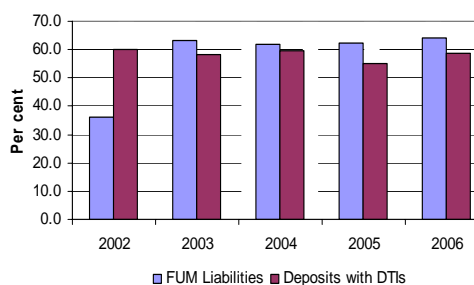
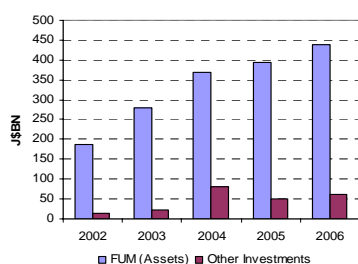


Figure 4.33
Securities firms' FUM (Assets) and Other Investments



There was a decline in assets of insurance companies as a proportion of total NBFIs' asset

Figure 4.34
Comparative FUM (Liabilities) and Commercial Bank Deposits

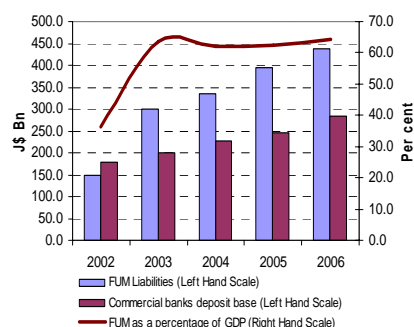
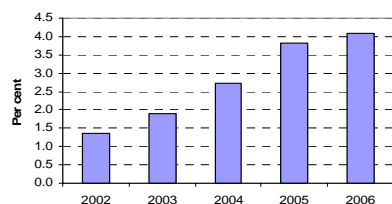
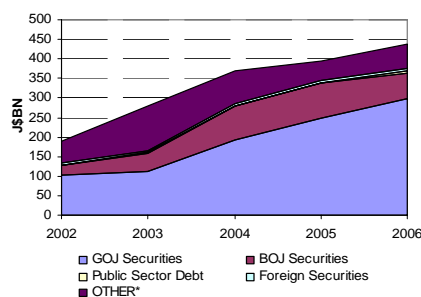


Figure 4.35
Return on Assets - Securities Firms



Source: Financial Services Commission

Figure 4.36
Composition of FUM (Assets) - Securities Firms



Source: Financial Services Commission

In the context of lower interest rates on GOJ instruments, securities firms have diversified their FUM portfolio to include more complex financial products that offer relatively higher returns (see **Figure 4.33 and Box 4**). Also, securities firms' funds under management continued to exceed commercial banks' deposits in 2006 (cf.).

Securities firms' profits continued to increase in 2006, albeit at a slower rate than in 2005 (see **Figure 4.35**). The slowdown was due to these companies remaining heavily invested in GOJ and BOJ securities. This was partly offset by increased investments in other securities which offered relatively higher rates of return (see **Figure 4.36**).⁴⁵ The ROA increased to 4.1 per cent from 3.8 per cent in 2005.

4.5 Insurance Companies

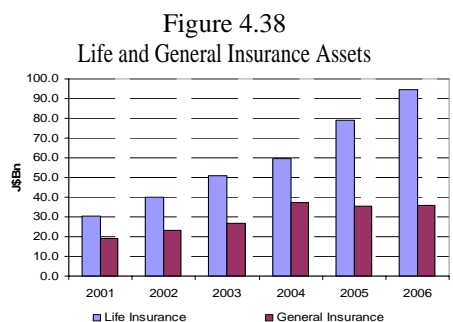
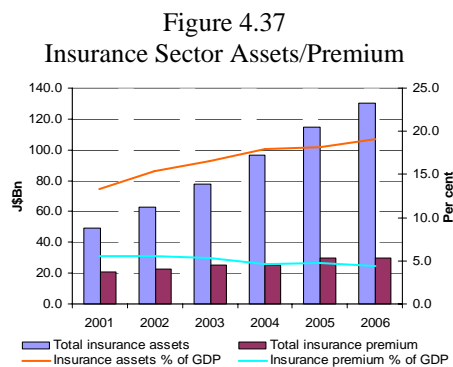
The life insurance sector continued to record strong growth in assets in 2006. At end-2006, total assets amounted to \$130.2 billion relative to \$114.4 billion at end-2005. This represented an increase of 13.8 per cent, slower than the 18.2 per cent growth recorded in 2005. Notwithstanding this slowdown, assets as a proportion of GDP increased by a percentage point to 19.1 per cent at end-2006 (see **Figure 4.37**). The number of general and life insurance companies remained the same as at end-2005.

⁴⁵ These other securities largely comprises placements in foreign currency instruments and equities.

Life insurance companies continued to dominate the insurance sector’s asset base, accounting for 72.6 per cent of total assets (see **Figure 4.38**). However, there was a marginal increase in the insurance sector’s share of total NBFIs assets. This ratio was 28.8 per cent at end-2006, higher than the 28.5 per cent recorded at end-2005. At end-2006, total insurance premiums amounted to \$35.2 billion relative to \$30.5 billion at end-2005. This reflected an increase of 15.4 per cent, albeit slower than the 21.6 per cent growth recorded in 2005.

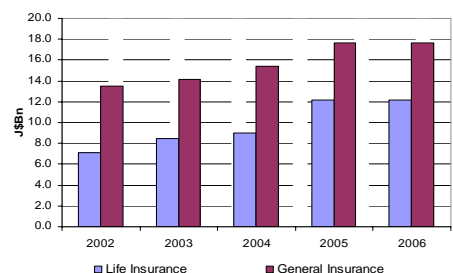
General insurance companies continued to dominate gross premiums, albeit at a lower level than last year (see **Figure 4.39**). Gross premiums of general insurance companies accounted for 52.8 per cent at end-2006, relative to 58.0 per cent at end-2005. Within the general insurance sector, business activity was dominated by property and motor vehicle classes of insurance.

The insurance sector remained profitable in 2006. This was evidenced by an increase in the ROA to 7.7 per cent at end-2006 from 7.5 per cent in 2005 for life insurance companies. The ROA for general insurance companies remained flat at 5.9 per cent at end-2006 relative to 2005. The insurance sector’s ability to generate profits was contained due to continued declines in domestic interest rates, as the sector remained heavily invested in GOJ securities (see **Figure 4.40**).



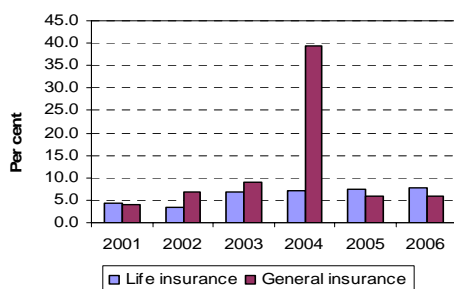
Source: Financial Services Commission

Figure 4.39
Life and General Insurance Premiums



Source: Financial Services Commission

Figure 4.40
Return on Assets – Life and General Insurance Companies



Source: Financial Services Commission

BOX 4.1 Securities Firms' Funds Under Management: Implications for Financial Stability

The rapid rate of growth in assets under management of institutional investors, particularly securities firms, within Jamaica's financial system reflected the continued improvements in international capital market integration. In recent years securities dealers have increasingly diversified their portfolio to include foreign securities from the global market. As noted in this report, securities dealers' 'FUM' was 64.2 per cent of GDP, relative to 62.5 per cent recorded at end 2005. In addition, securities firms' funds under management continued to exceed commercial banks' deposits in 2006. The advantages of increased global access to financial products for the system are a wider spectrum of risk-versus-return opportunities for investors. In this regard, greater diversification possibilities for financial institutions enhanced their ability to hedge risk exposures.

However, these developments have come with new types of systemic risks. The increased access to globally-traded financial products has exposed the financial system to the detrimental consequences of abrupt reversals in capital flows as well as greater potential for extreme volatility in external financial markets. Increased access by investors to financial products in external markets is a global phenomenon that has resulted in stronger linkages in world markets. The consequence of this greater correlation in market prices has increased the likelihood of severe shocks experienced in external jurisdictions having dramatic

turbulence 'spillover' implications for the domestic financial system.

Increased access to international financial products has also resulted in heightened exposure of domestic institutions and individual investors to derivative markets. Although derivatives offer a distinct advantage when used to hedge risk exposures, they are often used for speculative purposes due to the potential for higher payoffs when compared to more traditional products. When used for speculation the downside risk can be very detrimental to investors if their risks are not properly managed.

Anecdotal evidence suggests growing exposures of domestic financial institutions and investors to 'structured notes' that enable investors to take on higher levels of risk in exchange for the potential for above-market returns. For example, structured notes can offer higher initial coupons than current market rates, appearing very attractive on the surface. However, the initial higher return actually represents compensation for the upfront risk premium embedded in the note (that is, its payoff is linked to another underlying asset price such as the United States (US) dollar or US interest rate).

Common examples of structured notes held by investors in Jamaica are callable bonds linked to US government-guaranteed triple A-rated securities issued by Federal Home Loan Banks (FHLB), Fannie Mae and Freddie Mac to hedge their exposures to prepayment risk on US mortgage bonds. In effect, by issuing callable bonds the

institutions have transferred their interest rate risk to the bond holders in exchange for paying an option premium. However, the issuer of the callable bond retains the option to redeem the bond prior to the date of maturity. If market interest rates drop below the bond yield, the issuer might exercise the option and issue a new bond for a lower price. Consequently, the original holder of the redeemed structured note will be stripped from the gain in principal from the higher market price of the note. Hence, domestic financial institutions and individual investors must be made fully aware of the risks associated with instruments that may offer above-market yields initially but adverse returns under specific market conditions. Investors must ensure that they are adequately informed of the increased levels of financial risks that are being transferred to them by financial institutions. Additionally, the sophistication of institutions' risk management systems with regard to structured notes may be tested as the risks underlying these instruments may be difficult to quantify.

BOX 4.2 Decomposition of Return on Equity (ROE) for Deposit-Taking Financial Institutions in Jamaica

The return on equity (ROE) is one of the main indicators used to measure profitability of financial institutions. An increase in ROE is generally viewed as a favourable outcome for an institution and its stakeholders. However, what is not normally clear is whether or not this increase is due to a *real* improvement in financial strength, as opposed to an increase in the institution’s risk or higher leverage.

A decomposition of the ROE gives a clearer view of the factors that influence an increase or decrease in the ROE and its implications for the strength and soundness of the institution. The ROE may be segmented according to indicators computed from balance sheet and income statement data as follows:

$$ROE = \frac{\text{Pre-Tax Profit}}{\text{Operating Profit}} \times \frac{\text{Operating Profit}}{\text{Risk-Weighted Assets}} \times \frac{\text{Risk-Weighted Assets}}{\text{Total Assets}} \times \frac{\text{Total Assets}}{\text{Capital}}$$

An increase in an institution’s pre-tax profit margin and risk-adjusted income translates into a positive impact on its soundness and stability. On the other hand, increases in an institution’s appetite for risk and leverage indicate a decline in financial strength due to an implied increase in inefficiency and indebtedness, respectively. In this context, this box examines the trends in the ROE of deposit-taking financial institutions with a view to highlighting factors that have influenced these trends and the associated implications for the stability and soundness of these institutions. Since each component of the ROE relates to the soundness and strength

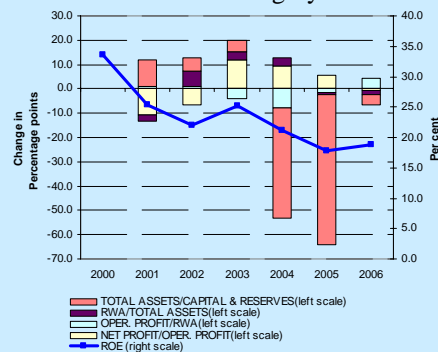
of an institution, there are associated implications for financial stability. These are summarized in **Table 1**.

Table 1: ROE Breakout Components

Indicator	Financial Stability Implications	Effect of an increase on financial strength
Pre-Tax profit/Operating profit (Pre-tax profit margin)	Measures the margin between income and costs	Positive
Operating Profit/RWA (Risk-Adjusted Income)	Measures efficiency on a risk-adjusted basis	Positive
RWA/Total Assets (Risk-Taking)	Measures propensity for risk	Negative
Total Assets/Capital (Leverage)	Measures leverage (gearing)	Negative

The ROE for the banking system exhibited a trend decline over the period 2001-2006. This was largely due to a fall in their pre-tax profit margin as well as sporadic declines in margins. In the past three years reductions in the use of leverage, which has augured well for financial stability, has contributed to the trend decline in the banking systems ROE (see **Figure 1**).

Figure 1: Trends in and Decomposition of ROE for the Banking System



5. Banking Sector Exposures

5.1 Overview

During 2006, there was further improvement in the banking sector's resilience to shocks affecting corporate and household debt due to continued strengthening in the credit quality of these sectors. The banking sector's resilience to high exposures in the corporate and household sectors was underpinned by the continued stability in the macroeconomic environment, as well as the high levels of banking system capitalization. The continued stability in the macroeconomic environment during 2006, particularly the continued reductions in domestic interest rates, has helped to limit the banking sector's exposure to public sector debt.

5.2 Household Debt and Banking System Exposure

Household debt held by the banking sector increased by 29.8 per cent during 2006 relative to 24.4 per cent during the previous year. In this context, household debt held as a share of banking system assets increased to 17.3 per cent of assets at end-2006, relative to 15.5 per cent at end-2005 (see **Figure 5.1**).⁴⁶

Additionally, household debt as a share of total loans was 47.9 per cent at end-2006 compared to 43.3 per cent at end-2005.

Figure 5.1
Household Debt as a Share of Banking Sector Loans & Assets

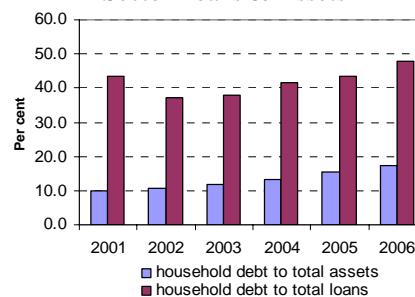


Figure 5.2
Growth in Household Debt & Banking System Assets

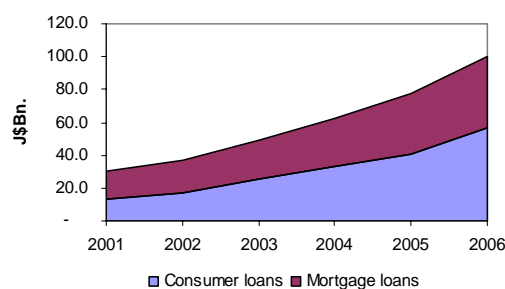
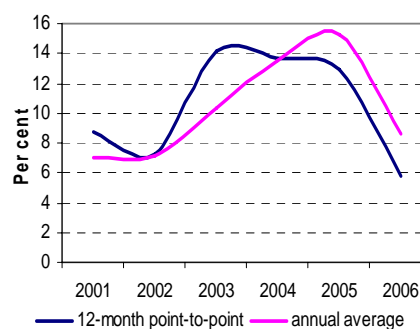


Figure 5.3
Domestic Inflation Rates

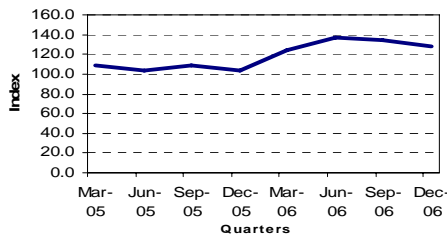


Source: Statistical Institute of Jamaica

⁴⁶ Household debt incurred with the banking sector is proxied by the sum of residential mortgage loans and consumer loans (which includes credit card receivables).

Consumer loans drive strong growth in household debt

Figure 5.4
Index of Consumer Confidence



Source: Jamaica Conference Board

Figure 5.5
Growth in Foreign Currency and Domestic Currency Deposits

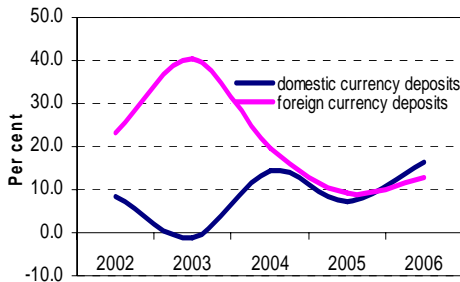
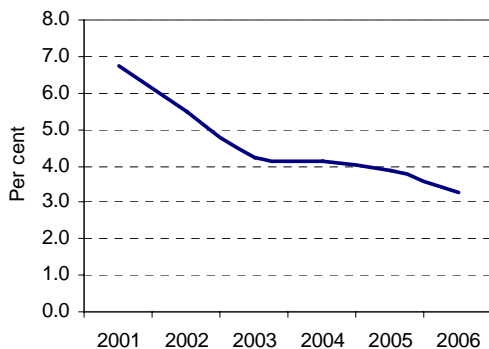


Figure 5.6
Household NPLs as a proportion of Household Loans



The main driver of the increase in household debt was the strong expansion in consumer loans. Against this background, at end-2006, consumer loans accounted for 56.6 per cent of loans extended to the household sector, relative to 53.2 per cent at the end of the previous year (see **Figure 5.2**). The expansion in consumer loans during 2006 was influenced by continued declines in domestic interest rates as well as more aggressive marketing strategies by many banking institutions. These entities refocused their operations towards core business activities to increase profitability in the context of the lower interest rate environment and declining interest margins during 2006.

Despite the strong growth in consumer lending during 2006, inflationary pressures in the economy remained moderate (see **Figure 5.3**).

Improvement in the macroeconomic fundamentals was also reflected in an increase in the Consumer Confidence Index during 2006. The index increased by 23.4 per cent to close at 128.0 basis points at end-2006 (see **Figure 5.4**).

Improvements in household sector loan quality was underpinned by continued declines in domestic interest rates

Against this background, householders showed greater willingness to hold Jamaica Dollar assets. This was evidenced in a faster rate of growth in domestic currency savings deposits relative to foreign currency deposits during 2006, a reversal of the trend over the past four years (see **Figure 5.5**).⁴⁷

Despite the improvements in the macroeconomic environment, there was a slowdown in the growth in mortgage loans from the banking sector during the year. Mortgage loans grew by 20.3 per cent during 2006 relative to 23.4 per cent during the previous year. This occurred in the context of a sharp decline in growth in the construction sector due to a cement shortage during the latter half of 2005 and early 2006. Furthermore, growth in mortgage loans was supplanted by the 100.0 per cent increase in the loan limit for National Housing Trust (NHT) beneficiaries in April 2006.

There was continued improvement in household sector loan quality during 2006. The ratio of household non-performing loans (NPLs) to household loans declined to 3.3 per cent at end-2006 from 3.9 per cent at end-2005 (see **Figure 5.6**). This improvement occurred in the context of continued declines in domestic interest rates and stronger growth in GDP during the year.

5.2.1 Household Sector Performance

The share of overall household debt as a proportion of disposable income increased

Figure 5.7
Household Debt and Consumer Loans as a Share of Income

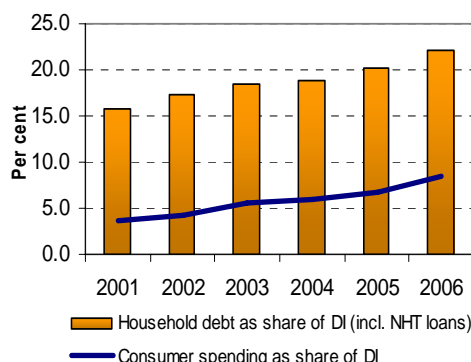


Figure 5.8
Corporate Sector Debt as a Share of Banking Sector Assets

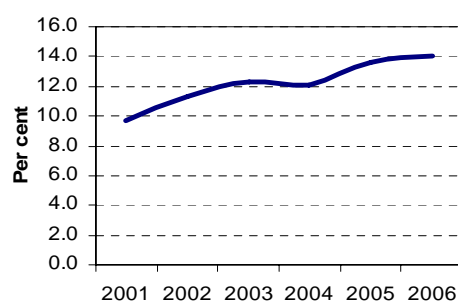
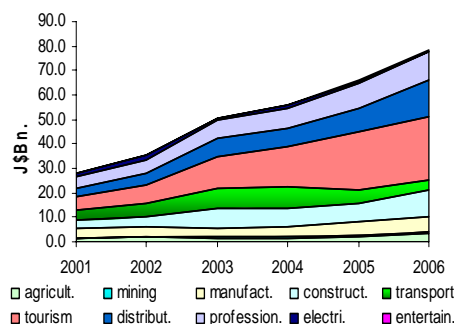


Figure 5.9
Banking Sector Exposure to Corporate Loans



⁴⁷ Banking system savings deposits were used as a proxy for householders' confidence in holding Jamaica Dollar assets.

Figure 5.10
Banking Sector Exposure to Corporate Sector as a Share of Assets

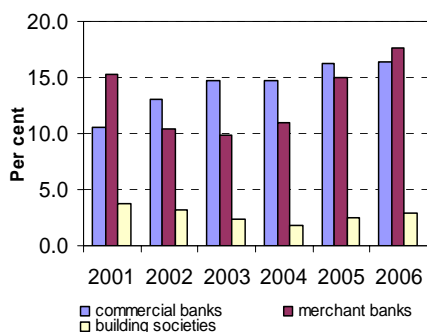


Figure 5.11
Loan Quality – Corporate Loans
Banking Sector

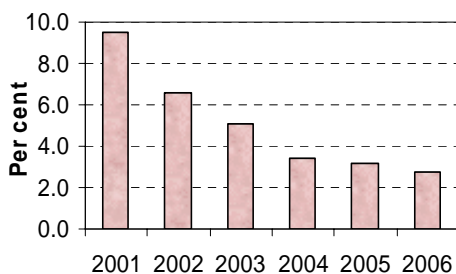
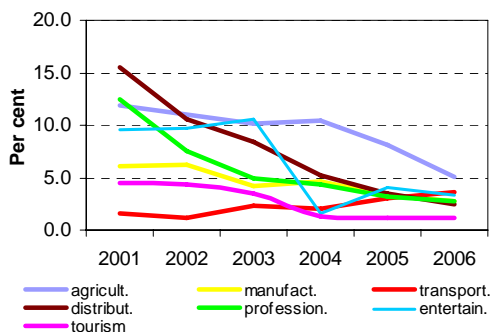


Figure 5.12
Ratio of Corporate Sector NPLs to
Corporate Sector Loans – Banking Sector



to 22.1 per cent at end-2006 relative to 20.2 per cent at end-2005 (see **Figure 5.7**).⁴⁸ This was largely driven by the strong increase in consumer loans as well the doubling of the loan amount accessible to NHT beneficiaries during 2006. Consumer loans as share of disposable income increased to 8.4 per cent at end-2006 from 6.8 per cent at end-2005 (see **Figure 5.9**).

Despite the deterioration in householders' debt service ratio, real disposable income improved during 2006, increasing by 5.9 per cent relative to a decline of 2.7 per cent during the previous year.⁴⁹ Growth in real disposable income was largely influenced by the marked improvement in the inflation outturn for 2006. Householders' disposable income was also impacted by socio-political developments during the year. Wage negotiations at the end of the Memorandum of Understanding (MOU) agreement period in March 2006, resulted in salary increases for public sector workers during 2006. This development also influenced salary increases across the wider economy.

Further improvement in real disposable income in the near term will be contingent on continued macroeconomic stability, fiscal containment and the absence of shocks to inflation performance.

⁴⁸ Overall household debt is comprised of household debt held by the banking sector plus NHT loans to beneficiaries. The disposable income for 2006 is based on trend.

⁴⁹ The household debt service ratio is an estimate of the ratio of debt payments to disposable personal income.

5.3 Corporate Sector Debt and Banking System Exposure

During 2006, corporate sector debt held by the banking sector increased by 19.4 per cent, relative to growth of 18.9 per cent for 2005.⁵⁰ Corporate sector debt as a proportion of total assets increased to 14.0 per cent at end-2006, relative to 13.6 per cent at end-2005 (see **Figure 5.8**). At end-2006, loans accounted for the bulk of the banking sector's investment in the corporate sector.

Banking sector loans to the corporate sector during 2006 were mainly channeled in lending to the tourism, distribution, construction and the professional services sectors (see **Figure 5.9**). The continued strong expansion in lending to the tourism sector funded large start-up projects as well as expansions in productive capacity during the year.

Commercial banks and merchant banks increased their share of corporate sector debt holdings during 2006 (see **Figure 5.12**). The increase was facilitated by the strong growth in customer deposits. Commercial bank deposits grew by 14.9 per cent during 2006 relative to growth of 7.9 per cent for 2005. For merchant banks, deposits

Growth in Corporate debt holdings driven by increased demand for loans to fund investment projects

Figure 5.13
Growth by Sector

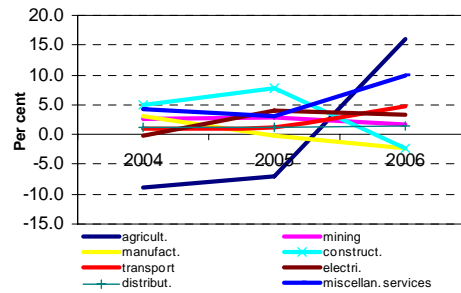


Figure 5.14
Daily Movements in Main JSE Index & Values Traded

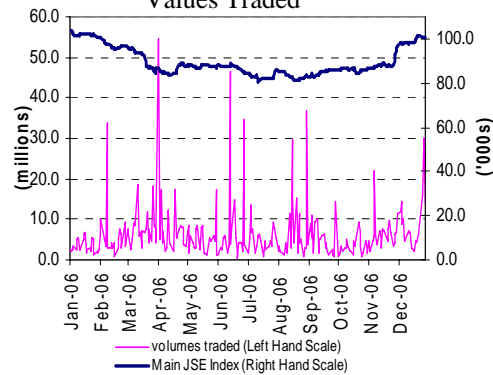
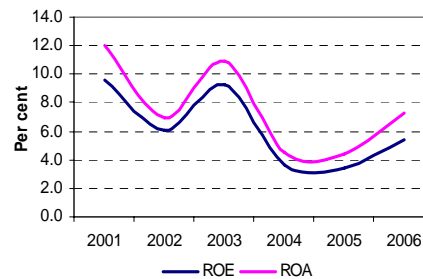


Figure 5.15
Profitability Indicators –Listed Companies in the Manufacturing Sector



⁵⁰ Corporate sector debt is defined as loans for commercial purposes, loans to other financial institutions and notes & debenture holdings of the banking sector.

Improvement in corporate sector loan quality was driven by the strong rebound in a number of sectors relative to 2005

Figure 5.16
Profitability Indicators – Listed Companies in the Financial Sector

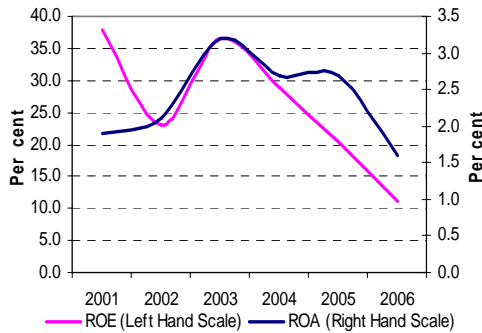


Figure 5.17
Non-Interest Expense to Gross Income – Listed Companies in the Financial Sector

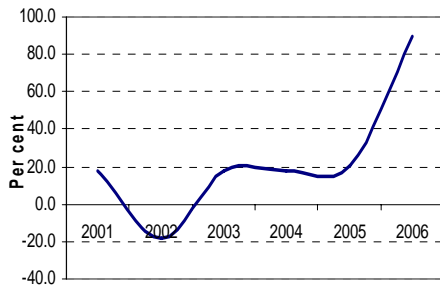
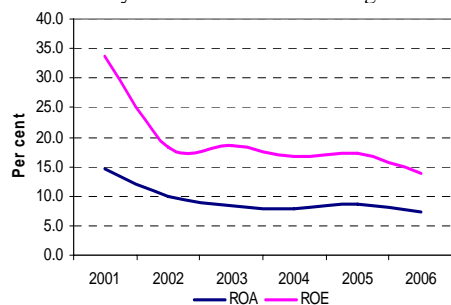


Figure 5.18
Profitability Indicators – Listed Conglomerates



grew by 15.5 per cent for 2006 relative to 6.2 per cent during the previous year.

For commercial banks, corporate sector debt as a share of assets increased to 16.4 per cent relative to 16.2 per cent at end-2005. With regard to merchant banks, this ratio increased to 17.6 per cent at end-2006 relative to 15.0 per cent at end-2005 (see **Figure 5.10**). Additionally, slower growth in mortgage loans facilitated further investment in the corporate sector during 2006.

5.3.1 Corporate Sector Debt Quality

The quality of corporate debt held by the banking sector improved during 2006. This was reflected in the continued decline in the ratio of non-performing corporate sector loans to total corporate sector loans to 2.7 per cent at end-2006 relative to 3.2 per cent at end-2005 (see **Figure 5.11**).

The improvement in loan quality was evident for the majority of sectors, with the exception of transport, storage and communication and electricity, water and gas (see **Figure 5.12**). The slight improvement in loan quality for the tourism sector was consistent with the strong growth performance in the sector during 2006. The sector grew by 9.9 per cent, representing the strongest sectoral growth performance for 2006.

There was marked improvement in loan quality for the agricultural sector in line with a strong rebound in the sector during 2006. The sector's contribution to real GDP grew by 15.9 per cent in 2006, relative to a 7.1 per cent decline in the previous year (see **Figure 5.13**). Despite the marked decline in the performance of the construction sector, this did not translate into deterioration in the sector's debt servicing capacity. At end-2006, the ratio of NPLs to total loans for the sector declined to 6.2 per cent relative to 7.8 per cent at end-2005. Similarly, despite deterioration in the growth performance in the manufacturing sector, there continued to be strong improvements in the ratio of NPLs to total loans for the sector.

5.3.2 Performance of Companies listed on the Jamaica Stock Exchange (JSE) during 2006

For 2006, there was weak profit performance for many companies listed on the JSE. This performance contributed to the Main JSE Index declining by 3.7 per cent during 2006 while market capitalization fell by 2.0 per cent during the year (see **Figure 5.14**). The mixed profitability performance of the listed companies was reflected in the trend in performance indicators during the year. For listed companies in the financial sector, which includes both DTIs and NDTIs, profitability was affected by declines in the growth in net interest margins.

Figure 5.19
Quarterly Industry Price-Earnings Ratios for the listed Companies - 2006

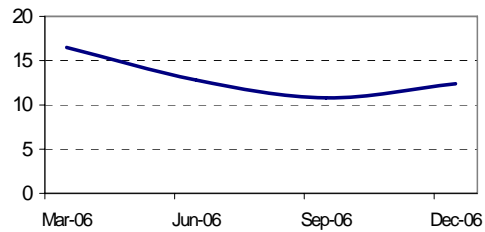


Figure 5.20
ROA – Listed Companies in the Communications, Insurance, Retail & Tourism Sectors

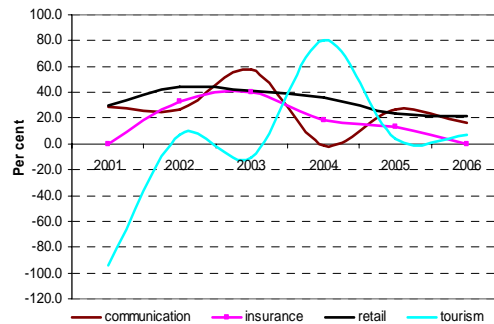
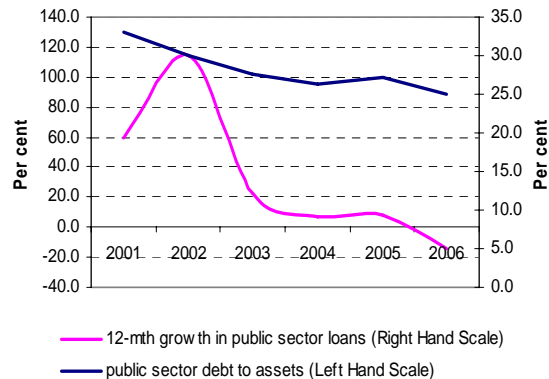
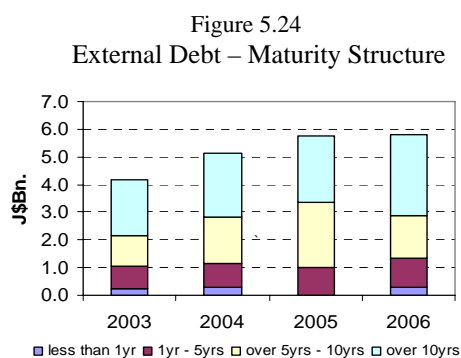
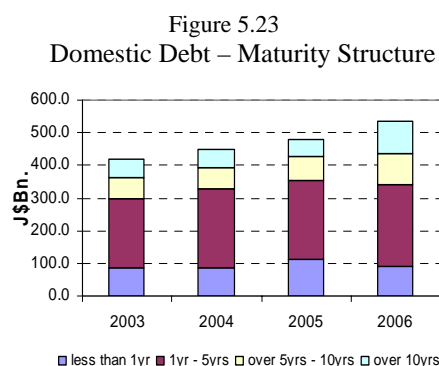
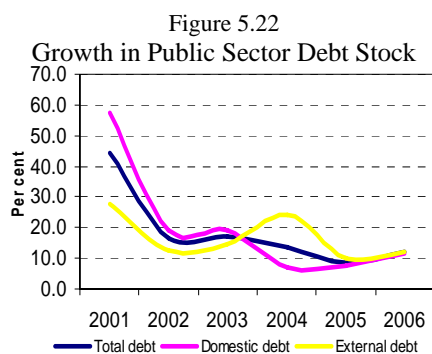


Figure 5.21
Public Sector Loans & Securities to Assets - Banking Sector





Despite efforts by some banking institutions to increase profitability during the year, the ROA for the financial sector declined to 1.6 per cent at end-2006 relative to 2.7 per cent at end-2005 (see **Figure 5.16**). This performance was also influenced by strong declines in the net interest margins for a number of the securities companies.

Profit performance for listed companies in the manufacturing and retail sectors influenced the stronger volatility in stock market activity which was evidenced during the first half of the year (see **Figure 5.14**). Despite the containment in revenue growth during the first half of the year, the return on assets (ROA) and return on equity (ROE) for the manufacturing sector increased to 5.5 per cent and 7.3, respectively, at end-2006. This compares to respective ratios of 3.5 and 4.4 per cent per cent at end-2005. However, there has been a trend decline in profitability since 2001 (see **Figure 5.15**).

There was also deterioration in the liquidity indicators for the sector during 2006. The sector exhibited a reduced ability to cover current liabilities with current assets during the year, consistent with the trend that has been observed since 2001. There has been an increase in the use of leverage financing in the sector, as evidenced by the decline in the capital to assets ratio during 2006. Nonetheless, the ratio remained high with an average of 64.0 per cent at end-2006.

The lower interest rate environment during 2006 influenced a sharp deterioration in the profitability indicators for listed companies in the financial sector.

There was an increase in the ratio of non-interest expenses as a proportion of gross income. This suggests deterioration in efficiency in the sector during 2006 and is consistent with the trend that has been observed since 2001 (see **Figure 5.17**). Nonetheless, liquidity levels have remained high, as current ratios have exceeded 100.0 per cent over the past six years.

For conglomerates, the ROA for the sector declined to 7.3 per cent at end-2006, from 8.5 per cent at end-2005. There was a similar performance for the ROE (see **Figure 5.18**). Against this background, a number of listed conglomerates embarked on various long-term initiatives to increase profitability during the second half of the year.⁵¹ This influenced an improvement in industry PE ratios during this period (see **Figure 5.19**).⁵²

Companies in the communication sector experienced declines in profitability during 2006. The ROA for the communication sector declined to 4.3 per cent at end-2006 from 5.5 per cent at end-2005 (see **Figure 5.20**). Additionally, the ROA for the insurance sector declined sharply during 2006.

5.4. Banking Sector Exposure to Public Sector Debt

The banking sector's exposure to public sector debt at end-2006 reflected a decline relative to the previous year.⁵³

Figure 5.25
Maturity Structure of Public Securities Commercial Banks

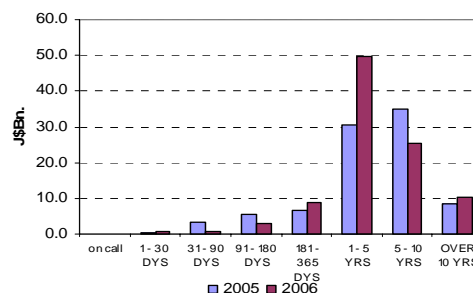


Figure 5.26
Maturity Structure of Public Securities FIAs

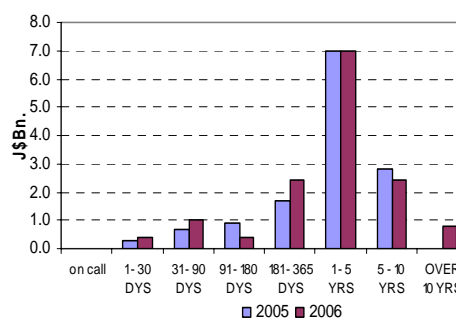
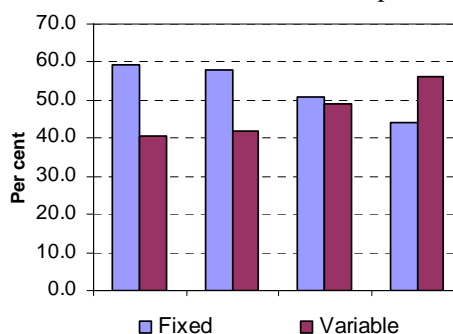


Figure 5.27
Domestic Debt Interest Rate Composition



⁵¹ Grace Kennedy announced reorganization plans involving the merger of several companies within its food trading division and Seprod continued to expand the scope of its operations through various acquisitions.

⁵² High P-E ratios can serve as signal of positive investor confidence in the growth prospects for an industry.

⁵³ Exposure is measured by public sector loans and securities as a share of banking system assets. Public sector comprises Public Entities and Central Government.

Figure 5.28
Foreign Linked Debt in Domestic Debt Portfolio

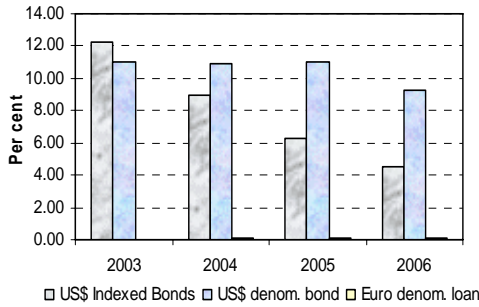


Figure 5.29
Debt to GDP Ratios

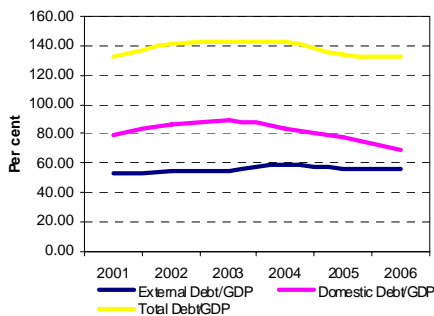
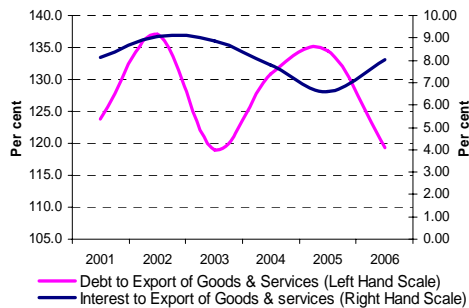


Figure 5.30
External Interest & External Debt to Exports of Goods & Services



At end-2006, the ratio of public sector debt to banking system assets declined to 24.9 per cent from 27.1 per cent at end-2005 (see **Figure 5.21**). This performance was due to the slower growth in public sector debt during 2006 as well as the banking system's strong expansion in lending to the private sector. The slower growth in public sector debt reflected a sharp decline in direct loans to the public sector during 2006 (see **Figure 5.21**).

The exposure of the banking sector to public sector debt improved during 2006 when measured in relation to banking system capitalization. Public sector debt as a share of banking system capital was 183.0 per cent at end-2006, 14.5 percentage points lower than end-2005.

5.4.1 Public Sector Indebtedness & Performance

For 2006, public sector debt increased by \$98.5 billion to \$925.8 billion, reflecting an 8.5 per cent increase relative to end-2005. Nonetheless, public sector debt as a share of GDP declined to 132.7 per cent at end-2006 from 133.3 per cent at end-2005. Domestic financing continued to account for the bulk of public sector funding during 2006. At end-2006, domestic debt accounted for 58.0 per cent of the total debt stock. Despite continued reliance on domestic funding, generally favourable conditions in the international capital markets during 2006 enabled Government to secure long term financing at fairly low interest rates.⁵⁴ This is somewhat reflective of improved investor sentiments internationally regarding

⁵⁴ Strong international liquidity as well as increased investor appetite for emerging market bonds resulted in a fall on yields on these bonds.

emerging market debt due to the continued improvement in the macroeconomic fundamentals for many of these economies.

The increase in the domestic and external debt stock during 2006 reflected increased borrowing by Government during 2006 to pre-fund its FY2007/08 budget (see **Figure 5.22**). In this context, reductions in costs of borrowing due to continued declines in domestic interest rates did not translate to slower growth in the domestic debt stock during the year.

The Government continued to be successful in extending the maturity profile of domestic and external debt during 2006. This was evidenced in the shifting of domestic and external debt into the 'over 10 years' maturity bucket (see **Figures 5.22 & 5.23**). For domestic debt, there continued to be increased investments in the '5 to 10 years' maturity bucket. This was largely due to the greater willingness of investors to take up longer-term instruments given the decline in inflation.

There was shifting of public sector securities issues to longer-term tenors during 2006. This was reflected in the lengthening of the average tenor of the public sector securities held by commercial banks and building societies at end-2006 relative to end-2005 (see **Figures 5.25 to 5.26**). However, for the FIAs, there were stronger investments in the shorter-term tenors of public sector securities issues relative to 2005.

The Government was unsuccessful in increasing the share of fixed rate instruments in the domestic debt portfolio as envisioned in its debt strategy (see **Figure 5.27**). Fixed rate instruments as a share of the debt portfolio declined to 44.0 per cent at end-2006, relative to 55.0 per cent at end-2005. This increased Government's exposure to macroeconomic shocks as fixed rate instruments act as a hedge against unexpected increases in interest rates, instability in the foreign exchange market as well as external shocks. However, while most of the domestic debt was contracted at variable rates, Government was able to reduce rates on its debt while elongating the maturity profile on new issues. Additionally, the increase in GOJ variable rate issues during 2006 helped to reduce the banking sector's interest rate risk exposure to GOJ debt.

The Government has made continued progress in reducing the foreign exchange risk of domestic debt in 2006. At end-2006, US\$-Indexed bonds totalled 4.5 per cent of the domestic debt portfolio relative to 6.3 per cent at end-2005 (see **Figure 5.28**). This is reflective of Government's policy decision to reduce the share of US\$-indexed bonds in the domestic debt portfolio that has been observed since 2003. Government's ability to reduce the supply of US dollar-indexed assets during 2006 was facilitated by the continued stability in the foreign exchange market during the year.

Jamaica's external debt performance indicators showed mixed results during 2006. Jamaica's ability to service external interest payments through export earnings

Government achieved success in extending the maturity profile of domestic and external debt

deteriorated in the year, largely reflecting a sharp increase in external interest payments. The ratio of external interest payments to exports of goods and services increased to 8.0 per cent in 2006 relative to 6.5 per cent at end-2005 (see **Figure 5.30**).

Notwithstanding, the ratio of external debt to exports declined to 119.4 per cent at end-2006 relative to 134.4 per cent at end-2005. The ratio declined as the growth in exports significantly outpaced the growth in external debt during 2006, representing a reversal of the trend observed in the previous year.

6. Risk Assessment of the Banking Sector

6.1 Overview

During 2006, the balance sheet and income statements of the banking system exhibited improved capacity to absorb potential market and credit risk shocks.⁵⁵ Reduced levels of volatility in interest rates and exchange rates catalyzed reductions in the market risk exposures. Continued increases in credit quality as well as improvements in the diversification of the credit portfolios of the banking sector insulated the banking system from the inimical impact of credit shocks. In addition, the stability of core deposits and buoyant liquid assets bolstered the banking system's capacity to absorb liquidity shocks during 2006.

6.2 Market Risks

6.2.1 Liquidity Risk of the Banking System

The funding structure of the banking system during 2006 was dominated by deposits, accounting for an average of 78.0 per cent of the total sources of funding (see **Figure 6.1a**). Deposits continued to show signs of stability in spite of anecdotal evidence of increased competition for funds by unregulated alternate investments schemes during 2006. Inter-bank funds and borrowing accounted for 15.1 per cent and 6.9 per cent of total funding structure, respectively. Of note, was the preference shown towards the use of inter-bank funds over borrowing relative to preceding year.

Figure 6.1
a) Funding Structure of Banking Activities
(January 2000 – December 2006)

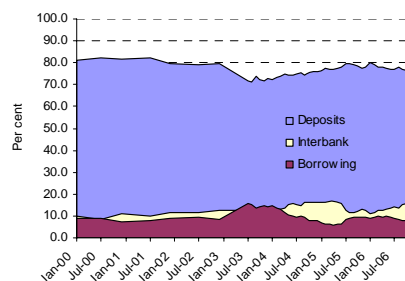


Figure 6.1
b) Weekly Range for Inter-Bank Rates
(December 2005 – December 2006)

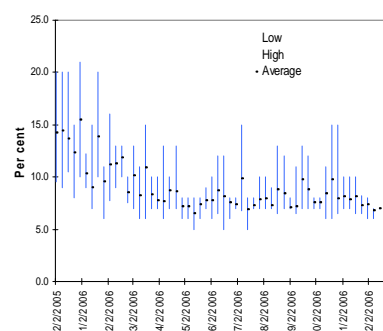
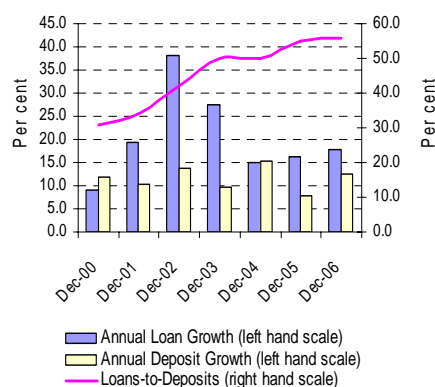


Figure 6.2
Loans to Deposit Ratio
(December 2000 – December 2006)



The loan-to-deposit ratio, continued to normalize during 2006

⁵⁵ The banking system in this chapter refers only to commercial banks, building societies, and merchant banks.

Figure 6.3
Overall Net Funding Positions

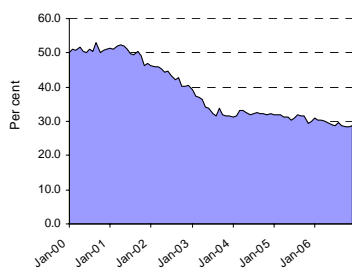
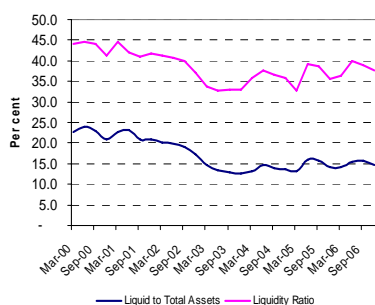
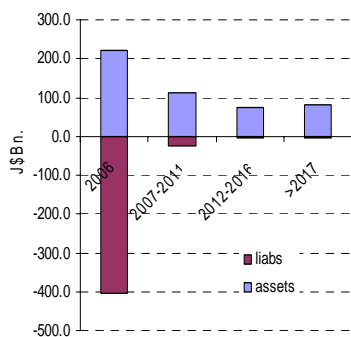


Figure 6.4
Core Liquidity Indicators



Reductions in average inter-bank rates as well as relative decline in high-low ranges both suggest that liquidity funding risk for inter-bank borrowing declined during 2006

Figure 6.5
Maturity Structure of Assets & Liabilities at End 2006



Reductions in average inter-bank rates as well as relative decline in high-low ranges both suggest that liquidity funding risk for inter-bank borrowing declined during 2006 (see **Figures 6.1a and 6.1b**).⁵⁶ Whereas annual growth in borrowings declined by 13.8 per cent, inter-bank funds and deposits grew by 36.1 per cent and 14.9 per cent, respectively. This compares with growth in deposits and borrowings of 8.0 and 22.6 per cent, respectively, and a decline in inter-bank funds by 17.8 per cent at end-2005. These developments augured well for the liquidity risk management within banks.

The banks' loans-to-deposit ratio increased marginally to 56.0 per cent at end-2005 from 55.0 per cent at end-2006. The loan-to-deposit ratio, which reflects the banking systems' main source of financing of its lending activities, continued to normalize during 2006. In particular, whereas loans increased by 17.7 per cent during 2006, this was significantly offset by buoyant growth in deposits of 14.8 per cent. Continued unabated increases in this ratio would suggest that banks would have to source higher cost funds to catalyze the financial intermediation process. This would increase both the likelihood of impairing their profitability and expose the sector to higher levels of liquidity risk (see **Figure 6.2**).⁵⁷

⁵⁶ The average inter-bank rate is computed as the average of the high and low rates in a trading week.

⁵⁷ Growth in loans, over the last five years, has also served to underpin core deposit stability due to the requirement of some institutions to hypothecate a portion of client funds over the life of the loan.

The net funding position of banking institutions decreased marginally to 28.6 per cent at end-2006 relative to end-2005. The positive gap implies that banks can fund their lending and advances from deposits (see **Figure 6.3**).

The banking system also continued to maintain high levels of liquidity as measured by the liquid asset ratio and the ratio of liquid assets to total assets (see **Figure 6.4**). The liquid asset ratio remained relatively flat at 35.6 per cent at end-2006, relative to end 2005, while the ratio of liquid assets to total assets increased marginally to 14.1 per cent at end-2006 from 13.7 per cent at end-2005.

At end-2006, banks' liquidity gap profile for assets and liabilities maturing within one year improved relative to that of the previous year as the banking system became less negatively gapped over the short-term (see **Figure 6.5** and **Figure 6.6**).

In a context of further declines in domestic interest rates and increases in US Federal Funds rates, banks reduced their short-term net liabilities relative to positions held in 2005. The reduction in the banking sector's negative gap position during 2006 served to reduce the exposure of financial intermediaries to positive interest rate shocks. This trend was observed for all sectors of the banking system. The most significant reduction occurred in the merchant banking sector. The exposure of

Figure 6.6
Maturity Structure of Assets & Liabilities at End 2005

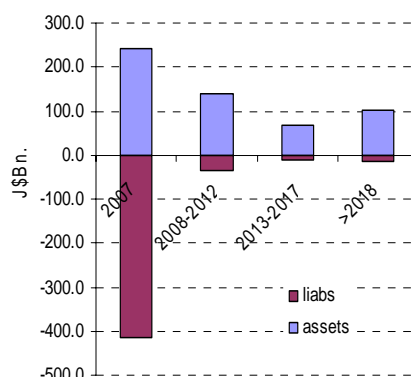
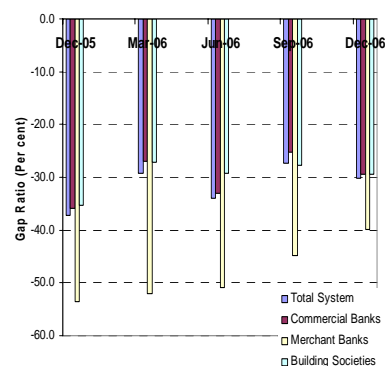


Figure 6.7
a) Liquidity Gap Ratios (Aggregate)



b) Liquidity Gap Ratios (Investments)

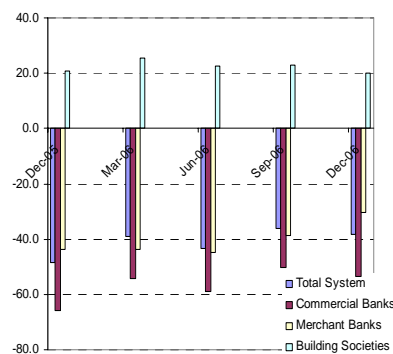


Figure 6.8
Quarterly Net Open Positions for the Banking Sector by Currency
March 2005 – December 2006

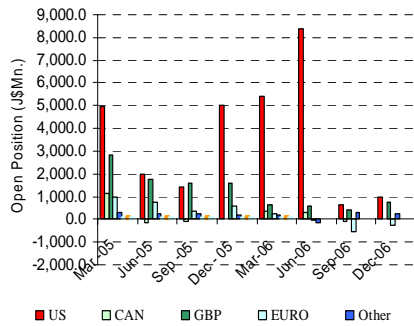
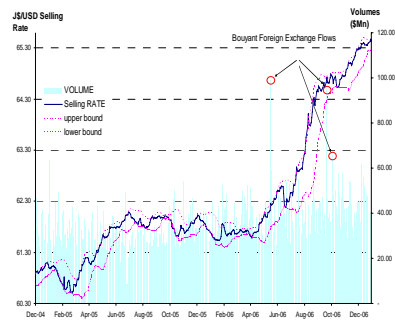
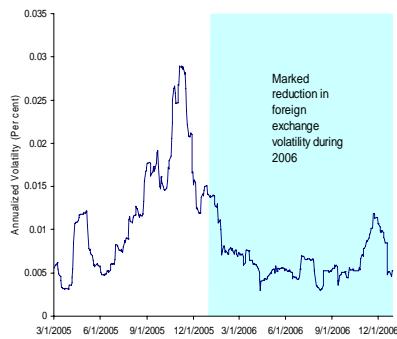


Figure 6.9
a) Spot Exchange Rates with the US Dollar and 95 Per cent Confidence Bands and US Dollar Trading Volumes



b) Annualized Volatility in Jamaica Dollar to US dollar Exchange Rate (March 2005 – December 2006)



merchant banks to liquidity funding risk declined by 13.9 percentage points relative to end-2005 to record a gap ratio of minus 39.9 per cent. The gap ratios for commercial banks and building societies were minus 29.4 per cent at end-2006 (see **Figure 6.7**).⁵⁸

In summary, the banking system's exposure to liquidity risk declined over 2006. As a result, liquidity risk did not pose systemic risk to the banking system.

6.2.2 Foreign Bond and Exchange Rate Risk Exposure

At end 2006, 42.3 per cent of banking system's assets and 44.4 per cent of the banking system liabilities were denominated in foreign currency. The largest exposure to foreign currency movements were from net open positions in US dollars which peaked in June 2006 but subsequently declined over the September and December quarters (see **Figure 6.8**). The reduction in net open positions in the latter half of 2006 occurred in a context of buoyant flows to the foreign exchange market and low levels of volatility in the foreign exchange rate (see **Figure 6.9**). In the context of a reduction in net open position in the latter half of 2006, foreign exchange risk was not a significant threat to the banking sector's stability. In particular, the aggregate Value at Risk (VaR) related to banks maintaining open

⁵⁸ The gap ratio is calculated as the ratio of the cumulative difference between interest bearing assets and liabilities over various time horizons e.g. less 1 year, 1-2 years, to total assets.

FX positions did not exceed 4.0 per cent of banks' regulatory capital (see **Figure 6.10**).⁵⁹ In particular, the FX VaR which mirrored the pattern of net open positions increased to 3.9 per cent of regulatory capital at end-June 2006. The outturn at end-June 2006 reflected the systems' relatively large long net open position during that quarter.

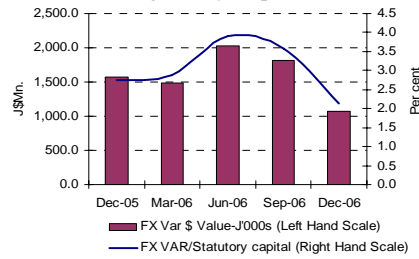
Historically, the risks of large depreciations have outweighed the risks of large appreciations in the Jamaica to US dollar exchange rate. Thus, the risk inherent in the large open position at end June were vitiated by the fact that banking system held long positions in US dollars. The ratio of net open positions to regulatory capital which peaked at 17.0 per cent in June 2006 declined significantly to 3.0 per cent at end December. Normalization in the net open positions in the latter half of 2006 influenced a decline in the FX VaR to regulatory capital to 2.1 per cent at end- 2006 (see **Figure 6.10a** and **Figure 6.11**).

The reduction in the Dollar Value of a Basis Point (DVBP) to Capital underscored the decline in the interest risk exposure of the foreign currency balance sheet for the banking system, particularly banks and building societies, during 2006

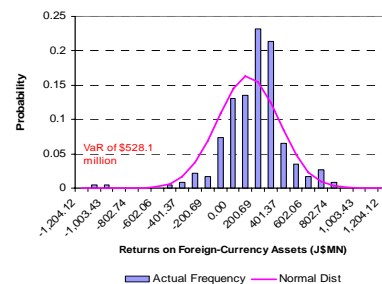
⁵⁹ The VaR is computed as the 99th percentile change over a 10 day trading period during the prior 252 trading days. See Article titled "VaR: The Bank of Jamaica Model" for more details.

Figure 6.10

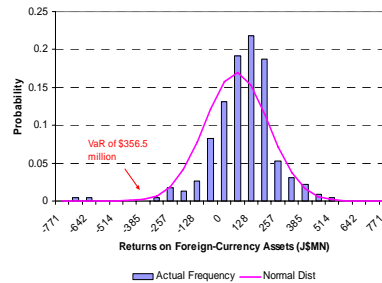
a) FX Value at Risk Expressed as Percentage of Regulatory Capital



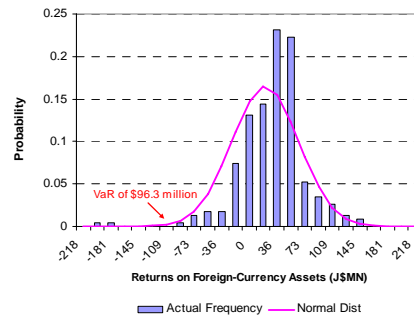
b) Distribution of FX Returns at End December 2006 for Commercial Banks



c) Distribution of FX Returns at End December 2006 for Merchant Banks



d) Distribution of FX Returns at End December 2006 for Building Societies



The FX VaR which mirrored the pattern of net open positions increased to 3.5 per cent of regulatory capital at end June 2006

Figure 6.11
Quarterly Ratio of Tiered Capital to Foreign Exchange Exposure

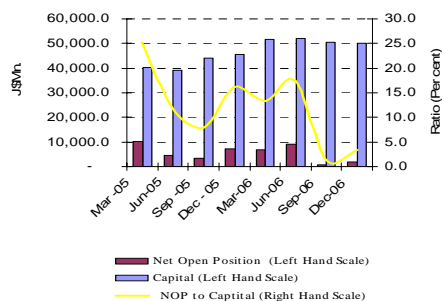


Figure 6.12
Dollar Value of a Basis Point (DVBP) to Capital for Foreign Currency Interest Sensitive Assets & Liabilities

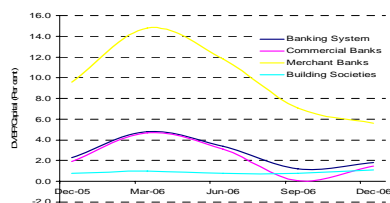
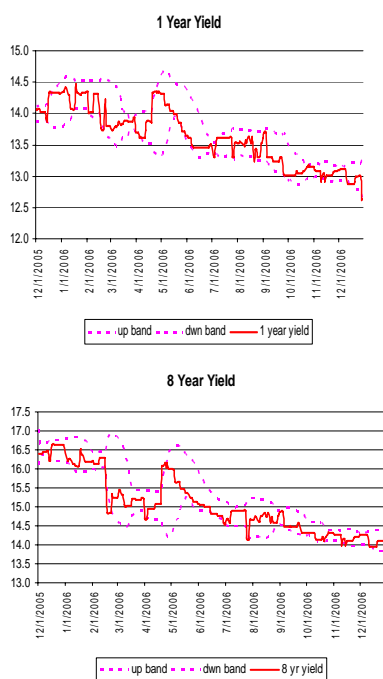


Figure 6.13
Spot Rates and Confidence Bands for Selected Yields



(see **Figure 6.12**).⁶⁰ However, although interest rate exposure for merchant banks declined during the year the DVBP to capital still remained higher than their counterparts at end-2006. For merchant banks the relatively larger exposure to interest rate risk for foreign denominated assets and liabilities arose from a greater use of leverage, longer re-pricing profiles and larger percentage of investments to total assets relative to banks and building societies (see **Section 6.2.3 Interest Rate Risk Exposure**). Banks continued to match long and short positions in foreign exchange forward contracts which limited their exposure to the possibility of increased volatility in the exchange rates.

Overall, however, the foreign bond and exchange rate risk exposure of the banking sector did not pose a threat to financial system stability during 2006.

6.2.3 Domestic Interest Rate Risk Exposure

During 2006, interest rates on various financial instruments displayed low levels of volatility in a context of improved macroeconomic performance as well as market participants' expectations of successive reductions in domestic interest rates (see **Figure 6.13**). Lower levels of bond price volatility augured well for the reduction in the Value at Risk (VaR) for bond portfolios held by the banking system.

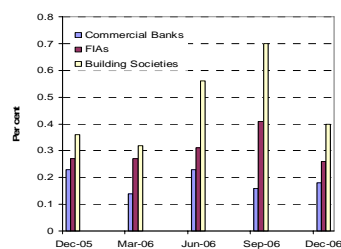
⁶⁰ The DVBP is the absolute value of the price change of a bond portfolio from a 100 basis point change in yield. It is a measure of the interest rate sensitivity and is represented as a percentage of capital for analytical purposes.

In particular, the VAR for commercial banks declined to a potential “worst case” loss of 0.18 per cent at end-2006 from a “worst case” loss of 0.23 per cent at end- December 2005. For merchant banks the VaR remained relatively flat, with the exception of the September quarter, at an average of loss at the 95.0 per cent level of 0.31 per cent (see **Figure 6.14**). The building societies sector, on the other hand, recorded an increase in their VaR, peaking at a loss of 0.70 per cent at end-September and then declining to 0.40 per cent at end-2006.

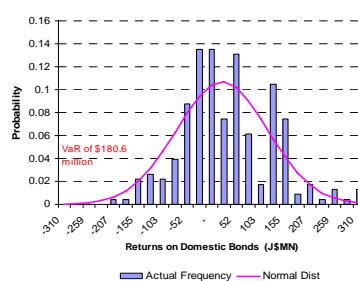
The varying degrees of exposure to interest rate risk were influenced by both the time to re-price for each sector's bond portfolio as well as the relative size of their investment portfolio (see **Figure 6.15**). Commercial banks had a larger investment to assets ratio when compared to merchant banks and building societies but concentrated their investment portfolio in assets re-pricing within one year. In contrast, the merchant banks had a ratio of investments to assets of 58.5 per cent with time to re-pricing concentrated in the 2 – 5 year period. This served to increase the exposure of merchant banks to the inimical impact of increased bond price volatility. Building societies had the lowest investment to total assets ratio and thus had comparatively lower capital exposure to market-related risk.

Both commercial banks and building societies were able to capitalize on the reduction in bond price volatility for instruments re-pricing less than 1 year during 2006. Merchant banks, however,

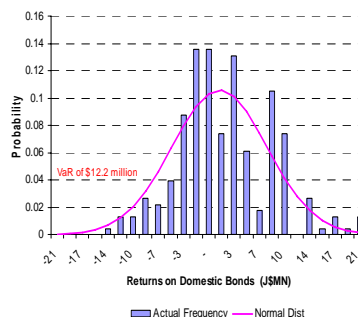
Figure 6.14
a) Value at Risk Loss for Interest Rate Risk Exposure for Banking System December 2005 - December 2006



b) Distribution of Bond Returns at End December 2006 for Commercial Banks



c) Distribution of Bond Returns at End December 2006 for Merchant Banks



d) Distribution of Bond Returns at End December 2006 for Building Societies

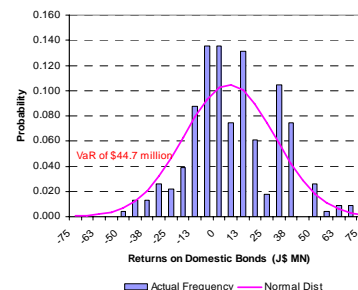


Figure 6.15
Repricing Structure of Interest Sensitive Assets
for the Banking System

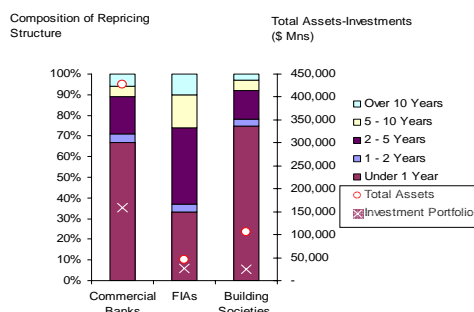
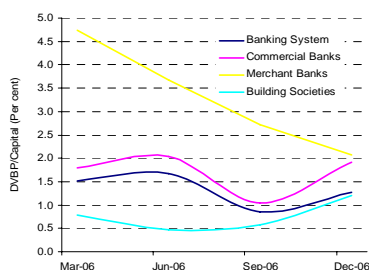


Figure 6.16
Dollar Value of a Basis Point (DVBP) to Capital
for the Banking System



Merchant banks rebalanced their portfolios towards shorter-term Jamaican Dollar securities in order to immunize against the possible increases in interest rate volatility

Table 6.1
Major Indicators of Interest Rate Risk for the
Banking System

	Dec 2006	Dec 2006
90-day Cumulative Total Gap (J\$ Billion)	15.6	30.3
90-day Cumulative FX Gap (J\$ Billion)	(12.7)	10.3
90-day Cumulative Gap/Balance Sheet Total (Per cent)	2.69	6.08
90-day Cumulative FX Gap/Balance Sheet Total (Per cent)	2.19	2.06
Average Interest Bearing Assets/ Average Interest Bearing Liabilities	110.6	109.94
Interest Margin (Interest income/Average Balance Sheet Total)	10.64	7.86
Spread *	6.56	6.59

re-balanced their portfolios towards shorter-term Jamaican Dollar securities in order to immunize against possible increases in interest rate volatility.

The dollar value of a 100 basis points (DVBP) for the entire banking system revealed a decline in the exposure of the system to interest rate risk (see **Figure 6.16 and Table 6.1**). In particular, the DVBP declined to a loss of 1.27 per cent at end-2006 relative to a loss of 1.51 per cent recorded at end-2005. This outcome was primarily attributable to the merchant bank sector which reduced its exposure to long-dated foreign currency assets in a context of continued tightening in the US Federal Funds rates during 2006. Consequently, for the merchant bank sector, the DVBP declined to a loss of 2.08 per cent at end-2006 from a loss of 4.73 per cent at end-2005.

Taken in the context of the entire banking sector, interest rate risk exposure did not threaten the stability of the banking system as at end 2006.

6.2.4 Credit Risk Exposure of the Banking System

For 2006, the banking system's credit risk profile continued to be characterized by improvements in the credit quality, adequate levels of loan-loss provision and increased access to credit for both households and corporates. However, in spite of increased competition within the banking credit market and in a context of several reductions in interest rates by the Bank, credit spreads for loanable funds declined only marginally over the period (see **Figure 6.16** and **Figure 6.17**).

Credit risk for the banking system continued to register improvements against the background of successive reductions in the benchmark interest rate as well as buoyant growth in several sectors of the economy. The ratio of non-performing loans (NPLs) to loans for the banking sector declined to 2.6 per cent at end 2006 relative to 2.9 per cent, at end 2005 (see **Figure 6.18**).

The adequacy of loan-loss provisions, measured as the ratio of loan-loss provisions to gross NPLs, continued to record high levels and was 95.9 per cent at end-2006 (see **Figure 6.18**). This outcome attests to the banking system's robust capacity to absorb the loss resulting from borrower default.

A healthy increase in credit to the private sector was recorded by the ratio of private sector credit (including households) to GDP at end-2006 of 32.2 per cent relative to 30.9 per cent at end -2005 (see **Figure**

Figure 6.16
The Evolution of Credit Risk by Economic Sector for the Banking System

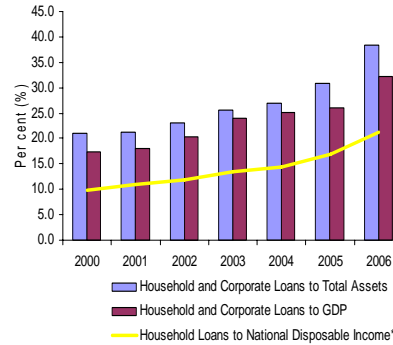


Figure 6.17
Selected Loan Rates and Loan-Deposit Spread of the Commercial Banking Sector

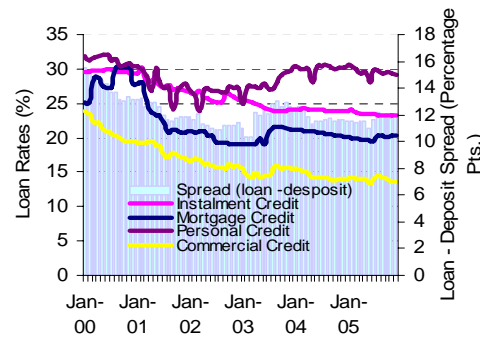


Figure 6.18
The Evolution of Credit Default Risk for Households and Corporates and the Adequacy of Provisioning for Bad Debt

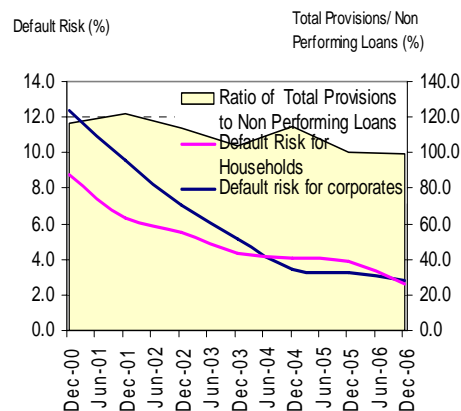


Figure 6.19
Trends in the Composition of the Loan Portfolio of the Banking System

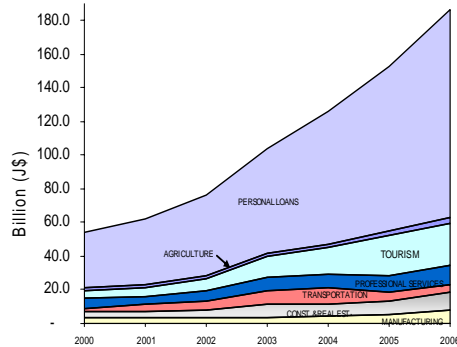
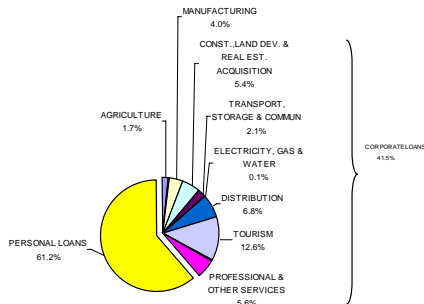
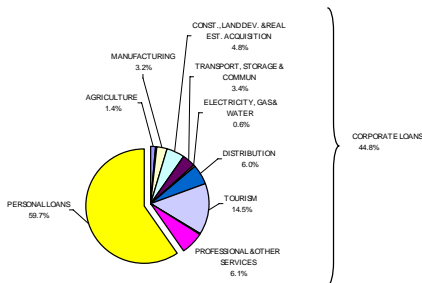


Figure 6.20
a) Composition of the Loan Portfolio of the Banking System at end -2006



b) Composition of the Loan Portfolio of the Banking System at end -2005



6.16). This increase was supported by the low interest rate environment and suggests increased focus by banks on financial intermediation. The increased penetration of loans recorded over the period also occurred against the backdrop of the 2.5 per cent calendar year growth in GDP. The loan-deposit spread of the banking system recorded a 2.1 percentage point decline at end-2006 relative to end-2005 (see Figure 6.17).

6.2.5 Credit Risk Exposure to the Household Sector

For 2006, credit to households (proxied by personal loans) grew by 25.6 per cent to \$ 123 221.0 million. Credit to households at end-2006 represented 61.2 per cent of the total credit extended to the private sector, up from 59.7 per cent at end-2005 (see Figure 6.20). The increasing levels of concentration risk tilted towards households are counter balanced by three factors.

Firstly, anecdotal data suggests that the loan book for household loans consists of a large number of small loans, which enhances the potential for risk diversification within the portfolio in spite of its large contribution to overall concentration risk to the banking systems loan book. Secondly, the level of indebtedness (proxied by loans to households) to disposable income is relatively low. This improvement occurred against the backdrop of a 4.35 percentage points increase in the penetration of household loans to national disposable income to 21.3 per cent. Finally, the credit risk exposure to households, as measured by

non-performing personal loans to gross credit for households was 2.7 per cent at end-2006, the lowest since 2000 (see **Figure 6.22**).

The commercial banking sector contributed most significantly to the improvement in the credit risk profile of the banking sector followed by building societies. The credit risk profile of the merchant banking sector vis-à-vis credit to household declined marginally over the period.

6.2.6 Credit Risk Exposure to the Corporate Sector

The concentration of loans to the tourism sector declined to 32.3 per cent at end-2006 from 36.0 per cent at end- 2005. In contrast, there were increases in shares of loans to the distribution, real estate and manufacturing sectors which represented 17.6 per cent, 13.9 per cent and 10.3 per cent of loans to corporates, respectively (see **Figure 6.21**).

Continued improvement in the loan quality of the tourism sector bolstered the loan book of the banking sector for corporates. This was only marginally offset by the deterioration in the loans disbursed to the *construction, land development and real estate sector*. The fall-out in the construction sector as a result of the 'cement -crisis' which began in mid-2005, began to show signs of impairing the sector's capacity to repay by June 2006 (see **Figure 6.22**). As a result, default risk increased to 7.8 per cent in June 2006 from 5.1 per cent at end-2005 before declining to 6.2 per cent at end- 2006.

Figure 6.21
a) Composition of the Loan Portfolio to the Corporate Sector Loan at end-2006

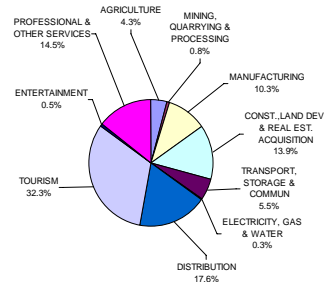


Figure 6.21
b) Composition of the Loan Portfolio to the Corporate Sector at end 2005

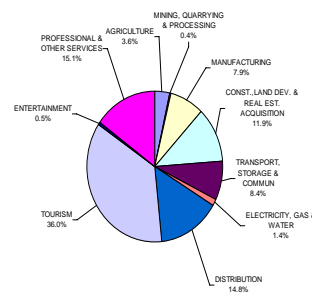
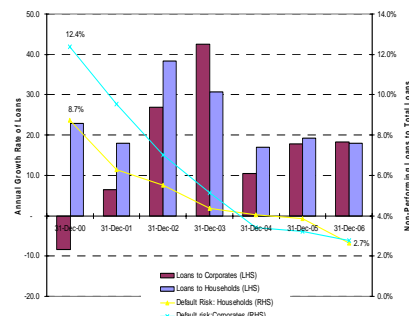
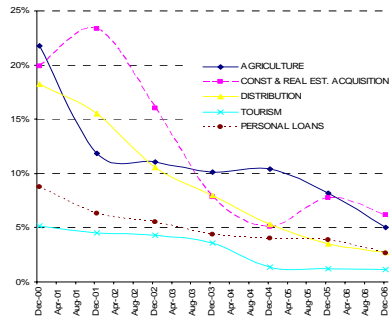


Figure 6.22
The Credit Risk by Economic Sector for the Banking System



NPLs for the corporate sector continue to trend downwards

Figure 6.23
The Evolution of Sectoral Credit Risk by for the Banking System



However, these developments did not hamper the overall improvement in credit quality of the corporate sector portfolio of the banking sector. This was attributable to their small exposure to the construction sector as well as the continued improvements in the credit quality of the rest of the loan book (see **Figure 6.23**).

Box 6.1 Financial Stability Assessment of the Banking Sector

Overview

*The BOJ conducted top-down stress tests of the resilience of the banking sector to adverse shocks using institutions' financial statements and prudential data as at the end of each quarter in 2006 (see **Table 1**). Stress test results on aggregate banking sector revealed more than adequate shock-absorption capacity following hypothetical shocks to credit, exchange rate, interest rate and liquidity (vis-à-vis interest rates and deposits) throughout 2006. In addition, positive results were obtained from the aggregate early warning system (EWS), notwithstanding slight deterioration in the micro-prudential indices for each of the banking sub-sectors in the last quarter of 2006*

Credit Risk Stress Test Results

The banking sector was resilient to potential deterioration in credit quality during 2006, due to the low levels of NPLs as well as high levels of capitalization (see **Figure 1**). The ratio of NPLs to loans for the banking sector declined to 2.6 per cent at end 2006 relative to 2.9 per cent, at end 2005, well within the 10.0 per cent international benchmark. This improvement in the NPLs to loans ratio of the banking sector was mainly influenced by commercial banks as

their NPLs to loans declined to 2.2 per cent at end 2006 from 2.4 per cent at end 2005. The resilience of the FIA licensees to NPL shocks also improved, with NPLs to loans declining to 4.4 per cent at end 2006 relative to 5.3 per cent at end 2005. This strengthening occurred despite temporary weakening during the year due to shortages of cement which downgraded the quality of loans disbursed to the construction sector. This development, however, had no systemic impact as the concentration of loans to the construction sector during the year was relatively low at 5.0 per cent. For building societies, NPL to total loans remained relatively stable around 3.6 per cent during 2006. In the context of the improvement in credit quality during 2006, there were less than 1.0 percentage point decline in capital adequacy ratios (CARs) of the commercial banks, FIA licensees and building societies sub-sectors as a result of hypothetical 10.0 per cent and 30.0 per cent increases in NPLs.

The banking system was also resilient to a hypothetical 30.0 per cent decline in performing loans to the private sector. This occurred despite relatively strong concentrations in personal loans as well as, to a lesser extent,

Table 1: Overview of Stress Tests

Stress	Description of Stress Test	Description of Shock
Credit	Hypothetical increases in non-performing loans (NPL) are applied directly to balance sheet NPLs. The assumed provisioning for new NPLs is 20.0 per cent for loan payments outstanding for 3 - 6 months and 100.0 per cent for loans outstanding for over 6 months. The bank's capital and risk-weighted assets are reduced by the increase in provisioning arising from the shock to NPLs.	<ul style="list-style-type: none"> •10.0 per cent increase in NPLs •30.0 per cent reduction in performing loans
Foreign Exchange Rate	The net open position is computed as the sum of the net spot positions, net forward positions and guarantees. Thereafter, the foreign exchange exposure is determined as the maximum of the long and short net open positions across all currencies. Hypothetical shocks to the relevant exchange rate are applied to each of the net open positions. The impact of the resulting foreign exchange gain or loss on profitability and capital adequacy are evaluated.	<ul style="list-style-type: none"> •10.0 per cent depreciation in J\$/USD rate •30.0 per cent depreciation in J\$/USD rate
Interest rate	Repricing net gap positions are computed for each maturity bucket as the repricing assets minus liabilities. The change in the market value of net repricing assets is evaluated by applying the interest rate shock and duration factor to each repricing gap position. The impact on profitability and capital adequacy is then evaluated.	<p><i>Domestic Currency Items:</i></p> <ul style="list-style-type: none"> •1400 bps rate increase on securities •400 bps rate increase on 'other' assets <p><i>Foreign Currency Items:</i></p> <ul style="list-style-type: none"> •150 bps rate increase on securities •20 bps rate increase on 'other' assets
Liquidity	For each maturity bucket, the liquidity gap is computed as assets minus liabilities. Cumulative gaps within 365 days are computed, to which hypothetical interest rate shocks are applied. The impact of the resulting change in net interest income on profitability and capital adequacy are evaluated.	<p><i>Domestic Currency Items:</i></p> <ul style="list-style-type: none"> •1100 bps rate increase on securities •100 bps rate increase on 'other' assets <p><i>Foreign Currency Items:</i></p> <ul style="list-style-type: none"> •100 bps rate increase on securities •10 bps rate increase on 'other' assets
Reputation	Hypothetical reductions are applied directly to the deposit base of the bank. Assets are assumed to be liquidated, in order of liquidity, so as to satisfy the demand. Haircuts are applied to non-liquid assets to satisfy further declines in deposits. The resulting impact on capital adequacy is evaluated.	<ul style="list-style-type: none"> •10.0 per cent reduction in deposits •40.0 per cent reduction in deposits
Early Warning	The Early Warning System (EWS) monitors macro- and micro- economic indicators of the banking sector, via a non-parametric approach to signal banking sector vulnerability. The signal is based on EWS scores for each indicator, which is computed based on the number of standard deviations of each indicator from its mean. The scores range from 0 to 5 with a score of 5 representing the most severe signal. Banking sector vulnerability at a point in time is determined by the trend in the aggregate EWS score (or index) over the previous eight quarters. A logit function is used to transform pre-shock scores into pre-shock probabilities of failure. Hypothetical shocks are applied to performing loans to assess impact on the post shock EWS score and probabilities of failure. The impact of a change in probability of failure on profitability and capital adequacy is evaluated.	<ul style="list-style-type: none"> •30.0 per cent reduction in performing loans

loans to the distribution and tourism sectors.

Foreign Exchange Risk Stress Test Results

The banking sector's exposure to foreign exchange risk declined during 2006 consequent on a reduction in the overall foreign currency net open position to capital (see **Figure 2**).

This improvement in foreign currency risk exposure was against the background of sharp declines in the US dollar-denominated net open positions held by some institutions over the September and December quarters. In addition, the CAR remained above the 10.0 per cent benchmark when the impact of hypothetical depreciations in the exchange rate on the banking sector balance sheet was assessed.

Stress tests applied to the balance sheets of the banking sector in 2006 indicated that the FIA sub-sector was most vulnerable to foreign exchange risk. In contrast, the building societies sub-sector was the least susceptible to hypothetical foreign exchange rate shocks. While the commercial banking sector had the highest net open position to capital during the year their high level of capital buffer provided a very strong shock-absorbing capacity for the sector.⁶¹

Interest Rate Risk Stress Tests

The banking sector appeared robust to interest rate shocks during 2006. Capital buffer levels were more than sufficient to offset the adverse

⁶¹ Buffer capital or excess capital comprises retained earnings, unappropriated profits and specified revaluation reserves. Losses incurred by financial institutions will erode buffer capital first, with losses in excess of buffer capital absorbed by statutory capital.

effect of potential interest rate increases (see **Figure 3**). Stress tests results indicate that capital adequacy of the sector was unchanged following hypothetical shocks to both domestic and international rate increases at the end of each quarter in 2006.

Liquidity Risk (Interest Rate) Stress Test

The banking sector appeared resilient to liquidity shocks during 2006. At the end of each quarter, the system did not suffer a decline in CAR under the interest rate shocks applied (see **Figure 4**). Specifically, for cases where increases in interest rates resulted in a loss in net interest income for the sector, buffer capital was sufficient to absorb this loss and prevent a decline in CAR levels.

Liquidity Risk (Deposit Withdrawal) Stress Tests

Deposit withdrawal risk did not pose a meaningful source of risk to the banking sector during 2006 (see **Figure 5**). In addition, none of the sub-sectors appeared susceptible to a possible sudden withdrawal of deposits during the year, although specific institutions were slightly adversely affected under the most extreme shocks applied. The robustness of the banking sector to the hypothetical sudden declines in deposit levels reflected the strong liquidity position of the sector throughout 2006.

Early Warning System (EWS) Stress Test Results

The macro-prudential index improved during 2006 in a context of the general improvement in macroeconomic fundamentals. The improvement in this index was reflected in the December quarter, partly offsetting deterioration over the first three quarters of 2006. The turnaround in

the macro-prudential index for the December quarter largely reflected a significant moderation in the volatility in the 12-month point-to-point inflation rate as well as marginal improvement in the 12-month growth in the stock market index. The value of the macro-prudential index at end 2006 was significantly below the 1996-1999 crisis threshold value.

During 2006, there was deterioration in the micro-prudential indices (MPIs) for commercial banks, merchant banks and building societies. This was largely reflected in a decline in commercial banks' overall capital to assets ratio, as well as deterioration in asset quality for merchant banks. For building societies, there was an improvement in the MPI during the June quarter, which largely reflected an increase in the sector's use of deposits to finance the acquisition of assets. However, a reduction in the use of FX deposits as well as overall FX liabilities to finance the acquisition of FX assets in the September and December quarters influenced the deterioration in the MPI. However, at end 2006, the MPIs for all three banking sub-sectors recorded values significantly below the 1996-1999 crisis threshold values.

Notwithstanding the deterioration in the MPIs, the banking system was able to withstand shocks to performing loans when scenarios of normal and extreme market conditions were considered. More specifically, there were marginal differences in the probabilities of failure before and after a 30.0 per cent shock to performing loans was contemplated for each quarter (see **Figure 6**). The system's ability to withstand shocks was also supported by the fact that the MPIs were well below the levels that obtained during the 1996 to 1999 financial crisis period.

Figure 1

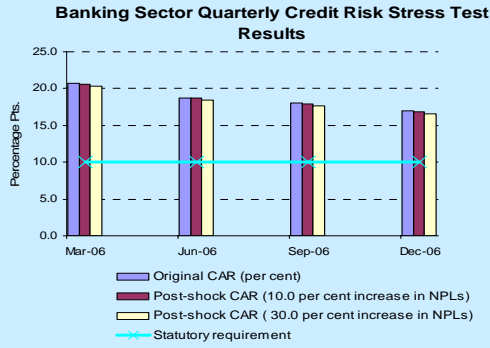


Figure 2

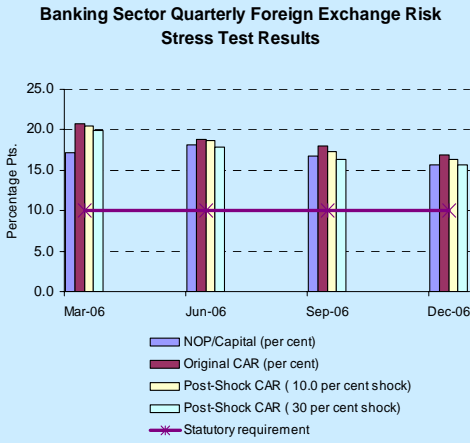


Figure 3

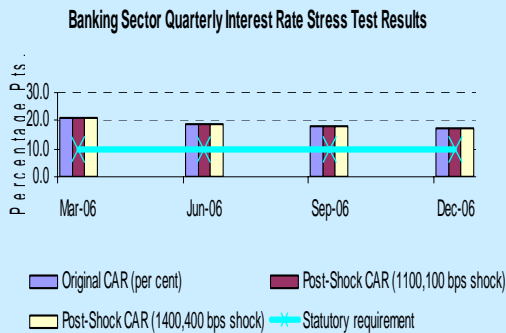


Figure 4

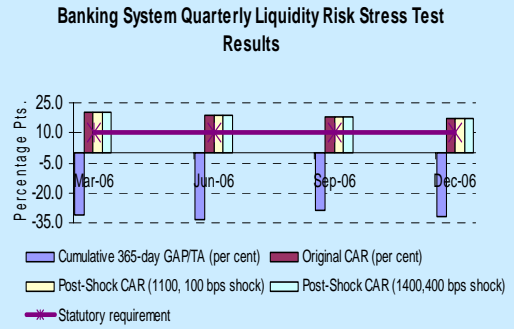


Figure 5

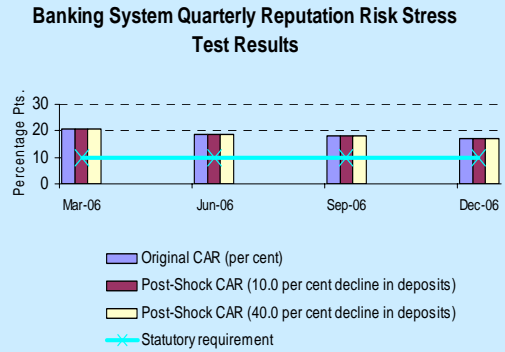
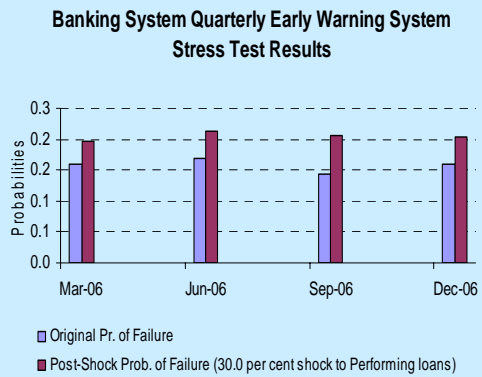


Figure 6



7. Payments System Developments

Figure 7.1
Currency in Circulation

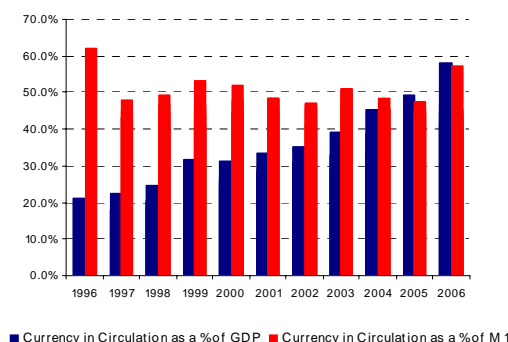
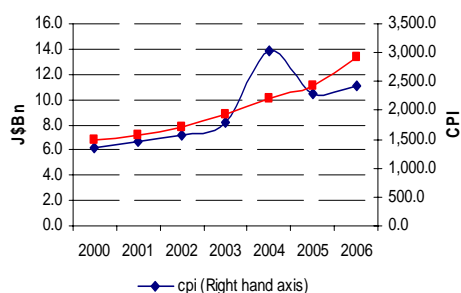


Figure 7.2
Currency in Circulation Per Capita



7.1 Overview

Among the different payment instruments available in the payments system in Jamaica, cash continued to be the primary means of conducting transactions. At end-2006, currency in circulation was approximately \$35.7 billion or 20.5 per cent of GDP. There was also an increase in the use of alternative means of payment for domestic currency transactions, namely cheques and electronic transactions instruments (debit cards and credit cards). At end-2006, total payments by cheques grew marginally to approximately \$380.0 billion, higher than the average of \$350.0 billion recorded over the previous two years (2004-2005). The value of electronic transactions through automated banking machines (ABMs) and point-of-sale (POS) terminals increased to \$17.6 billion at end 2006 relative to \$15.2 billion at end 2005. Electronic transactions processed in the two large value payments systems in Jamaica was \$316.4 billion or 181.0 per cent of GDP at end-2006. This represented a decrease of 17.6 per cent relative to 2005.

Currency in circulation, which reflects the demand for currency continued to be the primary means of conducting transactions. At end-2006, the stock was \$35.7 billion, relative to \$31.1 billion at end-2005. As a percentage of GDP, currency in circulation was approximately 20.5 per cent, relative to 17.8 per cent at end-2005 (see **Figure 7.1**). This reflected an increase in the role of cash in the level of economic activity during 2006.

Currency in circulation as a per cent of M1 increased to 57.2 per cent at end-2006 relative to 47.3 per cent at end-2005. The heightened demand for currency was also reflected in an increase in currency in circulation per capita to \$13 382.0 from \$11 136.6 at end-2005 (see **Figure 7.2**).⁶²

Notwithstanding the increased role of cash in the economy during 2006, there was an expansion in credit cards in circulation of 6.2 per cent, in contrast to the 20.7 per cent decline recorded last year. The growth in credit cards in 2006 was offset by a decrease in debit cards in circulation of 3.3 per cent (see **Figure 7.3**).

Increased role of cash in economic activity during 2006

7.2 Alternative Means of Payment

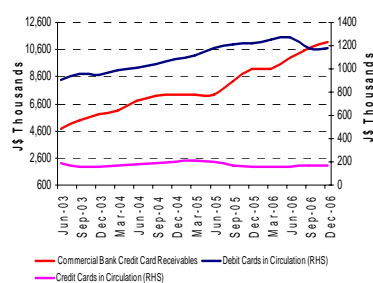
An expansion in the number of ABM terminals was also consistent with the increased cash use (see **Figure 7.4**). During 2006, the number of ABM terminals increased by 6.3 per cent. There was a decline of 5.7 per cent in the number of POS terminals installed.

There was an upward shift in both POS and ABM monthly volumes and monthly values of transactions for 2006 relative to 2005. These upward shifts were similar to the outturns for 2005 relative to 2004 and were driven by profit and efficiency incentives to consumers, retailers and banks with regard to reduced cash holdings.⁶³

⁶² The heightened currency demand may also reflect an increase in informal economic activities and a rise in the level of tax evasion.

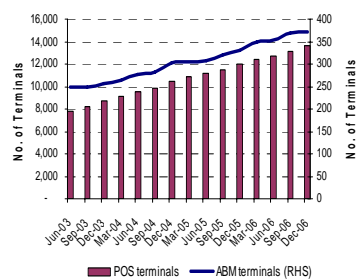
⁶³ Note that cash holding does not reflect cash use but refers to the amount of cash balances held in hand.

Figure 7.3
Debit and Credit Cards in Circulation
(in Thousands of Jamaica Dollars)



Increase in ABM and POS transactions reflects heightened consumer spending

Figure 7.4
Total ABM and POS Terminals



Greater proportion of "on-us" transactions implies increased soundness and efficiency in payments system

Figure 7.5
POS Volumes

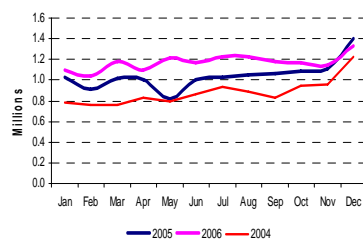


Figure 7.6
POS Values

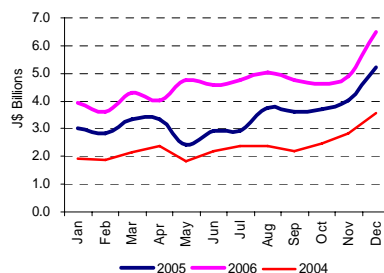


Figure 7.7
ABM Volumes

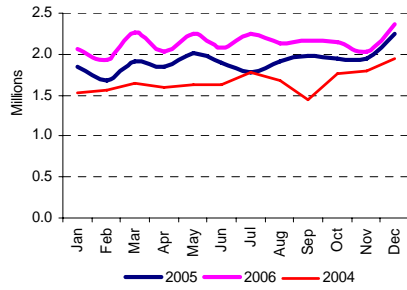


Figure 7.8
ABM Values

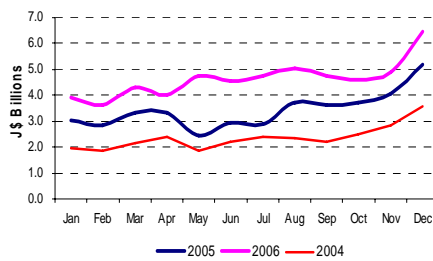


Figure 7.9
Value of ABM/POS Transactions

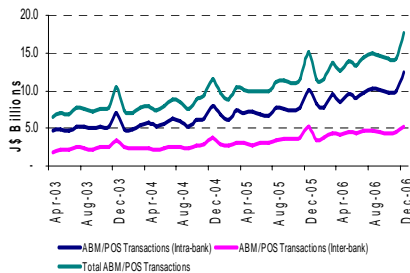
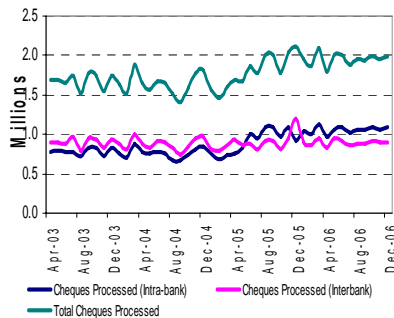


Figure 7.10
Volume of Cheques Processed



For 2006, the average monthly volume of POS transactions was 1.2 million, reflecting an increase of 13.0 per cent over 2005. The average monthly value of POS transactions was \$4.6 billion, an increase of 35.4 per cent relative to 2005. The increase in the average value of a POS transactions is an indication that consumer spending grew significantly in 2006. This increase in consumer spending was also reflected in ABM transactions. The average monthly volume of ABM transactions increased by 12.0 per cent to 2.1 million, while the monthly value of ABM transactions increased by 25.9 per cent to \$9.2 billion (see Figures 7.5 to 7.8).

These developments reflected the moderation in inflation expectations and continued improvement in investor confidence, which spurred an increase in economic activity during 2006.

During 2006, the value of electronic (both ABM and POS) transactions increased by approximately 21.1 per cent. Of these electronic transactions, 97.9 per cent was intra-bank (“on-us”) relative to 88.3 per cent in 2005. This higher proportion of payment transactions occurring between clients of the same bank implies increased levels of payments system efficiency and safety. This is due to the banks’ relatively lower reliance on the external exchange of payment orders as well as lower inter-bank principal and liquidity risks (see Figure 7.9).

7.3 Large Value Transfer Systems in Jamaica⁶⁴

Cheques remained the most popular non-cash payment instruments in Jamaica during 2006. The average monthly volume of cheque transactions increased to 1.9 million for 2006 from 1.8 million in 2005, while the average monthly value of cheques increased to \$373.7 billion at end-2006 relative to \$301.2 billion at end-2005. The volume and value of cheque transactions processed intra-bank was higher than cheques processed between banks (see **Figures 7.10, 7.11 and 7.12**).

Average daily volume of cheque transactions was 92 873, valued at \$17.8 billion. This was significantly higher than the 86 111 cheque transactions valued at \$14.3 billion recorded for 2005. The increase in the average daily volume and value of cheque transactions implied an increase in settlement risk.

During 2006, the volume of CIFTS transfers increased by 2.8 per cent relative to 2005. Similarly, the value of these transactions increased by 10.2 per cent (see **Figures 7.13 and 7.14**).⁶⁵ There were, on average, 89.7 CIFTS transactions per day valued at \$7.4 billion. This was higher than the average

Figure 7.11
Value of Cheques Processed

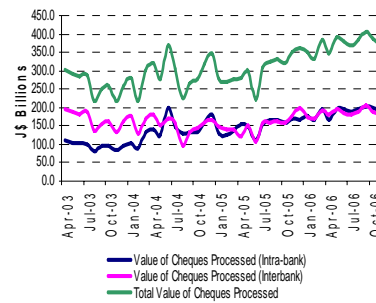


Figure 7.12
Average Cheque payment

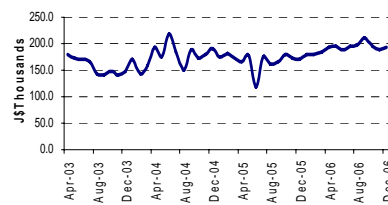
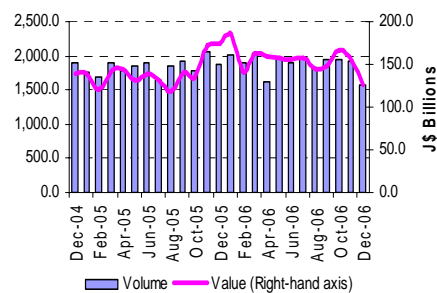
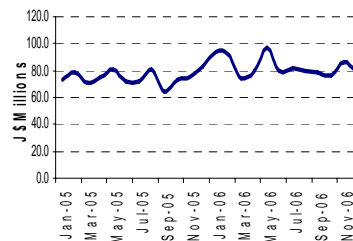


Figure 7.13
Volume and Value of CIFTS Credit Transfers



Increased occurrence of overdrafts associated with CIFTS heightens exposure to settlement risk

Figure 7.14
Average CIFTS Credit Transfer



⁶⁴ The large value systems are the Automated Clearing House (ACH) and the Customer Inquiry Funds Transfer System (CIFTS).

⁶⁵ The CIFTS network system is, a Deferred Settlement System operated by the BOJ that facilitates the electronic transfer of funds in local currency between the accounts of primary dealers, commercial banks, the Central Securities Depository and its broker members.

daily outturn of 87.3 transactions valued at \$6.5 billion during 2005. The higher value and volume of cheque transactions and credit transfers implied continued prevalence of vulnerabilities within the payments system, in particular increased exposure to settlement risk.

The average monthly volume of ACH transactions in Jamaica Dollars remained flat at 0.9 million during 2006. The average monthly value over the same period was \$185.5 billion, relative to \$152.2 million during 2005.

There were 74 overdrafts associated with the inter-bank settlement system in 2006, relative to 70 in 2005, reflecting an increase of 5.7 per cent. This increase coincided with the growth in the value and volume of CIFTS and ACH transactions, which suggests an increase in the Central Bank's exposure to credit risk.

In addition to the risk inherent with the increased number of overdrafts, there is also risk associated with the timing of the settlement cost and amount of each transaction. This is due to the process of clearing associated with the current deferred net settlement (DNS) system. A more efficient clearing and settlement system is therefore crucial in reducing the cost and risk of these transactions.

A delivery versus payment (DvP) settlement framework is important in any payments system. The efficiency of the DvP system ensures transparency and scope for development in the secondary market, while promoting soundness and integrity in the

payments system. In this context, the BOJ has embarked on the process of implementing a real time gross settlement (RTGS) and a centralized securities depository (CSD) in the Jamaica payments system (see **Box 8**).

**BOX 8. BOJ Proposed
Implementation of RTGS and CSD
Systems**

The implementation of a CSD and its integration with a RTGS system will provide the basis for a financially sound DvP settlement mechanism. In the RTGS, trades cannot be initiated unless there is sufficient funding available to complete the transaction. Further, participants will be able to readily access funds in the CSD via their securities holdings. These features will significantly reduce the different forms of risk in the payments and settlement system.

Details of all dealers and buyers and on all issues of securities will be stored in the CSD. This will enable movement of securities between the participants' accounts, settlement of transactions only if funds are available and allow investors to place bids on a desired allocation of primary issues of Government of Jamaica (GOJ) securities. When the RTGS and CSD are implemented, plans are for existing GOJ securities to be *immobilized* and new issues to be *dematerialized*.⁶⁶ This is with a view to eventually phase out physical evidence of ownership, as all participants and trading activity will be recorded in the CSD.

The main advantage of the CSD is that it will reduce settlement risk, as ownership of securities will be transferred in real time when a trade is completed. It will also ensure

⁶⁶Immobilized securities are held in a central depository for the account of its owner but that may be withdrawn from the depository in physical form. Dematerialized securities are securities that are not on paper and a certificate to that effect does not exist. They exist in the form of entries in the book of depositories.

full disclosure of information on all securities and the level of trading activity related to each security.

A comprehensive interface between the CSD and the RTGS provides an automatic collateralized intra-day credit mechanism for the provision of liquidity. This allows the BOJ to extend intraday credit to participants, holding securities as collateral. The interface will also allow the Bank to specify securities that can be used as collateral, apply different haircut rates to the various securities and define credit limits for each member. These characteristics allow the Bank to manage its credit risk exposure and limit the risk exposure to banks that borrow on a short-term basis to meet liquidity needs.

There are several other advantages associated with the RTGS-CSD interface in payments systems. These include:

- Electronic registration of securities
- Netting and clearing of securities
- Settlement and transfer of securities
- Safe-keeping of securities
- Collateral management
- Credit lines and risk management
- Lending and borrowing of securities
- Cash/Equity management

In addition to the functional advantages, the implementation of the RTGS-CSD interface will improve the integrity of the payments system via the observance of international standards. In particular, the recommendations outlined by the

International Organization of Securities Commissions (IOSCO) and the Committee on Payment and Settlement Systems (CPSS). These guidelines address the legal and regulatory framework of payments system, such as trade confirmation, settlement cycles, central counterparties, guarantee mechanisms, DvP systems and settlement conclusiveness. The principles also address operational reliability and business continuity, which reduces operational risk within the payments system. Custody risk mitigation, governance, efficiency, communication procedures and standards are also addressed.

A sound and stable payments system must be guided by a robust legal framework, which outlines the regulatory and oversight parameters of the payments system. The Electronic Transactions Act and the impending Payment Systems Act, in association with the RTGS and the CSD will address this aspect of the Jamaican payments system. This will reduce liquidity risk, increase the frequency of transactions and facilitate a further deepening and development of the Jamaican financial markets.

One of the major challenges in the implementation of the RTGS and CSD is the customization of legal and regulatory guidelines appropriate for Jamaica. In particular, how the system will handle the irrevocability of transactions and its ability and scope to conduct complex transactions, such as trading financial derivatives. The legal reform process also has to address the transition from immobilized to

dematerialized ownership record of securities. This may have an adverse effect on investor sentiment, particularly those who are accustomed to, and insist on having tangible ownership of securities. In addition, the timing of banks' payment requests may slow down the speed of transfer of funds, which could result in gridlock.⁶⁷ This also has to be incorporated into the appropriate design of the RTGS.

Another challenge of the RTGS is that it will require banks to maintain higher levels of liquidity than that which is currently maintained in the payments system. This is due to banks' concern of whether there will be sufficient funds to cover the demand for outgoing payments, which may raise the level of precautionary balances that each bank holds.

⁶⁷ Gridlock, in the case of two banks, is where bank A is waiting for bank B's payment and bank B is waiting for bank A's payment, so neither can receive payment.

Articles

An Assessment of Concentration & Efficiency in the Jamaican Banking Sector

*By Sherene Bailey
Senior Economist
Financial Stability Department*

Section I: Introduction

The purpose of this article is to provide an assessment of concentration and efficiency in the Jamaican banking sector over the period January 2005 – December 2006. The efficient market hypothesis states that efficient firms increase in size and market share because of their ability to generate higher profits, which usually leads to higher market concentration. Based on this hypothesis, there is a positive relationship between concentration and efficiency, as increases in productivity enables firms to offer competitive rates on loans and/or deposits inducing firms to gain larger market shares and increase profitability.

Section II considers movements in concentration in the banking sector using two measures, which include the Herfindahl-Hirschman index and the two-firm concentration ratio. In Section III, there is an overview of the efficiency measure employed. Section IV presents a discussion of the empirical findings

and as well as the relationship between trends in concentration and

efficiency. Finally, Section V provides the conclusions from the analysis.

Section II: Banking Sector Trends

Concentration in the banking sector is commonly measured by the Herfindahl-Hirschman index (HHI) and the two-firm concentration ratio. The HHI ratio is computed as the sum of all the banks' squared market shares, where market share is based on size of deposit base. The HHI can range from close to zero, indicating nearly perfect competition, to 10,000, indicating a monopoly.⁶⁸ The two-firm concentration ratio is represented as the percentage of total deposits held by the two most dominant banks. These indices were computed on a monthly basis over the period January 2005 – December 2006 and displayed a similar pattern for each sector. For each sector, the trend in the HHI ratio was largely influenced by the two dominant banks (see **Figures 1 – 3**).

For the commercial banks, there was a marked decline in concentration during 2005. However, there was an upward trend in concentration during 2006,

⁶⁸ According to the U.S. Department, a HHI of less than 1000, indicates a competitive marketplace, while a range of 1000 – 1800, indicates a moderately concentrated marketplace, while a HHI of 1800 and above represents a concentrated marketplace.

reflective of the aggressive marketing by the more dominant banks in a context of decline in net interest margin due to the lower interest rate environment during the year.⁶⁹ The HHI ratio at end-2006 was approximately 3 175.0, while the two-firm concentration ratio measured 77.5 per cent (see **Figure 1**). The HHI value of above 1 800.0 for the commercial banks suggests that the sector is highly concentrated.

For the merchant banks, there was a strong increase in the HHI index during 2005 and throughout most of 2006 (see **Figure 2**). This occurred despite the decline in the two-firm concentration ratio and reflected increases in the market share of the third largest merchant bank. Subsequent to this period, the HHI ratio remained relatively stable, averaging approximately 3050 during 2006, suggesting that the sector was highly concentrated during this period.

There was a marked increase in the HHI ratio for building societies in 2006 following a decline during 2005. The HHI ratio increased from 4 314.0 at end-2005 to 4 395.0 at end-2006. This was due to a strong increase in loans and advances for the dominant building societies during the year. This was reflected in

the sharper increase in the 2-firm concentration ratio during most of 2006 (see **Figure 3**).

Figure 1
Concentration Indices for the Commercial Banking Sector

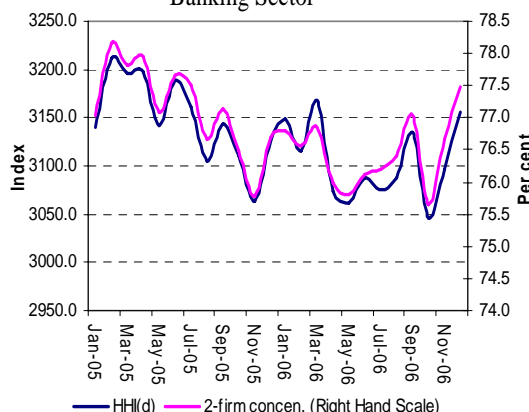


Figure 2
Concentration Indices for the Merchant Banking Sector

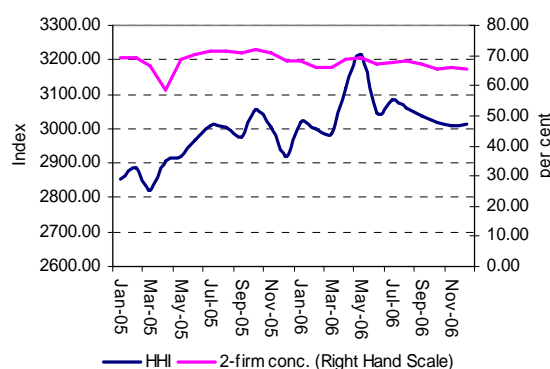
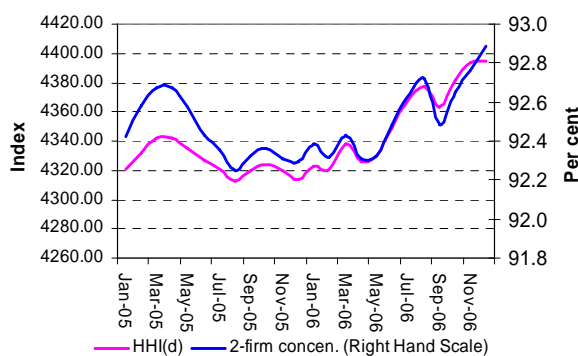


Figure 3
Concentration Indices for Building Societies



⁶⁹ Bank of Jamaica reduced interest rates on its entire spectrum of open market instruments on four occasions during 2006.

Additionally, the building societies' sector reflected the highest degree of concentration in the banking sector during the review period.

Section III - Empirical Framework for Measuring Efficiency

A technical efficiency measure was computed to determine how effectively banks utilize inputs to produce a given level of output. The bank's effectiveness in achieving the optimal mix of cost minimizing inputs, is referred to as 'technical efficiency' and can be specified by an efficient cost frontier. Given the likelihood of bank-by-bank deviations from the efficient cost frontier, a stochastic cost function was employed based on work by Aigner et al (1977), where deviations from the efficient cost frontier are specified by a random noise, v_i , and an inefficiency component, u_i . The cost functions is represented as:

$$\ln tc = f(y_i, p_i) + \varepsilon_i$$

where $\varepsilon_i = u_i + v_i$, y_i is the output i of each dominant bank, p_i is the cost of input i and v_i is the statistical noise distributed $(0, \sigma_2)$.⁷⁰ U_i is an inefficiency measure which can follow a truncated or normal distribution and measures deviations from the efficient cost frontier due to non-optimal employment of the

⁷⁰ Maximum likelihood estimation techniques are utilized in estimating the coefficients.

quantity or mix of inputs given their prices due to management errors.⁷¹ This variable is referred to as technical inefficiency. Estimates of u_i or technical inefficiency are derived from the stochastic frontier for each sector.

The log likelihood function is specified as:

$$\ln L = -\frac{N}{2} \ln \frac{2}{\pi} - N \ln \sigma - \frac{1}{2\sigma^2} \sum_{i=1}^N \varepsilon_i^2 + \sum_{i=1}^N \ln \left[\psi \left(\frac{\varepsilon_i \lambda}{\sigma} \right) \right]$$

with N denoting number of banks and ψ is the standard normal cumulative distribution. Mean inefficiency is given by:

$$E(u_i / \varepsilon) = \left[\frac{\sigma \lambda}{1 + \lambda^2} \right] \left[\frac{\phi(\varepsilon_i \lambda / \sigma)}{\psi(\varepsilon_i \lambda / \sigma)} + \frac{\varepsilon_i \lambda}{\sigma} \right]$$

where σ represents the ratio of variability, $\sigma^2 = [\sigma_u^2 + \sigma_v^2]$, $\lambda = \sigma_u / \sigma_v$ and $\phi(\cdot)$ is the standard normal density function. A variation of the model presented in equation 1 is utilized in estimating the cost frontier for each sector in the banking system for Jamaica. A translog cost function is considered because of its flexibility in allowing for input substitutability.

⁷¹ The variable v_i is an exogenous component which is due to data or measurement error or unexpected and uncontrollable factors.

$$\begin{aligned} \ln tc = & \alpha_0 + \sum_{i=1}^2 \alpha_i \ln(y_i) + \sum_{j=1}^3 \beta_j \ln(p_j) + \\ & 1/2 \sum_{i=1}^2 \sum_{k=1}^2 \alpha_{ik} \ln(y_i) \ln(y_k) + 1/2 \sum_{j=1}^3 \sum_{h=1}^3 \beta_{jh} \ln(p_j) \ln(p_h) \\ & + 1/2 \sum_{j=1}^3 \sum_{h=1}^3 \beta_{jh} \ln(p_j) \ln(p_h) + \sum_{i=1}^2 \sum_{j=1}^3 \delta_{ij} \ln(y_i) \ln(p_j) + \epsilon \end{aligned}$$

The model utilizes total operating and interest costs (TC) and several input and output variables. Output variables include loans (y_1) and all other earning assets (y_2) while there are three inputs with prices defined as the price of borrowed funds or deposits (ρ_1), price of fixed capital (ρ_2) and price of labour (ρ_3). P_1 is defined as total interest expenses divided by interest bearing liabilities, P_2 is defined as capital and occupancy expenses divided by fixed assets and P_3 is defined as personnel expenses divided by total assets. Consistent with linear homogeneity conditions, TC and the prices of all inputs are normalized by the price of borrowed funds (ρ_1). The transformed variables are denoted as TC^* , ρ_2^* and ρ_3^* .

The cost functions are estimated using FRONTIER, an econometric software package designed to provide maximum likelihood estimates of a variety of stochastic

frontiers.⁷² Cost efficiency estimates range over the interval, with a score of 1 indicating full efficiency, which means that the firm is operating on its efficient cost frontier. The amount by which the score deviates from 1 is a measure of technical inefficiency. The model utilizes quarterly banking system data covering the period December 2004 to December 2006. Inefficiency measures are derived for the commercial banking sector, the merchant banking sector and the building societies over the period.

Section IV - Empirical Results

The maximum likelihood estimates of the translog cost function are presented in Table 1. The value of the gamma parameter, which captures the variability related to the technical inefficiency component, is significant.

⁷²FRONTIER follows a three-step estimation procedure, first involving determining ordinary least estimates, followed by a two-phase grid search to refine these starting values and final estimates are obtained iteratively using the Davidson, Fletcher and Powell Quasi-Newton Method. See Coelli (1996) for a complete discussion of FRONTIER.

This indicates that the translog model is a significant improvement over the standard OLS function. Additionally, output variables, y_1 and y_2 and the price variable ρ_3^* along with various interaction variables are positive and significant at the 10.0 per cent level (see **Table 1**).

Based on the results from the translog cost frontier, inefficiency for all three sectors increased during 2006. For the commercial banks, merchant banks and building societies, the technical inefficiency ratios averaged 25.7 per cent, 9.0 per cent and 26.3 per cent during 2006 relative to 4.1 per cent, 2.0 per cent and 4.2 per cent during 2005, respectively (see **Figure 4**). The increase in inefficiency during 2006 occurred in a context where institutions in the banking sector experienced an increase in the cost of funding due to challenges in attracting deposits during the year. The cost efficiency ratios for 2006 suggest that on average the banking sector is operating 20.0 per cent above its efficient cost frontier. This suggests that banks would need to reduce costs by 20.0 per cent to achieve their optimal level of efficiency.⁷³

Figure 4
Cost Efficiency Estimates for the Banking Sector

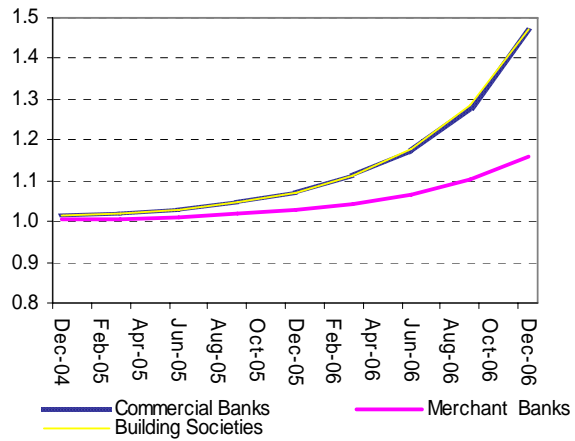


Table 1. Model Parameters of Stochastic Translog Cost Function

Variable	Coefficient	t-ratio
Dependent Variable: ln(cost)		
constant	98.6	98.6
ln(Y1)	-2.8	-4.0
ln(Y2)	-1.9	-3.1
ln(P2*)	2.3	2.9
ln(P3*)	-2.4	-2.7
ln(Y1)ln(Y1)	-0.3	-0.9
ln(Y1)ln(Y2)	0.8	1.1
ln(Y2)ln(Y2)	-0.3	-0.9
ln(P3*)ln(P3*)	1.7	2.4
ln(P3*)ln(P2*)	0.7	1.6
ln(P2*)ln(P2*)	0.0	0.1
ln(Y1)ln(P3*)	-0.7	-1.5
ln(Y1)ln(P2*)	-1.3	-4.7
ln(Y2)ln(P3*)	0.7	1.5
ln(Y2)ln(P2*)	1.3	4.6
Gamma	0.0	7.2
Constant (delta 0)	0.7	5.0

⁷³ This estimate compares favourable with findings in the Hong Kong banking industry as well as for a number of developed economies.

During 2006, there was a positive trend in the relationship between inefficiency and concentration for the commercial banks and building societies. For the commercial banks, the increase in inefficiency in the sector was associated with an increase in concentration during the year. A similar trend was observed for the building societies sector.

Section IV: Conclusion

During 2006, commercial banks were able to increase their market share despite an increase in inefficiency. This implies that banks are able to increase market share by maintaining interest margins or can afford to reduce interest margins despite the increase in inefficiency due to surpluses earned in past periods.

Calculation of Value at Risk: The Bank of Jamaica Approach

By Damion Brown
Economist
Financial Stability Department

Section I: Introduction

This article outlines the market risk model used by the Bank of Jamaica (BOJ) to estimate the market risk exposure of domestic deposit taking institutions (DTIs). Value-at-risk (VaR) estimates are used to quantify the level of market risk exposure.

VaR specifies the loss a portfolio is expected to experience over a given time period, with a specified probability. For example, a VaR estimate of \$2.5 million with a time horizon of 10 trading days and confidence interval of 99.0 per cent, means that there is a 1.0 per cent chance that the portfolio's loss will be greater than \$2.5 million over 10 consecutive trading days. VaR's usefulness, relative to other risk measures, stems from the fact that it can summarize positions across various types of securities to give a parameter that describes the entire market risk of an investment portfolio.⁷⁴ VaR estimates are affected by portfolio composition, sensitivity of assets within the portfolio to changes in risk factors,

⁷⁴ Risk measures that are specific to specific security types include duration for bond instruments and beta for equity assets.

variability of risk factors and the correlation between risk factors.⁷⁵

The probabilistic nature of VaR facilitates ease of interpretation and comparison of risk across assets groups. When used correctly, VaR estimates can be used to assess the risk to return trade-off for an asset and to determine the levels of capital appropriate for a given level of risk.

VaR estimates are greatly influenced by the stated time period over which losses will be incurred and the confidence interval. Generally, the greater the chosen time period and confidence interval, the greater will be the VaR estimate. The BOJ model stipulates a 99.0 per cent confidence interval using changes in value over a 10 trading day period.⁷⁶

Section II provides a brief description of the VaR methodologies. Finally, Stress test procedure is presented.

⁷⁵ Risk factors are market variables, for example interest rates, that affect the value of assets within the portfolio.

⁷⁶ This is consistent with the recommendations of the Basel Committee on Banking Supervision regarding the use of VaR models in a regulatory framework. See "Amendment to the Capital Accord to Incorporate Market Risk", 2005, Bank for International Settlement

Section II: VaR Methodologies

There are three methods of computing VaR estimates: variance-covariance (also known as analytic) approach, historical simulation and Monte Carlo simulation. The BOJ model currently calculates estimates for both the variance-covariance and historical simulation approach, with work currently underway to develop a Monte Carlo framework. The variance-covariance approach is based on the assumption that portfolio returns are normally distributed and therefore the loss associated with a given probability can be determined by the mean and standard deviation of portfolio returns. For historical simulation, past changes in risk factors are applied to the current portfolio composition of the banking institution's to simulate what portfolio returns would have been had the current portfolio composition been maintained. The VaR estimate is simply the relevant percentile of the simulated returns, when they are ordered from lowest to highest. Monte Carlo involves simulating risk factors by applying random numbers to a probability distribution chosen by the analyst.⁷⁷

⁷⁷ It is desirable that the simulation process for each risk factor take into account the covariance between risk factors. For the BOJ model, the covariance structure between historical risk factors over a specified period is imposed during the simulation process.

The simulated risk factors are applied to pricing functions and portfolio compositions to simulate portfolio returns, with the desired percentile of returns used as the VaR estimate.

In determining the most relevant estimation method, the following characteristics of each method may be considered: ease of implementation, ability to accurately incorporate derivative assets and simplicity in terms of explaining the method to non-technical users. The relative merits of each method are outlined in Table 1.

In the model and for VaR calculations generally, portfolio composition is implicitly assumed to remain constant over the holding time period of the VaR estimate. To the extent that institutions may be able to reposition their portfolios in response to adverse conditions more quickly, VaR estimates may overstate the portfolio's level of risk.⁷⁸ However, periods of relatively large losses normally coincide with lower liquidity levels which would limit an institution's ability to reposition its portfolio.

⁷⁸ For example, in the event of a rapid depreciation in the exchange rate, institutions with short positions in foreign currency would take action to cover these positions.

Table 1

	Variance-Covariance	Monte Carlo	Historical Simulation
Ease of Implementation	Very easy	Requires modelling skills	Fairly easy
Accuracy in Derivative Valuation	Limited accuracy for meaningful changes in value of underlying asset.	Has potential to be most accurate, if properly modelled by analyst.	Moderate accuracy
Simplicity in Communication	Requires knowledge of the normal distribution	Least Intuitive	Most intuitive

Jamaican's financial markets face several limitations, relative to more developed markets, which inhibit accurate pricing of some financial securities and the creation of "accurate" VaR estimates.⁷⁹ The BOJ model seeks to adjust for these inadequacies and data by the use of simplified assumptions and slight adjustments to the recommended technical procedures for calculating VaR.⁸⁰

The types of assets and number of instruments, outside of GOJ bond issues, available in Jamaica's financial markets are relatively limited. Investment products held by Jamaican deposit taking institutions can be broadly categorised into the following groups: domestic bonds, domestic equities, GOJ external bonds and other foreign currency securities.⁸¹ Currently no mechanism exists for electronic trading of domestic bond securities, which

⁷⁹ Specifically, there is limited market infrastructure for the efficient trading of debt securities, absence of a generally accepted yield curve and formal trading of derivative instruments, among others.

⁸⁰ Data limitations faced by the BOJ, particularly in terms of a lack of detailed information on DTIs investments holdings, also generates challenges.

⁸¹ No formal trading of derivatives exist, while forward foreign exchange contracts are very limited.

account for the majority of investments. A formally recognized yield curve does not exist, though yield curve estimates are available. Given the absence of a generally accepted yield curve and the limited data on actual trades, there are patent inefficiencies in the accurate pricing of fixed income products within the domestic market. Within the model, yield curve estimates produced by Bloomberg are used.

Foreign currency securities held by domestic DTIs mainly comprise securities denominated in foreign currency issued on the international capital market by the GOJ and, to a much lesser extent, domestic entities. Securities issued by organisations in the US that are guaranteed by the US Federal Government are also held in some instances. Domestic equity instruments represent securities traded on the domestic stock exchange, the Jamaica Stock Exchange. Though considered the most developed stock exchange within the region, the liquidity of the market is below that which exists in more developed economies.

The composition of investment holdings by most institutions mainly reflect positions in GOJ bonds, both domestic and external issues with domestic issues accounting for the majority, while equities typically account for a minimal share of investments. Given the dominance of domestic bond holdings in the investment portfolio of most institutions, domestic interest rate risk represents the largest market risk exposure for DTI's, followed by interest rate risk for external bonds and to a much lesser extent equity risk

The data BOJ obtains on DTI's investment holdings separates investments assets across various broad asset categories and repricing buckets. Within the model assets are grouped into: domestic bonds, domestic equities and foreign currency denominated bonds.⁸²

⁸² Given the investment guidelines to DTIs by the BOJ, the vast majority of foreign currency investments are in debt instruments, so the assumption that all foreign currency investments are bonds is reasonable. While it is desirable that investments be delineated in a more specific manner, which would facilitate a more accurate pricing of instruments, data containing the desired level of detail is currently unavailable. Specifically, the exact characteristics of all assets held, such as coupon, issuer and more precise dates to repricing would be useful.

To make estimation more tractable, a relatively limited number of risk factors are used to approximate changes in the value of assets within the portfolio. Based on the broad asset groupings used, the Model employs the following risk factors: the 30-day money market interest rate and selected tenors from the Bloomberg yield curve for Jamaica dollar denominated GOJ bonds, an estimated yield curve produced by Bloomberg on GOJ US dollar external bonds, the Jamaica Stock Exchange (JSE) main index and the Jamaica Dollar to US dollar exchange rate. The Model generates VaR estimates for each of the three possible methodologies, which facilitates comparison and allows a more extensive analysis of the level of market risk faced by DTIs.

An example of simulating asset returns is that changes in the value of a US dollar GOJ global bond would be determined by changes in the yields relevant to the bond and fluctuations in the exchange rate between the US dollar and Jamaica Dollar.

Pricing formulas are then used to determine the effect that changes in each risk factor will have on the value of the various instruments within the portfolio.

Changes in the value of bonds are approximated by the application of duration estimates to changes in the various interest rates, with domestic and foreign currency bonds separated into distinct portfolios and duration measures calculated for each currency and repricing bucket.⁸³ An individual duration measure is calculated for each repricing bucket of a DTI's bond portfolio to take into account the different characteristics of each institution's holdings.

Returns on foreign currency denominated bonds are attributable to two sources, fluctuations in foreign exchange rates and changes in the foreign currency price of the bond due to fluctuations in relevant yields. Changes in the Jamaica Dollar to US dollar exchange rate are used to approximate fluctuations in the overall value of the Jamaica Dollar relative to other

⁸³ All foreign currency bonds, irrespective of the currency issued in, are converted to US Dollar equivalent.

currencies. Changes in the foreign currency price of an external bond are calculated as a weighted average of the percentage point change in yields on GOJ external bond issues times the estimated duration measure for each repricing bucket.⁸⁴

Return on equity investments is proxied by the percentage change in the JSE Main Index, with the assumption that fluctuations in the value of equity holdings reflect movements in the main index. This results in the return on equity being the same for each institution, since information is not available on the specific equity holdings of each DTI.⁸⁵

An institution's investment portfolio daily return is the weighted average of the daily returns on each asset group, with the relative share of each asset group in the portfolio used as the relevant weight.

Section III: VaR Analysis

The results of the VaR analysis are used to inform the BOJ about changes in the market risk exposure of DTIs and the likely reason for these changes. Scenario analysis and stress tests are also conducted to determine the likely effect of adverse developments in financial markets on DTIs (see **Figure 1**).⁸⁶ As current regulations on capital requirements do not require DTIs to hold capital against market risk exposures, the estimation of VaR estimates by the BOJ allows for more detailed analysis of the financial stability of the banking sector.

⁸⁴ In order to limit the number of risk factors used, a limited number of repricing buckets are used for external bonds.

⁸⁵ This is a potential source of inaccuracy in the model as equity holdings may not be well diversified, with the possibility that some institutions can experience substantive gains in value while others experience losses. However, equity securities account for only a marginal share of total investments for most institutions and will therefore have a limited impact on overall returns for an investment portfolio.

⁸⁶ Examples of scenarios include unanticipated monetary tightening in the United States and sharp increases in the risk premium placed on emerging market debt.

Glossary

Asset Utilization	Measurement of the effectiveness of an institution's investment in earning assets. This ratio calculates the overall yield on earning assets.
Automated Clearing House	A facility that computes the payment obligations of participants, vis-à-vis each other based on payment messages transferred over an electronic system.
Central Securities Depository	An institution which provides the service of holding securities and facilitating the processing of securities transactions in a book entry (electronic) form.
Certificate of Participation	A financial instrument in which an investor has a <i>pro rata</i> share in a specific lease revenue made by a municipal or government entity and is subjected to annual appropriation.
Concentration Risk	The risk associated with the possibility that any single exposure produces losses large enough to adversely affect an institution's ability to carry out their core operations.
Consumer Confidence Index	An indicator of consumers' sentiments regarding their current situation and expectations of the future.
Credit Rating	An evaluation of the likelihood of a borrower's default on a loan. Sovereign credit ratings assess the likelihood that a sovereign entity will default on its obligations.

Credit Risk

The risk that a counterparty will be unable to settle payment of all obligations when due or in the future.

Deferred Net Settlement

The settlement of transfer orders netted at designated times between or among counterparties in order to economize on the number and value of transactions.

Delivery versus Payment

A mechanism which ensures that the transfer of payment from a payment system occurs if and only if the delivery of securities from a securities system occurs.

Disposable Income

The remaining income after taxes has been paid which available for spending and saving.

Financial Conglomerates

Financial institutions which undertake a wide range of activities such as banking, stocking broking, insurance and fund management.

Financial Intermediation

The process of channeling funds between lenders and borrowers. Financial institutions are regarded as financial intermediaries because of their role in transforming long-term lending or investment from shorter-term deposits or savings.

Fiscal Deficit

The excess of government expenditure over revenue for a given period of time.

Foreign Exchange Risk

The risk associated with potential losses incurred by an institution by holding foreign currency-denominated instruments due to adverse movement in the exchange rate.

Funds Under Management/ Managed Funds	The management of various forms of client investments by a financial institution.
GAP Ratio	The ratio of cumulative differences between interest bearing assets and liabilities over various time horizons (e.g. less than 1 year, 1-2 years) to total assets.
Hedging	Strategy designed to reduce investment risk or financial risk. For example, taking positions that offset each other in case of market price movements.
Interest Margin	The dollar amount of interest earned on assets (interest income) minus the dollar amount of interest paid on liabilities (interest expense), expressed as a percent of total assets.
Interest Rate Risk	The risk associated with potential losses incurred on various financial instruments due to interest rate movements.
Intraday Credit	Credit extended to a payment system participant that is to be repaid within the same day.
Large Value Transfer System	A payment system designated for the transfer of large value and time-critical funds.
Liquid Ratio	The ratio of average prescribed assets to average prescribed liabilities.
Liquidity Risk	The risk that a counterparty will be unable to settle payment of all obligations when due.
Net Open Position	The difference between long positions and short positions in various financial instruments.
Non-Performing Loans	Loans whose payments of interest and principal are past due by 90 days or more.
Off-Balance Sheet Items	Contingent assets and debts that are not recorded on the balance sheet of a company. They are usually note worthy as these items could significantly affect profitability if realized.

Payment System

A payment system consist of the mechanisms - including payment instruments, institutions, procedures, and technologies - used to communicate information from payer to payee to settle payment obligations.

Payment Versus Payment

A mechanism which ensures that the transfer of payment occurs if and only if the final transfer of a counterparty payment is simultaneously received.

Preferences shares

Capital stock which provides a specific dividend that is paid before any dividends are paid to common stock holders, and which takes precedence over common stock in the event of liquidation

Prescribed Liabilities

These refer to a) deposit liabilities, b) reservable borrowings and c) interest accrued and payable on a) and b).

Real-Time Gross Settlement System

A gross settlement system in which payment transfers are settled continuously on a transaction-by-transaction basis at the time they are received (that is, in real-time).

Repurchase Agreement (Repo)

A contract between a seller and a buyer whereby the seller agrees to repurchase securities sold at an agreed price and at a stated time. Repos are used as a vehicle for money market investments as well as a monetary policy instrument of BOJ.

Retail Payment System

An interbank payment system designated for small value payments including cheques, direct debits, credit transfers, ABM and POS transactions.

Stress Test

A quantitative test to determine the loss exposure of an institution using assumptions of abnormal but plausible shocks to market conditions.

Systemic Risk

The risk of insolvency of a participant or a group of participants in a system due to spillover effects from the failure of another participant to honour its payment obligations in a timely fashion.

Value at Risk (VAR)

A metric or statistical technique that seeks to estimate the loss that an institution will not exceed over a specified time period with a given probability.

