Assessing the Relative Cost-at-Risk of Jamaica’s Domestic Debt Maturities Before & After the Debt Exchange

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Abstract

A country that consistently records high fiscal deficits is one that is likely to have a heavy debt burden and possibly default on its debt. The recent global financial crisis has highlighted these problems and has forced such countries and others to implement necessary fiscal and debt sustainability measures. This is in a context where market variables became unstable and magnified financial risks that were already present. Additionally, the closure of the capital markets and the drying up of international liquidity forced a number of countries to take steps to implement fiscal and debt measures in order to access loans from multilateral agencies such as the IMF, World Bank and IDB. It is against this background that this paper attempt to examine the risks associated with Jamaica’s domestic debt maturity profile before and after the implementation of the Jamaica Debt Exchange (JDX) in February 2010, which was a pre-condition to borrowing from the IMF and multilateral financial institutions. The paper utilized the Relative Cost-at-Risk approach to ascertain if the risks that prevailed before the debt exchange have been reduced.

JEL Classification: E62, F31, D81, G32
Keywords: Fiscal Policy, Foreign Exchange, Criteria for Decision-Making under Risk and Uncertainty, Financial Risk and Risk Management

1 The views expressed in this paper are those of the author and in no way represent an official position of the Bank of Jamaica.
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1.0 Historical Review

Over the past decade Jamaica has been significantly challenged to achieve fiscal and debt sustainability, in a context of a weak domestic environment and its vulnerability to external shocks. Between FY 2000/01 and FY 2009/10, Jamaica’s debt has been on a rise (see Chart I, in Appendix). Incidentally, total debt as a per cent of gross domestic product (GDP) has reached 129.4 per cent end FY 2009/10, relative to 96.8 per cent end FY 2000/01 (see Chart II in Appendix). The upward trend in total debt reflects consistently high deficits as well as the realization of contingent liabilities. The fiscal account has shown signs of serious imbalance for most of the decade, with the deficit exceeding the international benchmark of 3.0 per cent of GDP, with the exception of FY 2000/01 and FY 2005/06 (see Chart III, Appendix). This is in a context where interest payments as a per cent of tax revenue have averaged 56.9 per cent amidst weak economic activities. The high deficit has been largely attributed to high interest payments resulting from high borrowing requirements and the sensitivity of the debt portfolio to interest rate and exchange rate shocks. This was exacerbated by revenue inflows that continued to fall short of targets, a reflection of the weak economic environment and an economy vulnerable to external economic shocks. Compounding the country’s problem was the realization of contingent liabilities which included costs of the financial sector rescue through the Financial Sector Adjustment Company Limited (FINSAC) as well as the assumption of liabilities on behalf of state owned entities such as Air Jamaica, Sugar Company of Jamaica (SCJ) and Clarendon Alumina Production Limited.2

FY 2000/01 – FY 2002/03

This period was marked by a sharp increase in the Government fiscal deficit as a per cent of GDP, with the ratio increasing to 6.9 per cent of GDP in FY 2002/03, relative to 0.8 per cent in FY 2000/01. The upward movement was against the background of a weakened domestic economy, and uncertainty in global financial markets and international trade following the terrorist attack on 11 September 2001 in the United

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2 FINSAC was established in January 1997 to resolve the problems of solvency and liquidity being experienced by the financial sector during the 1990s. Two of the five sugar estates operated by the SCJ were privatized in 2009 and negotiations continue with a view to divesting the remaining three. Air Jamaica divestment process began in April 2010 and CAP is schedule to follow shortly.
States (US). The prevailing uncertainty significantly affected the Government, as it grappled with the task of tabling credible budgets that would boost investors’ confidence in its fiscal policies. For example, in December of FY 2002/03, the Government furnished a supplementary budget, amidst fallout in its fiscal position. The supplementary budgeted reflected additional borrowing in the domestic market coupled with additional interest payments resulting from higher domestic interest rates since September 2002. This prompted the international rating agency Standard and Poor’s to downgrade the outlook on Jamaica’s sovereign debt from stable to negative, as the value of these bonds fall consequent on investor demand for higher yields to offset the risks.

The immediate response was an accelerated depreciation in the selling rate of the US Dollar and shift into foreign currency deposits. This occurrence was consistent with the heightened demand for foreign exchange during fourth quarter of FY 2002/03. It was against this background that the Bank of Jamaica (BOJ) drastically tightened its monetary policy stance during the March 2003 quarter to protect the net international reserve. In this regard, the Bank increased interest rates on its securities (with rates on the 365-day tenor reaching 36.95 per cent on 26 March 2003) and aggressively intervened in the foreign currency market. These actions were taken in an effort to maintain financial and price stability, and dampen further depreciation of the foreign exchange rate (see Chart IV). Further, this was in a context where fiscal policy was expansionary and exacerbated the depreciation in the exchange rate. The quarter also saw the BOJ providing financial support to the Government which had to meet a €200.0 million debt obligation in February 2003. The assistance was necessary as the uncertainty in the Global market was not conducive for the Government to borrow on the international capital market. Furthermore, the expansionary fiscal policy would have resulted in a crowding out effect in the domestic lending market. Given the government’s appetite for debt and investors uncertainty, the Government was forced to issue high cost short-term debt. This led to an increase in the stock of debt. In that, as a consequence the country debt stock reflected greater liquidity and refinancing risk. Notably, the level of interest rate during the March 2003 quarter would have been informed by the weakened growth in the domestic economy and increased government demand for financing.
FY 2003/04 – FY 2007/08

Following the challenges of FY 2002/03, the Government fiscal programme for FY 2003/04 was geared towards fiscal adjustment which saw an increase in the primary surplus through tax measures and expenditure savings. The fiscal discipline initiated a reduction in the debt to GDP ratio from 123.5 per cent in FY 2003/04 to 108.5 per cent in FY 2007/08. The fiscal stance was able to renew confidence in the domestic market which enabled the central bank to gradually ease monetary policy by lowering interest rates. The recovery in the external market positively influenced economic activities in domestic economy which showed signs of growth, and contributed greatly to the fall in the 12-month point-to-point inflation rate after March 2004 (see Chart V). Additionally, the Government was able to increase the weighted average age of new debt issues to 9.8 years in FY 2006/07, from 2.8 years in FY 2004/05, which contributed to the extension of the maturity profile.

FY 2008/09 – FY 2009/10

Following its success at containing the fiscal deficit from FY 2003/04 to FY 2007/08, Jamaica experienced an uptick in its fiscal and debt ratios in subsequent years (see Chart II and III, in Appendix). The worsening of these ratios reflected heavy financing demand by the Government, increased debt servicing cost consequent on a sharp rise in interest rates and investor demand for high cost short term Government securities. This position was against the background of the slowdown in the US economy and tightening in global liquidity. The ensuing global financial crisis had a negative impact on Jamaica’s financial and export sector. A number of local financial institutions were faced with margin calls, as the value of Jamaica’s global bonds which were used as collateral fell, consequent on a rise in bond yields. This occurrence resulted in a significant demand for US Dollars on the local market, which lead to a sharp depreciation of the exchange rate. In an effort to temper the depreciation, the Bank of Jamaica (BOJ) intervened in the market by increasing rates across all tenors of its open market instruments and employed moral suasion to establish a pact among foreign exchange dealers to limit competitive bidding. The crisis contributed to further fallout in the domestic economy, prompting the Government to implement a number of tax measures during FY 2009/10 in order to finance expenditure.
The economic fallout led to an identified foreign exchange gap which needed to be closed in FY 2010/11. As a result the Government approached some multilateral and bilateral agencies for borrowing. The Government approached the International Monetary Fund (IMF) for balance of payment support totaling US$1.25 million. Additional funds borrowed from other multilateral agencies would serve to support the country’s economic reforms and help it cope with the consequences of the global downturn. However, an approval by the IMF was contingent on Jamaica restructuring its debt portfolio through the implementation of a debt exchange aimed at reducing the fiscal deficit through lower interest cost. The implementation of a fiscal responsibility framework would ensure fiscal discipline and accountability within the public sector. These conditions were similarly required by the other multilateral agencies.

It is therefore the objective of the paper to determine the risks associated with the maturity profile of Jamaica domestic debt, before and after the debt exchange initiative, by utilizing the Relative Cost-at-Risk (RCaR) approach. This is in a context of ascertaining if the level of risks still exists after the debt exchange. The Relative Cost-at-Risk as a percentage of projected domestic interest payments was included in the assessment of the results and viewed alongside the available results of other countries. The RCaR was also examined by relating the value to projected GDP for the respective fiscal year.

2.0 Jamaica’s New Paradigm

2.1 Overview of Jamaica’s Debt Exchange

In order to receive funding from the IMF, the Government had to restructure its debt and implement a fiscal responsibility framework. The debt exchange was designed to provide the space for the Government to lower deficit based on lower interest payments. However, the benefits into the medium and long-term would be dependent on further decline in interest rates and the exchanging of existing high cost short-term debt.

On 14 January 2010, the Government announced its Debt Exchange Initiative, which was restricted to the domestic debt and only domestic resident bondholders. This decision was taken as interest rates on the domestic debt instruments were considered
excessively high, relative to the much lower rates on external debt. The exchange would incorporate debt issued prior or on 31 December 2009 and maturing on or after 24 February 2010. Participants in the JDX would receive a par-for-par exchange of old Government of Jamaica (GOJ) debt instruments for new long dated Benchmark Notes. The domestic portion of the debt portfolio was estimated at $700.0 billion. The Government targeted a participation rate in the debt exchange of close to 100.0 per cent (see Table II, in Appendix) in order to ensure that its objectives were met. Importantly, the allocation of old debt instruments for new Benchmark instruments was geared at reducing the level of volatility / risk in the debt stock. Hence, fixed rate (FR) instruments could only be exchange for new fixed rate benchmark instruments (BMI), US Dollar linked instruments for US Dollar BMI s while variable rate (VR) debt could be exchange for either FR, VR or inflation indexed BM. Notably, the Government estimates the cost saving impact of the JDX for FY 2010/11 at 3.0 per cent of GDP.

2.1.2 Impact of the JDX

On completion of the JDX, the Government obtained a voluntary 99.2 per cent participation rate was achieved. As such, for FY 2010/11, the GOJ will benefit from relatively lower domestic interest payments stemming from the cost saving impact of the JDX, as well as an improvement in the maturity profile (see Charts VI and VII). The JDX saw the conversion of 350 old GOJ instruments bearing average rate of 19.3 per cent with weighted average age of debt of 4.5 years to 25 new Benchmark Instruments with average rate of 12.5 per cent and having weighted average age of 8.9 years. Notably, accrued interest payment amounting to approximately $40.0 billion was made in February 2010.

Importantly, the success of the JDX not only fulfilled a vital precondition to the country receiving IMF support, but unlocked additional funding from bilateral and multilateral agencies such as the World Bank, Inter-American Development Bank and Caribbean Development Bank. This would result in loan flows amounting to US$2.4 billion. Of note, a portion of the funding was used to establish the Financial System Support Fund (FSSF) which will be available to Jamaican financial institutions that
experience financial difficulties consequent on participation in the JDX. To date, none of the FSSF has been used.

2.2 Summary of Jamaica’s Debt Strategy FY2010/11

Following the implementation of the JDX, the Government plans to maintain the maturity profile as at March 2010 and limit the number of Benchmark Instruments to 25. Additionally, a limited number of CPI indexed bonds will be offered to the market, the fixed rate portion of the domestic debt will be increased by 2.0 per cent to 58.4 per cent and reduce the US Dollar linked portion of the domestic debt to 12.0 per cent portion. Importantly, the government will seek to implement legislation governing debt management.

The outlined debt strategy is geared towards reducing the risk to the debt portfolio, in particular to interest rate and exchange rate shocks. As indicated above, the strategy to increase the FR portion of the debt will in essence reduce the composition of the VR portion of the debt. The latter being the riskier portion of the debt, given its sensitivity to interest rate movement. Additionally, the reduction of the US Dollar-linked portion will minimize additional cost resulting from significant depreciation on the Jamaica Dollar against the US currency. These components of the strategy will contribute to lowering the debt stock and place the trajectory of the debt to GDP ratio on a downward path. Notably, the Government plans to review its debt strategy with the aim of including analysis of cost/risk tradeoffs at end June 2010.

3.0 Literature Review

The development of a model that considers the costs and risks associated with the fiscal and debt sustainability should be updated from time to time to incorporate changes in the macroeconomic environment (domestic and foreign) and the risk tolerance of the issuer, as these factors would impact the composition of the existing debt portfolio.

Dooley (1997) considered that Governments should put their debt in homogeneous long-term domestic currency instruments, rather than in instruments

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3 See Government of Jamaica Information Memorandum: Invitation to Participate in the Jamaica Debt Instruments (revised 18 January 2010).
denominated in foreign currency. This is to avoid any additional costs that may be incurred in acquiring the foreign currency, in the event that there is an appreciation of the foreign currency relative to the local currency.\footnote{As at December 2009, 84.6 per cent of domestic debt was in domestic currency, 15.4 per cent US dollar denominated and the remainder in Euro. Source: Ministry of Finance and Public Service, Jamaica.} Any additional costs will contribute to an increase in the actual cost to service debt denominated in a foreign currency. In this case, the minimization and assessment of exchange rate risk will be critical. However, with Government’s assets being largely comprised of the discounted value of future taxes denominated in domestic currency, Cassard and Folkerts-Landau (1997) argue that this will put a limitation on Government’s ability to generate foreign currency revenue. Furthermore, De Fontenay and Jorion (2000) suggest that it would be in the interest of developing countries to diversify the currency composition of their external debt. This would reduce the risks associated with the impact of interest rate and exchange rate shocks on a country’s ability to meet its external debt obligations.

Cassard and Folkerts-Landau (1997) pointed out that, a developing country may fail to consider the costs that may result from an external shock when acquiring debt. Such costs in terms of output, reputation and welfare could lead to a financial crisis. They further indicated that a net foreign exchange exposure can worsen the economic impact of external shocks and limit the policy options available in the event of a financial crisis. On that note, it would be unwise to pursue an expansionary monetary policy during a financial crisis as there is the possibility of a sharp decline in the value of domestic currency. Such a depreciation of the currency would worsen a country’s indebtedness and risk profile and further magnify the financial crisis.

Blommestein (2006) and Wheeler (2004) believe it is essential to have strategic benchmarks as these relate to Government’s risk tolerance and the preferred portfolio regarding the trade-off between expected cost and risk. This would provide debt managers with a clear view of how to structure a country’s public debt portfolio on the basis of a cost and risk.\footnote{Cassard and Folkerts-Landau (2000) indicated the sound management of liabilities while considering the risks involved is one that is to a great extent independent of political influence. Political institutions should however suggest their debt strategy and policy constraints in the form of a benchmark portfolio to a debt manager or agency.} Once the optimal combination of instruments or portfolio is ascertained, the Government’s fiscal position would be controlled against risks within an
acceptable level given macroeconomic shocks, thus strengthen the country’s position against a fiscal crisis or avoiding the distortions of high and variable tax rates. Blommestein (2006) highlighted two examples where the protection against economic shocks is possible. Firstly, a portfolio of nominal fixed rate debt can help to protect the budgetary position from supply-side shocks. Secondly, inflation-indexed debt and variable interest rate debt are better hedges when it comes to demand shocks.

Some strategic benchmarks used by Wheeler (2004) included the ratio of domestic to foreign currency, fixed-rate to floating-rate debt, and the maximum refinancing ceilings and refinancing guidelines. The strategic benchmarks used by any Government should be reviewed and modified from time to time in order to assess its suitability. Wheeler (2004) indicated that modification(s) may be necessary in instances where there is a banking crisis, discovery of large minerals or energy and changes in policy regarding net foreign currency debt. He suggests that there should be a level of coordination between debt managers, fiscal policy advisors and central bankers. This is due to the level of interdependencies between their various policy instruments. Information relating to the Government’s current and future liquidity needs and any emerging debt sustainability problems should be shared with the other parties.

Papaioannou (2006) outlined some methods for assessing risk from the perspective of a sovereign debt manager. He examined duration, convexity, skewness and value at risk (VaR) as a measure of interest rate and exchange rate exposure. However, Jensen (2002) pointed out that given the differences in objective functions for foreign reserves and government debt, the VaR as a measure to monitor the risk position would be more appropriate for a financial institution rather than applying it to the Central Government outstanding debt. This is the case as the market value of outstanding debt does not carry as much weight as interest expenditure in the budget. In this regard, the Danish National Bank developed a Cost-at-Risk (CaR) model, a risk monitoring system for Government debt which is utilised in decisions on the composition of maturity profile and duration of new debt. The CaR model has been used by the Danish Government, Swedish National Debt Office, the United Republic of Tanzania, Canada and other countries as part of their risk management programme.

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6 See Jensen (2002)
Velandia (2002) indicated that a stochastic simulation can be used to quantify the risk associated with public debt. The module would utilize Monte-Carlo simulation to generate a large number of possible interest and exchange rate paths, each of which would generate a particular projection of future debt servicing flows. The cost is then given by the mean of all possible scenarios and risk is measured based on the dispersion of debt servicing paths around the mean. The mean can also be restricted to ensure the expected costs are market-neutral. Velandia’s quantification of risk is similar to that of the Danmarks Nationalbank (2004), except that future development in interest rates would be carried out using the Cox Ingersoll Ross (CIR) interest-rate model. The CIR model is a linear one factor model where the only stochastic factor is the spot rate (the short-term interest rate).

Holmlund (2003) utilized the Relative Cost-at-Risk to show how much higher than expected interest costs may be in a one-year perspective using debt maturing with the year. Smith (2006) in her measurement of the level of exposure to macroeconomic risks faced by Jamaica applied a Cash Flow at Risk (CFaR) model to Jamaica’s domestic debt stock over the medium term. She examined the vulnerability of the domestic debt maturity profile, focusing on all debt repricing in the fiscal year and also looked at the incremental CFaR as it relates to the component of the debt (fixed rate, variable rate and US$ linked).

4.0 Data and Methodology

The Relative Cost-at-Risk will be calculated for two scenarios, pre-JDX and post-JDX. The RCaR for the post-JDX scenario will attempt to ascertain if the level of risk that existed in the debt portfolio prior to the debt exchange still prevails. The data used in the calculation are:

- Domestic debt redemption profile as at December 2009 and after the JDX were acquired from the Ministry of Finance & Public Service, Jamaica.

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7 See Danish Government Borrowing and Debt 2003 report
8 Although VaR and RCaR are both based on statistical relationships and assumptions, the difference between the two lies in the outcome they focus on. VaR calculations measure the risk that the market value of the debt will climb. While, RCaR calculations measure the risk that the current interest costs of debt will increase without regard to market value effects.
180-day Treasury Bill (T-Bill) yields and end-month selling rate for the US Dollar ($J: US$1.00) were acquired from the Bank of Jamaica. The 180-day T-Bill yield was used as most of the debt in the debt portfolio prior to the JDX were repriced at this rate. The end-month selling rate was selected, as the US$ linked debt is converted with this rate. A sample size of 100 was selected for the calculation of both scenarios. The only exception was that, data for the pre-JDX scenario spanned November 2000 to February 2009. While data points for the post-JDX scenario ranged from February 2002 to May 2010.

The standard deviations for the monthly T-Bill and exchange rates were computed, from which the annualized standard deviations were then calculated. It is assumed that the standard deviation of the variables increases with the square root of time. The correlation between the interest rate and exchange rate was also calculated. It was assumed that all the debt maturing in the fiscal year would be reissued and the debt stock would be increased by the level of the projected deficit (see Appendix), which would be financed through the issuing of domestic debt. The issuance strategy is outlined below in Table 1.

The domestic debt maturities were summed for each fiscal year, to which the annualized standard deviations, for interest rate and exchange rate, and correlation coefficient were incorporated in a matrix to calculate the Relative Cost-at-Risk as outlined by Holmlund (2003). The RCaR as a percentage of projected interest payments for each fiscal year was calculated, which was viewed against the available results for two countries, Sweden and the United Republic of Tanzania. These two countries were only ones on which public information could be found. It should be noted that the results for the countries are for different years.

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10 See Table III & IV for the domestic debt maturities for each fiscal year.
4.1 Assumptions

Issuance Strategy

1. For simplicity, the paper assumed that the Government issuance strategy pre-JDX for new debt to finance the deficit and maturing debt to be reissued will mimic that of April – December 2009 (see Table 1). The assumption is that the volatility of and the correlation between the two variables would remain the same.

2. The issuance strategy for the post-JDX scenario will mimic the manner in which the debt exchange was carried out (see Table 1). This is in a context that the Government would continue to maintain its maturity profile with the reissue of each benchmark instrument that matures.

3. The projected deficit for a fiscal year would be financed through the issue of domestic debt instruments in the manner indicated in assumptions 1 & 2 above.

4. The exposures that affect the interest payments are a linear combination of normally distributed variables.

5. The T-Bill yield and end-month selling rate are assumed to be normally distributed.
Table 1: Issuance Strategies for Pre and Post JDX.

<table>
<thead>
<tr>
<th>Issuance Strategy</th>
<th>Maturity profile</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Within 2 Year 3 Years 4 Years 5 Years per</td>
<td></td>
</tr>
<tr>
<td>Pre-JDX Strategy</td>
<td>a Year 2 Year 3 Years 4 Years 5 Years and above</td>
<td>cent (%)</td>
</tr>
<tr>
<td>(April – December 2009) $J US$ linked</td>
<td>42.0 12.1 9.3 4.5 20.3</td>
<td></td>
</tr>
<tr>
<td>Post - JDX $J US$ linked</td>
<td>8.0 2.8 9.3 7.8 66.2</td>
<td></td>
</tr>
</tbody>
</table>

5.0 Model: Relative Cost at Risk

In assessing the risk associated with the maturity profile of Government domestic debt, a Relative Cost at risk (RCaR) model was used. The methodology follows that outlined by Holmlund (2003). A Cost-at-Risk model can be measured as either Absolute Cost-at-Risk or Relative Cost-at-Risk (RCaR). Absolute Cost-at-Risk measures the maximum interest cost with an associated probability in the given period, while RCaR gives the difference between Absolute Cost-at-Risk and the expected interest cost. It is important to note that the RCaR and Absolute Cost-at-Risk are approximate measures, based on statistical relationships and normal distribution assumptions, which are implied by the volatility and correlation between historical interest rates and exchange rates.

In this paper, the RCaR was measured using the annualized volatility of the interest rate and exchange rate with a 95 per cent probability. In the section that follows, the RCaR for Jamaica’s domestic maturity profile was estimated for the periods prior to and immediately following the debt exchange.

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11 Danish Government Borrowing and Debt -2005
5.1 Measuring the Relative Cost-at-Risk

With the use of historical data for the yield on the 180-day Treasury Bills and exchange rate, the volatility of these variables as measured by the standard deviation were calculated. Rather than using the simple calculation of standard deviation, the paper utilized the exponential weighted moving average (EWMA) methodology to calculate the volatility. The EWMA is an improvement on the simple variance, in that, the EWMA approach gives recent returns a higher weighting in computing the variance, unlike the simple variance where all returns earn the same weight.\(^\text{12}\) This measure of volatility introduces lambda (\(\lambda\)) a smoothing parameter which is less than 1.\(^\text{13}\) The EMWA was computed as follows:

\[
\text{Monthly Variance} = \sigma_m^2 = \sum_i^n \ln \left( \frac{S_i}{S_{i-1}} \right)^2 (1 - \lambda) \lambda^{1-i} \tag{1}
\]

\[
\text{Annualized Standard Deviation} = \sigma = \sigma_m^* \sqrt{12} \tag{2}
\]

where,
- \(S_i\) = variable of interest (interest rate or exchange rate)
- \(i\) = time
- \(n\) = number of observations
- \(\lambda = 0.97\) (this value for smoothing parameter is used with most financial data).

The standard deviations for the cost increases based on the various risk factors were computed as follow.

\[
\sigma_c^r = DM * \sigma_r^r \tag{3}
\]

\[
\sigma_c^{FX} = DM * \sigma_r^{FX} \tag{4}
\]

where,
- \(r\) = average yield on the 180-day Treasury Bills
- \(FX\) = the weighted average selling rate of the US Dollar
- \(\sigma_r^r\) & \(\sigma_r^{FX}\) = standard deviation for cost increase related to the relevant risk factors
- \(DM\) = Domestic Debt maturing within the fiscal year (debt slated for maturity and

\(^{12}\) See Harper (2007). A GARCH (1,1) (General Autoregressive Conditional Heteroscedasticity) model may provide similar result to a EWMA model.\n
\(^{13}\) Under this condition, instead of equal weights, each squared return is weighted by a multiplier.
the portion of projected deficit issued to mature within the fiscal year).

The overall standard deviation for the cost increases, represented by $\sigma_c$, was computed using equation [5]. The equation included the correlation between interest rate and exchange rate assessed by the Pearson correlation, represented by $\rho_{rFX}$. It should be noted that the overall risk of debt maturing within a fiscal year will be less than the sum of the individual risks as the risk factors are not perfectly correlated.

$$\sigma_c = \sigma_c^2 = \left[ \sigma_r^2 \sigma_{FX}^{-1} \right] \begin{bmatrix} 1 & \rho_{rFX} \\ \rho_{rFX} & 1 \end{bmatrix} \begin{bmatrix} \sigma_r^2 \\ \sigma_{FX}^{-1} \end{bmatrix}$$ \quad [5]

Since there is an interest in assessing the overall standard deviation with a 95 per cent probability, the overall standard deviation was multiplied by 1.65 as depicted in [6].

$$RCaR = \sigma_c * 1.65$$ \quad [6]

6.0 Results and Discussion

6.1 Pre-Debt Exchange

The Relative Cost-at-Risk as a per cent of projected domestic interest payment for each fiscal year was projected at 48.6 per cent and 56.3 per cent for FY 2010/11 and FY 2011/12, respectively. As per issuance strategy for pre-JDX in Table 1, which was applied to new debt issued. This indicates that there was a 95.0 per cent chance that costs may be as high as 56.6 per cent above projected interest payments by FY 2011/12, given the current track. Therefore, interest payments for FY 2010/11 and FY 2011/12 could have exceeded expectations by $62.4 billion and $69.6 billion, respectively, with a 95 per cent probability. The RCaR for FY 2010/11 was equivalent to 5.0 per cent of the projected GDP for FY 2010/11. This figure signifies the maximum possible deterioration in the Government’s projected fiscal balance in the fiscal year based only on the interest
costs, and if realized would indicate a serious fiscal imbalance, given the international benchmark of 3.0 per cent.

Chart 1: The Relative Cost-at-Risk as Per Cent of Projected Interest Payments

<table>
<thead>
<tr>
<th>RCaR as Per cent of Project Interest Payments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per cent</td>
</tr>
<tr>
<td>0.0</td>
</tr>
<tr>
<td>10.0</td>
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<tr>
<td>20.0</td>
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<tr>
<td>30.0</td>
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<tr>
<td>40.0</td>
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<tr>
<td>50.0</td>
</tr>
<tr>
<td>60.0</td>
</tr>
<tr>
<td>FY2010/11</td>
</tr>
<tr>
<td>48.6</td>
</tr>
<tr>
<td>FY2011/12</td>
</tr>
<tr>
<td>56.3</td>
</tr>
</tbody>
</table>

The results in Chart 1 reflect the vulnerability of domestic debt maturities, based on the issuance strategy in prior fiscal years. In regards to FY 2010/11, the RCaR as a per cent of projected interest payments value of 48.6 per cent was largely attributable to the issues in FY 2009/10 and FY 2008/09. The result points to the limited success the Government had in extending the maturity profile of the domestic debt instruments, as investors’ demand was for short-term tenors, given the prevailing uncertainties in financial markets and the genesis of the global financial crisis.

The results can be viewed in light of the fact that the proportion of Jamaica’s domestic debt maturing within 5 years and less was 73.1 per cent at end-March 2004, declined to 57.1 per cent at end-March 2007 but increased to 67.4 per cent by end-March 2009 (see Chart VIII, Appendix I). This period marked by uncertainty in the domestic market due to its vulnerability to the crisis at the time. Additionally, investors’ would have loss confidence in the Government fiscal measures and Standard and Poor’s would have downgraded the Government global bonds from stable to negative. These factors would have impacted exchange rate depreciation would contributed to high inflation rate,
prompting the BOJ to increase rates. In this regard, the 12-month point-to-point rate was 16.6 per cent and the yield on the 180-day T-Bill was 23.5 per cent. These factors would have influenced investors action to gravitate towards short-dated high cost government instruments. Notably, debt maturing within a year, which accounted for a significant portion of debt, was 21.0 per cent at end-March 2004, declined to 13.1 per cent at end-March 2007 after which increased to 18.6 per cent at end-March 2009. Consequently, the Government was exposed to relatively high rollover risk, very high refinancing cost and very high cost short-term debt. This is simply because interest payments are less certain when debt has to be rolled more frequently.

The manner in which the Government issued its domestic debt during the past decade was undoubtedly a function of investors’ demand, which was reflective of the prevailing macroeconomic environment. The RCaR for FY 2010/11 was greatest for issues from FY 2008/09, a period in which real economic growth was negative 1.0 per cent. Of note, the contribution to the RCaR from issues in FY 2006/07 was zero. What was interesting about this fiscal year was that the real growth rate was 2.4 per cent, the highest realized for the past five fiscal years. The growth in the economic was indication of recovery in the global economy which translated to increased activities within the domestic economy. Furthermore, the fiscal adjustments implemented at this time also boosted economy activity and would have influence the easing of monetary policy. In addition, there was interest rate and exchange rate stability as well as a downward trend in inflation three fiscal years prior to FY 2006/07. Consequently, the Government of Jamaica (GOJ) was able to issue debt with a longer tenor in which the average weighted age of new domestic issues was 9.8 years, the highest recorded over the last five fiscal years (See Table I, Appendix I). This highlights the point that the GOJ will be more successful in issuing domestic debt with longer tenors as well as reduce the RCaR when there is or sign of real economic growth.

For countries with long records of surpluses, governments have the ability to issue bonds with a longer tenor. Denmark’s government, for example, has been able the concentrate its issuance strategy on the 10-year maturity segment due to its ability to record surpluses over the years. Jamaica on the other hand has consistently recorded

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14 Danish Government Borrowing and Debt 2007
high deficits for the past decade, FY 2000/01 to FY 2009/10, and as a result has been
challenged in issuing long-term debt. Additionally, with a greater portion of Jamaica’s
debt having a short tenor, 5 years and less, the country’s maturity profile was more
susceptible to shocks to interest rate and exchange rate stemming from international
factors.

To put this in perspective, these results before the JDX were viewed in
comparison to other countries. Table I shows the RCaR as per cent of projected interest
payments for two countries. As indicated above, public data were only available for
these two countries. Of note, these countries these countries did not effect a debt
restructuring.

Table I: Relative Cost-at-Risk as Per Cent of Projected Interest Payments for a Few

<table>
<thead>
<tr>
<th>Country</th>
<th>RCaR as Per Cent of Projected Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Target</td>
</tr>
<tr>
<td>Swedish National Debt Office Bank (2005)</td>
<td>10-15 %</td>
</tr>
<tr>
<td>The United Republic of Tanzania (2001)</td>
<td>15.0 %</td>
</tr>
<tr>
<td><strong>Jamaica: Pre-JDX scenario FY2010/11</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong>Post-JDX scenario FY2010/11</strong></td>
<td>None</td>
</tr>
</tbody>
</table>

In 2001, the United Republic of Tanzania’s RCaR as a per cent of budgeted
interest payments with 95.0 per cent probability was 50.6 per cent. This estimate was
obtained at a time when 45.0 per cent of domestic debt was due to mature in less than
three years. Tanzania Debt Strategy Report (2002) indicated that it would have required
two to three years of sustained low inflation and stable interest rate to lower the figure to
reasonable levels, such as 15.0 per cent of budgeted cost.16

In relation to Jamaica, Jamaica’s RCaR as per cent of projected interest payments
for FY 2009/10 was 28.7 per cent. Any attempt at lowering this and future ratios would
require an improvement in the macroeconomic environment, a larger focus on risk which
has implications for debt servicing costs. Whether the RCaR is excessive or too little

16 See The United Republic of Tanzania Ministry of Finance National Debt Strategy: Background Study on Domestic
& Total Debt (2002).
would depend on how much risk the Government is willing to take in its debt management.

6.2 Post-Debt Exchange

The financial crisis necessitated an approach to the multilateral institutions for financial support given the closure of the international capital market. However it was recognized that borrowing from the International Monetary Fund via a Stand-By Agreement (SBA) would require a programme of reform as well as some pre-conditions which would put the country on a sustainable fiscal and debt path. In this regard, a pre-condition was the implementation a debt exchange (JDX) of its domestic debt stock in February 2010.

The implementation of the debt exchange resulted in an extension of the maturity profile, as depicted in Chart VI in Appendix. This contributed to RCaR as a per cent of projected interest payments for FY 2010/11 and FY 2011/12 of 19.1 per cent and 11.6 per cent, relative to the estimates before the debt exchange of 47.8 per cent and 56.6 per cent, respectively, see Chart 3. This suggests that interest payments post-JDX are not expected to exceed projected payments by $28.1 billion and $15.6 billion, respectively, that is with a 95.0 per cent probability. Importantly, the estimates after the JDX assumes that the medium-term macroeconomic projections hold true, that is, stable inflation, interest rate and exchange rate, and the Government will maintain the maturity profile with the 25-New Benchmark Instruments.
6.3 Scenario Analysis: Post-JDX

If the Government should find itself failing to meet the quarterly targets after end-March 2011 and return to issuing new debt in a manner similar to that of FY 2009/10, then the RCaR as a per cent of projected interest payments for FY 2011/12 would rise to 29.9 per cent. This would suggest that interest payments could exceed expectations $40.1 billion, with a 95.0 degree of certainty. This is in a context, that the debt portfolio before the JDX comprised highly with short-term high cost debt. Additionally, the portfolio was extremely sensitive to interest rate and exchange rate shocks, as indicated by the RCaR for the pre-JDX scenario.

7.0 Conclusion & Recommendations

Fiscal and debt sustainability is of great importance for countries that continue to record high deficits and have unstable debt burdens. This unfavorable situation might be made even more untenable in the context a financial crisis rendering Government securities unattractive. The results of the paper found that Jamaica’s Relative Cost-at-Risk (RCaR) as a per cent of projected interest payments for FY 2010/11 post-JDX was 19.1 per cent, relative to that of 48.6 per cent pre-JDX if the short maturity profile had
persisted. As such, the risk associated with the Governments debt portfolio was significantly lowered given the implementation of the JDX.

The short maturity profile of the old debt portfolio also contributed to a high RCaR in the pre-JDX scenario, when compared to the lower RCaR which was made possible by the extension of the domestic debt portfolio and the cost saving impact stemming from the implementation of the debt exchange. Notably, this should be viewed against the background that Jamaica has not been able to maintain a low fiscal deficit over the past decade and reduce the composition of the debt structure with high cost short-term debt instruments, which would have been a function of the weak macroeconomic environment. In addition, lower RCaR for the future will also be dependent on continued stability in the domestic macroeconomic environment. The continued success would therefore smooth the domestic amortization profile and reduce the refinancing risk. However, given the unpredictability of financial crisis, developing countries with a large portion of their debt denominated in foreign currencies will encounter serious policy challenges, more so during a financial crisis. These challenges, as pointed out by Cassard and Folkerts-Landau (1997), will revolve around managing the value of the local currency, as well as the associated interest rates and maturity risks.

The Relative Cost-at-Risk model is a simple model that gives a description of the risks and should be used from a tactical perspective, given other strategic decisions. Continuous risk assessment should be a key element in ensuring medium term debt sustainability. The Jamaican economy has showed that the level of coordination better fiscal policy and the monetary policy is important in managing the domestic liquidity, price stability and the value of the Jamaican Dollar.

The failure of the Government to manage the maturity profile of the current debt portfolio could result an increase in the RCaR, within the medium-term. As such it is necessary that they at minimum the Government maintain the current strategy to issue no greater than 25 instrument’s with rate offered ranging from 11.00 per cent to 13.25 per cent and tenors of 3-months to 30-years. Any adjustment to this strategy must be carefully examined given the potential negative impact of the domestic economy and external factors on the debt stock. Further, the Government should maintain its fiscal

17 Such as, how varying issuance strategies may affect the associated risks.
discipline, as this will boost confidence in its fiscal measures and allow for further easing of monetary policy.
8.0 References


Ministry of Finance and Public Service, Jamaica. 


9.0 Appendix I

9.1 List of Charts

Chart I: Trend in Total Public Debt

Chart II: Total Debt/GDP
Chart III: Fiscal Parameters as a Per Cent of GDP

Chart IV: Trend in the Exchange Rate
Chart V: Trends in Key Macroeconomic Variables

Chart VI: Domestic debt Maturity profile before and after the JDX
**Chart VII:** Comparison of Interest and Non-Interest Expenditure

![Chart VII: Comparison of Interest and Non-Interest Expenditure](image)

**Chart VIII:** Jamaica’s Domestic Maturity Profile

![Chart VIII: Jamaica’s Domestic Maturity Profile](image)
9.2 List of Tables

Table I: Illustration of the Age of Domestic Debt Issues Since FY2004/05

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Weighted Average Age of New Domestic Debt Issues* (years)</th>
<th>Average Age of Domestic New Debt Issues (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004/05</td>
<td>2.78</td>
<td>3.68</td>
</tr>
<tr>
<td>2005/06</td>
<td>4.73</td>
<td>4.98</td>
</tr>
<tr>
<td>2006/07</td>
<td>9.77</td>
<td>13.42</td>
</tr>
<tr>
<td>2007/08</td>
<td>5.24</td>
<td>7.67</td>
</tr>
<tr>
<td>2008/09</td>
<td>2.84</td>
<td>4.16</td>
</tr>
<tr>
<td>April –December 2009</td>
<td>3.96</td>
<td>3.54</td>
</tr>
</tbody>
</table>

*The weighted average age is the summation of each nominal value of the debt times the age of the debt all divided by the number of issues.

Table II: Summary Term Sheet

<table>
<thead>
<tr>
<th>Expiration Date</th>
<th>January 26, 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Settlement Date:</td>
<td>February 24, 2010</td>
</tr>
<tr>
<td>Eligible Bonds</td>
<td>$700.0 billion local law bonds (FR/VR/USD)</td>
</tr>
<tr>
<td>Transaction Type:</td>
<td>Par-for-par exchange offer</td>
</tr>
<tr>
<td>New Bonds:</td>
<td>25 new benchmark bonds</td>
</tr>
<tr>
<td>Pricing:</td>
<td>New Jamaican Dollar bonds priced in the range of 12-13%</td>
</tr>
<tr>
<td>Allocation Rules*:</td>
<td>All exchanges will be from shorter dated bonds to longer dated bonds</td>
</tr>
<tr>
<td>Target participation:</td>
<td>Substantially 100%</td>
</tr>
</tbody>
</table>


18 The government may exercise its reallocations rules in the event that eligible investors submit offers in excess of $50.0 billion in respect of any one series of New Notes. See Government of Jamaica Information Memorandum: Invitation to Participate in the Jamaica Debt Exchange, 14 January 2010.
Calculating Projected Interest Payments:

\[ \text{ProjDebt}_t = \text{Debt}_{t-1} + \text{ProjDeficit}_t \]

\[ \text{ProjIntPay}_t = \left[ 0.6 \times \text{ProjDebt}_t \times (\text{ProjOMOIR}_t + 0.015) \right] + \left[ 0.4 \times \text{ProjDebt}_t \times \text{AvgIRon} \quad \text{FRDebt}_t \right] \]

Where,

- \( \text{ProjDebt} \) = Projected Debt
- \( \text{Debt} \) = Debt
- \( \text{ProjOMOIR} \) = Projected OMO Interest Rate
- \( \text{AvgIRon} \quad \text{FRDebt} \) = Average Interest Rate on Fixed Rate Debt
- \( t \) = Time