

November 18, 2002

Mr. Raul Regalado, President and CEO
Members of the Board of Commissioners
Metropolitan Nashville Airport Authority
One Terminal Drive, Suite 501
Nashville, TN 37214

Report of Internal Audit Section

Dear Mr. Regalado and Board of Commission Members:

We have recently completed a review of certain derivative contracts executed by the Metropolitan Nashville Airport Authority (MNAA). This review was conducted at the request of the Director of Finance of the Metropolitan Government of Nashville and Davidson County.

Our objectives for this review included: (1) Conduct a detailed review of the risks associated with all interest rate swap contracts currently in place at MNAA, (2) Analyze the prudence of the current interest rate swap contracts, and (3) Develop recommendations for MNAA relative to any future interest rate swap contracts.

November 18, 2002
Mr. Raul Regalado
Page 2

In completing this review we retained the services of KPMG Investment Advisors, an affiliate of KPMG LLP, to work under our direction. KPMG issued a detail report of their analysis, findings, and recommendations, which is attached to this report.

Scope and Procedures

This review was initiated in March, 2002 and focused on four derivative contracts as of June 30, 2002 as follows:

	<u>Notional Amount</u>
Sogen Swap	\$53,500,000
6.0% Knock-in Barrier Swaption	53,500,000
6.5% Knock-in Barrier Swaption	64,730,000
7.0% Knock-in Barrier Swaption	29,355,000

The notional amount reflects the amount of the underlying debt upon which the swap payments are to be based. These derivatives mature in 2015 through 2019.

The procedures performed by KPMG included:

- Reviewing any MNAA debt policies,
- Reviewing the terms and conditions of each swap contract,
- Assessing any analysis performed to evaluate swap contracts prior to execution,
- Modeling the financial aspects of each contract against various market conditions,
- Determining the financial and economic sensitivity to market changes, and
- Reviewing the risks associated with each swap contract.

Findings and Recommendations

As a result of their review, KPMG issued the attached report detailing their analysis, findings, and recommendations. Early in their review, KPMG concluded that the risks associated with the Sogen Swap were minimal. As a result, most of their analysis focused on the three knock-in barrier swaptions, and the more significant matters noted in their report are primarily related to those derivative contracts.

KPMG found that the three knock-in barrier swaptions were complex derivative contracts that are speculative in nature. While KPMG had encountered basic interest rate swap derivatives in other airport reviews, they had not encountered speculative derivatives among their other airport clients as complex as those in place at MNAA. KPMG also concluded that the contracts were executed without sufficient independent analysis. While MNAA reviewed historic interest rates and concluded that there was little probability of interest rates staying above the barrier rates long enough to trigger an increase in the interest rates MNAA would have to pay, KPMG concluded that the contracts were priced under the assumption that there was a 40% chance that such an interest rate barrier breach would occur during the term of the contracts. If such a breach were to occur prior to 2010, KPMG concluded that it would likely have a materially negative impact on cash flow.

KPMG recommended that any future derivative contracts be independently analyzed prior to execution. Further, KPMG did not find that MNAA had a debt management strategy in place that integrated a debt policy and a derivative policy, and they recommended that such policies and an overall debt strategy be adopted before any derivative contracts are considered in the future.

The knock-in barrier swaption contracts and KPMG's analysis are complex, and their attached report addresses the contracts and analysis in detail and includes additional background on the nature of derivatives in Appendix III.

November 18, 2002
Mr. Raul Regalado
Page 4

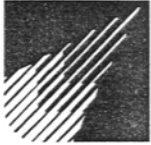
Management's response to the audit recommendations is attached to this report. As part of their response, management included a probability analysis conducted by Deloitte & Touche. The Deloitte analysis concludes that the likelihood of interest rate barriers being breached was low – 10.11% and under at the time the transaction was entered - which supports MNAA's view that they expected to make money on the transaction. The Deloitte analysis would have been based on historic interest rate movements, and does not contradict KPMG's conclusion that the transaction was actually priced based on interest rate option movements at the time of the transaction that implied a 40% likelihood that the interest rate barriers would be breached. Further, the Deloitte analysis does not contradict KPMG's conclusion that the transaction itself was speculative in nature.

This report is intended for the information of the management of the Metropolitan Government of Nashville and Davidson County. This restriction is not intended to limit the distribution of this report, which is a matter of public record.

Internal Audit Section

Kim McDoniel
Internal Audit Manager

Copy: Mayor Bill Purcell
Karl F. Dean, Director of Law
David L. Manning, Director of Finance
Eugene Nolan, Associate Director of Finance
Metropolitan Council Audit Committee
Richard V. Norment, Director of County Audit
KPMG, Independent Public Accountant



METROPOLITAN NASHVILLE AIRPORT AUTHORITY

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DIRECTOR OF FINANCE
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November 12, 2002

Mr. David L. Manning
Director of Finance
Metropolitan Government of Nashville of Davidson County
106 Metropolitan Court House
Nashville, TN 37201

Dear Mr. Manning:

This letter is acknowledgement that the Metropolitan Nashville Airport Authority (MNA) has received the Audit Report (Report) recently completed by KPMG on behalf of the Metropolitan Government of Nashville and Davidson County Department of Finance.

After thorough review of the Report, the MNA agrees with the findings that the MNA adopt a formal debt management policy and retain the services of an independent financial adviser. We are determined to evaluate all of the other issues raised in the Report. Additional comments to specific findings are included in the attached staff analysis.

We would like to express our appreciation again for your assistance and cooperation during this process. Any improvements we can make in our financial practices benefit the MNA as well as the customers and community we serve.

Sincerely,

Raul L. Regalado
President and CEO

/arh

Attachment


R. Clayton McWhorter, Chairman
James H. Cheek, III, Vice Chairman
Ann Butterworth, Secretary
Bill Purcell, Mayor

COMMISSIONERS
J. D. Elliott
Betty J. Marshall
Bert Mathews

Gilbert S. Merritt
Juli H. Mosley
Irby C. Simpkins, Jr.

PRESIDENT and CEO
Raul L. Regalado, C.A.E.

INTEROFFICE MEMORANDUM

TO: RAUL REGALADO
FROM: DOUG WOLFE 
SUBJECT: KPMG AUDIT RESPONSES
DATE: 11/12/2002

As you know, our nation has seen many changes in the economy since the tragic events of September 11, 2001. In response to these economic shifts, airports across our country are re-evaluating their financial decisions and practices. Thus, we appreciate the fact that the Finance Department for Metropolitan Nashville and Davidson County retained KPMG LLP (KPMG) to review the Airport Authority's derivative transactions as we continuously strive to improve our policies and financial practices. The Executive Summary report by KPMG recommends some valid practices to be implemented.

In reviewing KPMG's analysis of our derivative transactions, it is of our opinion that KPMG did not fully address or recognize the following:

- Business Purpose - The events of September 11, 2001 significantly impacted the Airport's cash projections. Based on these projections, there was a high probability that we would be in default to certain debt covenants. At that time, short-term borrowings were not feasible and long-term debt would not positively impact our situation; the Knock-In Barrier Swap provided the best option for providing additional funds to comply with the Authority's debt covenants.
- Probability of Deliverance - KPMG's analysis did not address the likelihood of the options ever being delivered to MNAA on the Knock-In Barrier Swap. In a review performed by our consultant, Deloitte & Touche LLP, the likelihood that MNAA will pay the counterparty any money is 1% or less. Thus, the positive cash flow impact to MNAA is approximately \$3.85 million.
- Uniqueness of Transaction - In their report, KPMG stated that airports and tax-exempt revenue bond issuing institution have entered into basic interest rate swap agreements, however they were unaware of any such institutions entering into swap agreements similar to MNAA's. Despite the information provided in the analysis by KPMG, there are several examples of airports and other municipalities having used this type of derivative transactions including:

- Philadelphia International Airport
- Tampa International Airport
- Orlando International Airport
- Pennsylvania Intergovernmental Cooperation Authority
- Alabama Public Schools and College Authority
- City of Chicago

Attached are specific responses to the KPMG report findings. MNAA management has reviewed KPMG's recommendations and found that in light of the recent economic and the financial challenges faced by the airline industry, the Authority's decisions to participate in the reviewed derivative transactions to be of sound judgment. This decision was not only supported by extensive research by the Authority, but was reiterated by an attached report created independently by our consultant, Deloitte & Touche LLP.

MNAA Management Responses to a KPMG Review of Certain Derivative Contracts Executed by MNAA

This is a response by management of the Metropolitan Nashville Airport Authority ("MNAA") to the report prepared by KPMG LLP ("KPMG") at the request of the Internal Audit Section of the Finance Department for Metropolitan Nashville and Davidson County ("METRO"). KPMG was retained by METRO to review the derivative usage of MNAA. This included reviewing the risk monitoring and risk management of MNAA, the economic sensitivity of existing derivative contracts to financial market changes, and MNAA's counterparty risks.

Since the KPMG report predominantly covers one derivative transaction, the Knock-In Barrier Swap, our responses will be limited to the KPMG Executive Summary. We will provide an overall response to the report (i.e. a MNAA executive summary similar to the one prepared by KPMG), and we will provide feedback/responses to various points made in the report.

MNAA Executive Summary:

Management of MNAA takes the role of representing the traveling public in Middle Tennessee and surrounding regions seriously in managing the Nashville International Airport. Our stewardship includes evaluating all financial instruments, including derivatives, which are economically advantageous for MNAA. We do not enter into derivative transactions lightly, and all such transactions require the approval of both the Airline Affairs Committee (comprised of the signatory airlines serving the Nashville International Airport) and the MNAA Board of Commissioners. We have a good track record of managing the costs of the Nashville International Airport. The Nashville International Airport's costs to the airlines are among the lowest in the country (confirmed by KPMG in their report on page 7), which has resulted in the favorable air service that our community enjoys today. We do not feel the air service at the Nashville International Airport or our financial condition would be in the position it is today if we had not taken advantage of the financing structures similar to the subject of this review.

KNOCK-IN BARRIER SWAP

In order to help fund the Nashville International Airport's capital budget for fiscal year 2002 (July 1, 2001 to June 30, 2002), we included cash proceeds from a Knock-In Barrier Swap. Prior to preparing our FY '02 budget, we received various financing proposals from different entities. In determining which transaction to consummate, we reviewed such things as risk, MNAA objectives, and airline objectives. Based upon our review, it was felt that a Knock-In Barrier Swap was the transaction most suitable for our needs. We presented this option to the signatory airlines that have majority-in-interest (MII) approval at the Nashville International

Airport to obtain their approval. The signatory airlines approved the use of such a financial transaction unanimously. Our Board via the approval of our FY '02 operating and capital budgets then approved this transaction in principal.

The tragic events of September 11, 2001 had a significant impact on the airline industry and a significant impact on our financial condition. Thus, during September and October of 2002, we performed numerous cash flow projections that were based upon the projected traffic of the airlines serving Nashville. These cash flow projections were unfavorable and indicated a strong possibility of MNAA not being in compliance with certain outstanding debt covenants. Thus, MNAA needed additional funds generated from sources other than long-term debt in order to remain in compliance with its debt covenants. After September 11, 2001, credit markets were not open to airports due to the volatility of the airline industry. Therefore, short-term borrowings were not feasible and could not help MNAA meet its debt covenants. As a result, we reviewed the financial feasibility of a Knock-In Barrier Swap and began the negotiation process to enter into a Knock-In Barrier Swap that was tied to the Bond Market Association ("BMA") Municipal Swap Index rate. Before entering into such an agreement, a financial and historical review of the BMA index was performed and concluded the following:

- Since November 1981, the 6%, 6.5% and 7% BMA barriers had not been broken (six-month rolling average) since October 1990, September 1989, and September 1982, respectively.
- The BMA has averaged on a six-month rolling average from November 1981 to October 3, 2001 greater than 6%, 6.5% and 7%, 134, 50, and 22 times, respectively. This translates to the fact that in the last 20 years, the BMA six month rolling average did not penetrate the aforementioned barriers 87%, 95% and 98% of the time.
- The average BMA rate from the time frame of November 1981 to October 3, 2001 had been 4.41%.
- The last ten-year average BMA rate through October 2001 had been 3.30%.

Based upon our review of the BMA/JJ Kenny indices, we recommended to the MNAA Board Finance Committee that we execute a Knock-In Barrier Swap containing barriers of 6%, 6.5% and 7%. The MNAA Board approved the execution of this transaction, and we began negotiating with the selected counterparty and executed the transaction, which resulted in a payment to MNAA in the amount of \$3,853,000.

MNAA MANAGEMENT RESPONSES TO KPMG EXECUTIVE SUMMARY:

In reviewing the Executive Summary prepared by KPMG, the following specific comments are provided:

- KPMG states Page 4, "Our review has concluded the derivatives have been priced with a 40% chance a breach will occur".

This is the essence of this particular transaction, because if the barriers are never breached, then MNAA received \$3.853 million dollars without having to repay any monies. Based on an analysis of historical data, the probability of the barriers ever being breached was determined to be very low (much lower than the 40% stated above). Due to this assertion, we commissioned Deloitte & Touche LLP to calculate the prospective probability. Their report is included as an attachment to our responses. Based upon their analysis, the lifetime cumulative likelihood to occur (or "LTO", i.e., the cumulative probability of the counterparty exercising the swaption) for the respective barriers are shown below:

Barrier Level	Prospective Probability as of July 31, 2002	Prospective Probability at the Time of Transaction, October 24, 2001
6.0%	1.03%	10.11%
6.5%	0.01%	0.17%
7.0%	0.0017%	0.04%

Following the calculation of the LTO, Deloitte & Touche calculated the cumulative expected values of payment (or "EVOP", i.e., the cumulative expected values of payments under the obligation). The expected value of (net) payments by MNAA to the counterparty are shown below:

Barrier Level	Expected Value of Net Payments as of July 31, 2002	Expected Value of Net Payments at the Time of Transaction, October 24, 2001
6.0%	\$2,578.21	\$35,327.54
6.5%	\$16.70	\$568.91
7.0%	\$1.18	\$42.29

On page 1 of the attached report by Deloitte & Touche it states,

"A probabilistic analysis of likelihood-to-occur and expected value of payments indicates that both at the time of the transaction and as recently as July 31, 2002 the likelihood-to-occur and the expected values of payments are extremely low compared to the value received by MNAA for entering into the instant obligation. By such measures, the transaction was extremely beneficial to MNAA."

Based on the analysis by Deloitte & Touche, as of July 31, 2002, the positive cash flow impact to MNAA will be in the range of \$3.850 to \$3.853 million or approximately 99.9% of the premiums received.

- On page two, KPMG states,

"...many of the financial decisions facing MNAA have the potential of creating conflicting objectives with the Airport Authority. Since the airlines servicing Nashville approve most financial decisions, there is the desire by these current users of the facility to approve decisions, which would benefit them currently. Such financial decisions may have the potential to disadvantage future users of the facility, such as new carriers or passengers, in the form of higher costs in the future."

MNAA makes decisions by weighing the benefits/costs of both the short term as well as the long term. These decisions must take into account what is best for the Authority, the community and current and future airlines serving the Airport.

- On page two, KPMG states,

"...the responsibility of MNAA should be one of selecting and presenting the best deals of the appropriate type for all beneficiaries of the airport authority rather than exercising market judgment to try to pick the optimal deal, such as speculating on interest rate directions."

We completely agree that the Authority's responsibility is one of selecting and presenting the best deals of the appropriate type for all beneficiaries of the Airport. We feel we carry out this responsibility in our management of the Nashville International Airport for all constituents. There is an appropriate time and place to use derivative transactions, but we do not believe that this constitutes a high degree of speculation.

- On page three, KPMG states,

"...If the BMA swap rate were to rise such that all three barriers were to be breached, MNAA would have the effect of over half of its total debt being floating rate, with a spread of 1.2% over BMA as an interest rate for three quarters of floating rate exposure, which would be a drastic increase in borrowing costs from the current fixed level. For example, the 7.0% barrier swap, based upon the Series 1998 Revenue Bonds, has interest rates between 4.50% and 5.375%; the swap would have an interest rate of 8.20% or more at breach..."

We agree with the facts stated above by KPMG. However, KPMG did not address the likelihood that such an event will occur. Furthermore, they did not address the fact that the BMA index plus the premium would have to remain above our underlying fixed bond rates. Once again, it should be noted that, according to our consultant, the likelihood that the 7.0% barrier would be reached is 0.0017% and the overall expected payout relating to all of the swaptions is less than \$3,000, which does not appear to be a drastic increase in borrowing costs.

- On page three, KPMG states,

"In general, our review of other airports (including Denver International Airport and Dallas/Fort Worth International Airport) and tax-exempt revenue bond issuing institutions have shown, an increasing acceptance of basic interest rate swap derivatives in their financial structure. These are used most commonly to affect lower cost borrowing, which meets the debt policy needs of the issuer. We have not seen derivative use of the complexity and speculative nature of that in place currently at MNAA, nor the use of derivatives as a potential alternative to debt issuance for long-term capital or working capital needs."

In the last year, the following airports have entered into swaptions similar to MNAA:

- Philadelphia International Airport
- Tampa International Airport
- Orlando International Airport

In addition, the following governmental entities have also entered into swaptions similar to MNAA in the last year:

- Pennsylvania Intergovernmental Cooperation Authority
- Alabama Public Schools and College Authority
- City of Chicago

- On page three, KPMG states,

"MNAA does not appear to have an integrated debt management strategy." "We recommend MNAA adopt an integrated debt management strategy."
"MNAA does not have a comprehensive derivative policy."

The Authority does not have a written debt management strategy. However, our informal debt management strategy has always been to reduce debt, lower our interest rates and extract value from our balance sheet. Staff is in the process of developing and implementing a written integrated debt management strategy and policy that will include a comprehensive derivative strategy.

- On page four, KPMG states,

“MNAA does not have the analytical capability to evaluate or monitor the swaptions it has sold and prospective arrangements of the recent type the agency has entered. This would require relatively sophisticated pricing and modeling software as well as a detailed understanding of derivative contracts and the key drivers to these contracts, which include yield curve shapes and the relationship of different yield curves to each other, the volatility of BMA, LIBOR and their underlying swap rates, the impact of the barriers and their average, versus absolute, exercise values and the pricing of the underlyings. MNAA, without these resources in-house, should look to retain a consultant to provide this level of detail on a recurring basis. We recommend MNAA either acquire the software and expertise to evaluate its current positions and prospective arrangements in in-house, or retain an independent advisor to perform this activity for them. As well, the board should request evaluation of the financial position, cash flow and bond covenants coverage for the airport authority both in strict terms and with all derivative exposures considered. This will allow for better forecasts of potential coverage issues.”

The Authority agrees with the statement that it does not have the in-house resources to constantly monitor the value of the swaptions we have sold. Currently, the swaptions are valued on an annual basis to comply with FASB 133 for audited financial statement purposes. The Authority will consider retaining an independent advisor to perform recurring reviews of these swaptions.

- On page four, KPMG states,

“As well, the board should request evaluation of the financial positions, cash flow and bond covenant coverage for the airport authority both in strict terms and with all derivative exposures considered. This will allow for better forecasts of potential coverage issues.”

In March of 2002, Leigh Fisher Associates completed a debt capacity study of MNAA. Their analysis focused on MNAA's ability to take on more debt while maintaining reasonable airline fees and charges. Their analysis stated that MNAA would be able to take on an additional \$100 million of variable-rate bonds and maintain airline payments per passenger within the industry average. Results of the study will be reviewed with the Board and can be made available to the Metro Department of Finance.

- On page four, KPMG states,

“...such a cost is ultimately borne by the greater Nashville community. Though the airlines would be required to initially fund the cashflow requirements, in the form of higher

landing fees and leases, this cost would be passed through to the users of the airport facility, creating a direct impact to the community.”

It should be noted that airport costs to airlines nationwide make up less than 4%-6% of the ticket prices paid by the consumer. Furthermore, the airlines employ national pricing strategies, which are based on their total nationwide costs. The airline's ability to pass on costs to the consumer are limited to market demand and competing airlines.

- On page five, KPMG states the following in reference to the Knock-In Barrier Swap,

“...it does not appear a comprehensive review was performed to fully evaluate and present the financial and economic impact of the proposed transaction.”

MNAA performed quantitative analysis on (1) the BMA and JJ Kenny indices since 1981, and (2) cash flow impacts from all three options being delivered and remaining above the fixed bond rate for six-month intermittent periods. This information was fully presented to the Board along with management recommendations. Thus, the transaction was fully evaluated by MNAA management, and the financial and economic impact of the transaction was properly presented to the MNAA Board.

- On page six, KPMG states the following in reference to the Knock-In Barrier Swap,

“The receipt of cash could have been replicated through working capital and other borrowings, which may have been difficult or expensive given the post September 11th economy and risks for airports.”

KPMG recommends that the Airport could have acquired cash through other means, and immediately acknowledges that this may have been difficult or expensive. Due to fact that the credit markets were generally not available to the airline industry post September 11th, the Knock-In Barrier Swap was the best and most appropriate transaction to execute at that time.



Report on the Probabilities and Expected
Values of Certain Swaption Transactions Between
Metropolitan Nashville Airport Authority ("MNAA") and Morgan Guaranty Trust
Company of New York ("MG") from October 26, 2001

A. General Summary

1. A probabilistic analysis of likelihood-to-occur and expected value of payments indicates that both at the time of the transaction and as recently as July 31, 2002 the likelihood-to-occur (or "LTO", i.e., the cumulative probability of MG exercising the swaption) and the expected values of payments (or "EVOP", i.e., the cumulative expected values of payments under the obligation) are extremely low compared to the value received by NAA for entering into the instant obligation. By such measures, the transaction was extremely beneficial to MNAA. To the extent MNAA entered into the transaction based on its perception of the low LTO and EVOP, its approach and decision at the time were economically sound and beneficial to its mission of obtaining funds on short notice at a limited cost and with limited exposure.

B. Qualifications

2. As Director of Economic Services in the Dispute Consulting & Corporate Forensic services practice of Deloitte & Touche's Financial Advisory Services organization, I provide economic, statistical and financial analysis to our firm's clients. In this capacity I work with a staff of seasoned professionals in the areas of economics, statistics, finance, accounting and advanced computational methods. I have been analyzing financial assets, liabilities and obligations in both academic and business settings for over 25 years. My curriculum vita is attached to this report.

C. The Transaction

3. MNAA entered into a set of swaption transactions with MG on October 26, 2001, for which it received \$3,853,000. Its obligation was to pay upon execution of the swaptions a floating rate of the Bond Market Association ("BMA") Municipal Swap

Index plus 120 basis points on the notional value of the following outstanding publicly issued bonds¹:

- A. Issuance date: October 26, 2001
Final repayment date: July 1, 2019
Initial balance: \$53,500,000
Monthly interest rate: 4.865%
Barrier rate: 6.0%
Balance as of July 31, 2002: \$53,400,000
Premium Received on October 26, 2001: \$1,628,000
- B. Issuance date: October 26, 2001
Final repayment date: July 1, 2015
Initial balance: \$64,730,000
Monthly interest rate: See Exhibit B of terms and conditions²
Barrier rate: 6.5%
Balance as of July 31, 2002: \$62,415,000
Premium Received on October 26, 2001: \$1,700,000
- C. Issuance date: October 26, 2001
Final repayment date: July 1, 2016
Initial balance: \$29,355,000
Monthly interest rate: See Exhibit B of terms and conditions³
Barrier rate: 7.0%
Balance as of July 31, 2002: \$27,985,000
Premium Received on October 26, 2001: \$525,000
4. The swaption allowed MG to enter at anytime into a swap that would have MNAA pay a rate equal to the BMA plus 120 basis points in exchange for MG paying MNAA the fixed rate on the bonds if the average BMA exceeded in the prior six months the following hurdle rates:
- Bond issue "A" : 6.0 %
Bond issue "B" : 6.5 %
Bond issue "C" : 7.0 %

¹ The balance of each bond is repaid according to a set schedule which was provided by MNAA and included in the analysis.

² The fixed exchange rate is given in Exhibit B of the "terms and conditions of the Option on a Swap Transaction" dated October 26, 2001.

³ The fixed exchange rate is given in Exhibit B of the "terms and conditions of the Option on a Swap Transaction" dated October 26, 2001.

D. The Analysis

5. A probabilistic analysis of cumulative likelihood-to-occur and expected value of payments was performed based on a weekly simulation. It was assumed the transaction costs are negligible and thus in the future MG would exercise the swap at any point in which the hurdle rates were exceeded.
6. According to the analysis the following, lifetime cumulative likelihood to occur applies to each bond:

Table 1

Bond Issue	At the Time of Transaction, October 24, 2001 ⁴	As of July 31, 2002 ⁵
A	10.11%	1.03%
B	0.17%	0.01%
C	0.04%	0.0017%

7. Following the calculation of LTO an analysis calculating the cumulative expected values of payments under the obligation, EVOP⁶, was performed. Under this analysis the net possible obligations (variable rate paid over fixed rate received) at each month end were factored by their respective probabilities to occur. The results were accumulated over the remaining life of the bonds, resulting in a cumulative-to-maturity expected value of (net) payments by the MNAA to MG, as follows;

Table 2

Bond Issue	At the Time of Transaction, October 24, 2001 ⁷	As of July 31, 2002 ⁸
A	\$35,327.54	\$2,578.21
B	\$568.91	\$16.70
C	\$42.29	\$1.18

⁴ The actual transaction took place on October 26, 2001; however, the closest six-month average BMA data provided was as of October 24, 2001.

⁵ July 31, 2002 is the date of the most recent BMA index data provided to us.

⁶ Values were not adjusted for the time value of money; since most expected payments would have occurred in the future such an adjustment would further lower the EVOP.

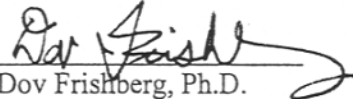
⁷ The actual transaction took place on October 26, 2001; however, the closest six-month average BMA data provided was as of October 24, 2001.

⁸ July 31, 2002 is the date of the most recent BMA index data provided.

E. Disclaimers

8. The analysis reported upon herein is based on summary information received regarding the bonds the agreements and the transactions involved. The documents related to the bonds and the transaction have not been reviewed and may, upon review, cause a change in understanding of the facts and premises related to the analysis.
9. The analysis reported upon herein is a probabilistic simulation and its results may differ for analyses employing other valuation techniques without casting doubt on their validity and efficacy.
10. This analysis was performed at the request of the MNAA for the purpose of assessing the economic ramification of its decision October 2001 to enter into the instant transactions and the result of the analysis and any information contained in this report may not be used for any other purpose.
11. The analysis reported on herein may be supplemented if and when additional information is brought to my attention.

* * * * *


Dov Frishberg, Ph.D.

10-8-02
Date

Review of Metropolitan Nashville Airport Authority Swap and Derivatives Risks



**METROPOLITAN GOVERNMENT
OF
NASHVILLE AND DAVIDSON COUNTY**

October 28, 2002

kpmg

Table of Contents

Executive Summary	2
Introduction.....	7
Objectives.....	7
Background	7
MNAA	7
Economic Environment.....	8
Use of derivatives.....	8
Procedures Performed.....	9
Analysis.....	9
Sogen Swap.....	9
1995 Series A Swap	10
Synthetic Advance Refunding Series 2001A.....	11
Three sold “Knock-In Barrier” Swaptions.....	12
KPMG Commentary.....	19
Observations and Recommendations	23
General.....	23
Market Risk.....	25
Credit Risks.....	26
Risk Monitoring	27
Appendix I – Items Reviewed.....	28
Appendix II – Specified Objectives.....	30
Appendix III – Derivatives Primer.....	31

Executive Summary

At the request of the Internal Audit Section of the Finance Department for Metropolitan Nashville and Davidson County, we have performed a review of the derivative usage of the Metropolitan Nashville Airport Authority (“MNAA”). This included reviewing the risk monitoring and risk management of the MNAA, the economic sensitivity of existing derivative contracts to financial market changes, and MNAA’s counterparty risks.

Our review included analysis of all relevant contracts and agreements, committee and board minutes, credit support annex and master agreements, financial statements and other details made available to us by MNAA. We conducted interviews with MNAA personnel, requested and obtained derivative valuations and constructed a pricing model to aid in the evaluation of the obligations to which MNAA has exposure. We believe our review provided us with sufficient detail to form our conclusions and issue our recommendations.

In performing this review, we kept in mind that many of the financial decisions facing MNAA have the potential of creating conflicting objectives within the Airport Authority. Since the airlines servicing Nashville approve most financial decisions, there is the desire by these current users of the facility to approve decisions which would benefit them currently. Such financial decisions may have the potential to disadvantage future users of the facility, such as new carriers or passengers, since it is possible the cost of such decisions may be paid in some part by users of the facility in the form of higher transportation costs. It would not be unexpected for the airlines to chose more short-term solutions. Since under normal circumstances most of the costs and benefits of financing decisions flow through to the airlines, the responsibility of MNAA should be one of selecting and presenting the best deals of the appropriate type for all beneficiaries of the airport authority, rather than exercising market judgment to try to pick the optimal deal, such as by speculating on interest rate directions. MNAA has a duty to consider the effect of the financing and derivative solutions on the current and long-term interests of the Authority when selecting and presenting alternatives to the board.

Our review is based upon contract and valuations as of March 31 and June 30, 2002. At June 30, 2002, MNAA had five derivative contracts, though one is not applicable to this evaluation. The four we reviewed in detail are

- Sogen Swap
- 6.0% Knock-In Barrier Swaption
- 6.5% Knock-in Barrier Swaption
- 7.0% Knock-in Barrier Swaption

The Sogen Swap is a classic floating for fixed interest rate swap which matched in all material terms the underlying debt issue, which is the Airport Improvement Revenue Bonds, Adjustable Rate Refunding Series 1993. Because of this matching, the risks associated with this derivative are considered minimal. The main ongoing exposure is one of credit risk associated with the counterparty, which is considered minimal based upon Sogen’s current ratings. This swap has a notional amount of \$53,500,000 and a current value (as a liability to MNAA) of \$2,685,700, as of June 30, 2002, as calculated by MNAA.

The three knock-in barrier swaptions form the majority of the report, since these are complex contracts. MNAA has sold options to the counterparty, Morgan Guaranty, to allow Morgan to enter into swap transactions with MNAA, with MNAA paying floating rate interest on the notional amounts and receiving fixed. The notional value and fixed rate relate to three current debt issues of MNAA, while the floating rate is the Bond Market Association (“BMA”) Municipal Swap Index rate plus a premium of 1.2%. Each of these options has a barrier, which limits Morgan’s ability to exercise the option until interest rates have risen, on average, above the barrier for a six month period of time. MNAA received the option premiums for each of these contracts when sold. The date of the transactions was October 26, 2001. A summary of the three contracts is presented below.

<u>Barrier level</u>	<u>Maturity</u>	<u>Notional</u>	<u>Liability (6/02)</u>	<u>Premium rec’d</u>	<u>Liability</u>
6.0%	July 1, 2019	\$53,500,000	\$2,347,749	\$1,628,000	(\$719,749)
6.5%	July 1, 2015	\$64,730,000	\$2,393,573	\$1,700,000	\$(693,573)
7.0%	July 1, 2016	<u>\$29,355,000</u>	<u>\$836,539</u>	<u>\$525,000</u>	<u>\$(311,539)</u>
TOTALS		<u>\$147,585,000</u>	<u>\$5,577,861</u>	<u>\$3,853,000</u>	<u>(\$1,724,861)</u>

Our review has led to the following observations and recommendations:

- | As of June 30, 2002, MNAA represented it had derivative notional exposure of \$197,200,000, representing four different bond issues. This total represents two-thirds of the \$297.1 million long term debt at June 30, 2002. If the BMA swap rate were to rise such that all three barriers were to breached, MNAA would have the effect of over half of its total debt being floating rate, with a spread of 1.2% over BMA as an interest rate for three quarters of floating rate exposure, which would be a drastic increase in borrowing costs from the current fixed level. For example, the 7.0% barrier swap, based upon the Series 1998 Revenue Bonds, has interest rates between 4.50% and 5.375%; the swap would have an interest rate of 8.20% or more at breach. Whether such an event would have an impact on the rating of MNAA debt is unknown. Most rating agencies use a multi-factor model which incorporates debt levels, finances, competitive position, ownership, management and environmental issues. The change in operating and financial ratios and debt coverage may not be significant to impact current ratings.
- | In general, our review of other airports (including Denver International Airport and Dallas/Fort Worth International Airport) and tax-exempt revenue bond issuing institutions have shown an increasing acceptance of basic interest rate swap derivatives in their financial structure. These are used most commonly to affect lower cost borrowing which meets the debt policy needs of the issuer. We have not seen derivative use of the complexity and speculative nature of that in place currently at MNAA, nor the use of derivatives as a potential alternative to debt issuance for long-term capital or working capital needs.
- | MNAA does not appear to have an integrated debt management strategy. Such a strategy would detail the objectives of the MNAA in terms of debt issuance, use of fixed and variable interest rates, expectations of interest rates and their impact on financing and operations budgets. Such a strategy would coordinate with the Debt Policy and Derivative Policy, and would change through time as markets, expectations and financing needs change. We recommend MNAA adopt an integrated debt management strategy. Once the debt strategy, and the derivative policy detailed in the next recommendation, are complete, we recommend MNAA evaluate all current exposures against the new strategy.
- | MNAA does not have a comprehensive derivative policy. Such a policy would specify the types of derivatives, and the features of those contracts, which can be considered for

use by MNAA. This policy would also clarify the objectives for use of specific instruments and necessary reporting (discussed below), indicating whether objectives are being met. It should detail due diligence requirements prior to entering into a contract, pricing requirements and ongoing monitoring. Counterparty credit risks, market risks and risk monitoring would be detailed within such a document, and the reporting required both internally and externally would be specified, in terms of its contents and frequency as well as its audience. We recommend MNAA draft and adopt a comprehensive derivative policy.

MNAA does not have the analytical capability to evaluate or monitor the swaptions it has sold and prospective arrangements of the recent type the agency has entered. This would require relatively sophisticated pricing and modeling software as well as a detailed understanding of derivative contracts and the key drivers to these contracts, which include yield curve shapes and the relationship of different yield curves to each other, the volatility of BMA, LIBOR and their underlying swap rates, the impact of the barriers and their average, versus absolute, exercise values and the pricing of the underlyings. MNAA, without these resources in-house, should look to retain a consultant to provide this level of detail on a recurring basis. We recommend MNAA either acquire the software and expertise to evaluate its current positions and prospective arrangements in-house, or retain an independent advisor to perform this activity for them. As well, the board should request evaluation of the financial positions, cash flow and bond covenant coverage for the airport authority both in strict terms and with all derivative exposures considered. This will allow for better forecasts of potential coverage issues.

MNAA should better evaluate the pricing of derivatives prior to their execution. The most recent transaction with Morgan was the equivalent of a negotiated contract. While this is not unusual in the derivative marketplace, especially with unique and complex contracts, it does not make it easy for an infrequent player in the derivatives marketplace to ensure they are getting a fair quote. This fact could be helped by asking for prices on an initial hedge portfolio, which can be compared during the negotiation process for price changes relative to the derivative contract to detect whether the dealer is improving the pricing or not. Alternatively, bids from other dealers could be obtained to evaluate the quote received by the initial dealer. It should be noted that MNAA did evaluate the probability the knock-in barrier swaptions would be exercised, based upon a review of the historical BMA rates. Only for a short period of time in the early 1980's were the rates ever above the barriers but not for a six month period which would trigger the option. Based upon this, and MNAA's expectation of future rates, it was determined there was little probability of a breach. In addition, MNAA also concluded that if a breach did occur, there was even a smaller chance that rates would remain high enough to actually cause a real cost to the airport in terms of variable rates above the previous fixed dollar amount. While historical results are an important consideration in reviewing a potential contract, they are not necessarily a good indicator of what the market will do in the future. Our review has concluded the derivatives have been priced with a 40% chance a breach will occur. As well, given the barrier rate is above the current fixed rate and the variable rate would include a 120 basis point premium, it is likely if a breach were to occur it would create a material negative change in cash flow from the current debt exposure.

Currently, there is no credit risk exposure for the swap. This is true generally because the Sogen swap and the three swaptions are currently valued as liabilities. If interest rates were to change (by increasing past the barriers, causing them to be exercised, and then decline), they could potentially become an asset to MNAA, creating a credit risk exposure to Morgan. Based upon the Credit Support Annex of the swap agreement, should the unencumbered cash of MNAA fall below \$15 million, Morgan could request

the posting of collateral, equal to the amount by which the value of the liability exceeds the premiums received, rounded up to the nearest \$100,000.

It should be noted that while MNAA has the ability to sustain higher borrowing costs, either in the form of additional liability exposure or a increase in the cost of the current debt, such a cost is ultimately borne by the greater Nashville community. Though the airlines would be required to initially fund the cashflow requirements, in the form of higher landing fees and leases, some portion of this cost could be passed through to the users of the airport facility, creating an economic impact to the community. This potential fiscal impact should be part of any and all financing and derivative decisions of MNAA.

While MNAA does not need to retain a derivative expert on staff in order to evaluate and execute derivative contracts, it should have a very detailed set of policies and procedures in place in order to firmly establish the processes it must perform prior to the execution of any contract. This would help to ensure that the level of analysis necessary to fully evaluate any potential deal is performed, and if not by the internal staff, then by experts outside of MNAA. Such policies and procedures would detail the situations when an outside consultant should be retained to evaluate potential deals and ensure pricing by competitive dealers or pricing on contracts and hedge portfolios simultaneously are received and evaluated prior to a contract's execution. This should not differ materially from the types of controls in place for debt issuance or any other service MNAA must go outside to obtain. MNAA does not need, and realistically cannot be, an expert on all topics. But it should ensure prudence and due diligence in all dealings where it is not an expert.

Morgan Guaranty presented certain information to MNAA as part of the process of explaining and demonstrating the financial aspects of the swaptions. It should be noted the materials presented by Morgan Guaranty are best described as marketing materials, meant to convince a party to enter into the derivative transaction; they were not an independent evaluation of the financial risk and exposures to be faced by MNAA. Much of the information presented did not fully explain the risk factors associated with the transaction nor did it provide a comprehensive analysis of the cashflow and financial consequences for MNAA. For example, the presentation suggested MNAA would limit tenor or provide termination flexibility. Tenor, or the length of time of exposure to the contract, was set at the longest of MNAA's existing borrowings, so it was not truly shortened, and these contracts did not provide any better unwind alternatives than less complex derivatives and, in fact, due to their complexity, they may be more costly to unwind. No quantitative analysis was provided to substantiate any claims. In fact, were Morgan to have provided some form of analysis on the deals, it would have been considered a conflict of interest, since Morgan was not independent to the transactions and stood to benefit substantially from the deals. MNAA must not rely upon a party to the transaction to prepare analytical materials. Had a third party been retained to review the potential transaction, they would have been expected to estimate the financial and cash flow impacts throughout the life of the swaptions to MNAA, the sensitivity of the swaptions to key variables, such as interest rates, volatility and yield curve shapes, and the impact of these swaptions to the overall derivative portfolio held by MNAA. As well, they would have evaluated the contracts against the derivative policy and debt strategy of the airport authority, were they to exist. As it was, while only a review of the contracts themselves could have been performed, it does not appear a comprehensive review was performed to fully evaluate and present the financial and economic impact of the proposed transaction.

A review of the transactions should also include presentation of alternatives and their relative strengths and weaknesses when compared to the derivatives under consideration. In this case, the transaction could be decomposed into two parts: a cash payment of the premium and the creation of a complex exposure to variable interest rates. The receipt of cash could have been replicated through working capital and other borrowings, which may have been difficult or expensive given the post September 11th economy and risks for airports. MNAA indicated that its immediate borrowing ability was almost non-existent in the months after September 11th, since most lending institutions were unsure of the economic environment in which airports would exist in the future, and MNAA decided to act on these swaptions that they had been considering for several months. However, by the time the swaptions were executed in October, it is entirely possible other less sophisticated options were available. The exposure to floating interest rates could have been created through a more simplistic fixed for floating swap, which would have had a potential immediate impact, depending on the rates used in the contract. The benefits of the selected swaptions against these, or other, alternatives was not presented.

Introduction

At the request of the Internal Audit Section of the Finance Department for Metropolitan Nashville and Davidson County, we have performed the procedures outlined below with respect to our detailed review of the risks associated with all the swap contracts currently held by Metropolitan Nashville Airport Authority (“MNAA”). This report enumerates our procedures and provides our observations based on performance of these procedures.

Objectives

A review of risks arising from the use of derivatives by Metropolitan Nashville Airport Authority (MNAA) including:

- Economic sensitivity to changes in financial markets,
- Counterparty risks,
- Risk monitoring and risk management.

Please see appendix II for the formal expression of objectives specified in Amendment No. 2 to Contract No. 14431.

Background

MNAA

MNAA operates Nashville International Airport and a general aviation facility. Its main sources of revenue are parking fees, leases to airlines, and rentals to concessions (restaurants, gift shops, car rental agencies, etc.) Its construction and capital improvement program are funded by grants and borrowings, and supplemented by passenger facilities charges and direct airline amounts. The repayment of the debt comes from operating earnings. The airline group must approve the operating budget, all borrowings, the capital budget and significant financial transactions. The space rental and landing fee charges that determine the airline’s lease payments are set as part of the budget process, and the airlines are residually responsible for paying enough to make sure that MNAA continues to remain in compliance with its debt covenants. MNAA enplanement costs are currently lower than average, making Nashville more attractive as a hub than higher cost airports. Lower enplanement fees are apt to be reflected in lower ticket prices, which benefit travelers living in the area and local businesses by lowering their costs and making Nashville a more attractive destination thus bringing in more tourists and visitors. MNAA is able to borrow on a tax-exempt basis. Some of its bond issues have been insured.

While MNAA publishes earnings statements, the calculations of compliance with its debt covenants exclude non-cash items. Thus, an unrealized (non-cash) loss on a derivative not qualifying for hedge treatment, which would flow through the current period earnings statements, would not impact the debt covenant compliance ratios. Three of the derivative contracts currently in place with MNAA are instruments which “do not qualify for hedge treatment” in the MNAA

financial statements. All unrealized gains and losses on these contracts based on periodic valuation of these instruments will therefore flow through the current period earnings statements. Should MNAA begin paying out cash on such a derivative, those payments would then be included in the debt covenant compliance calculations. This point is important since it highlights the less than obvious exposures that derivatives can create. Because of this, MNAA should prepare summaries of its debt covenants with and without the impact of non-cash derivative activity. The impact to debt covenants due to the potential change in cash flow, from changes in derivative values, would provide a summary of the financial exposure of the derivatives should a cash event occur and help to keep the Airport Authority apprised of its financial risk.

Economic Environment

The attacks on September 11th created an immediate temporary shutdown of all air travel within the U.S., and when it resumed, it was at approximately 50% of the pre-attack level. This significantly reduced revenues for both MNAA and the airlines, which experienced a slight reduction in certain variable costs due to reduced flights, but an increase in fixed costs due to increased security measures. Air travel in general and at BNA specifically has continued to increase from that low level, but has not yet fully recovered. Airline finances are therefore negatively impacted, with perhaps US Air being the most impacted of MNAA tenant airlines, and Southwest (with the largest local volume) being least effected. Congress has made available loan guarantees to support the airlines, but conditions attached have limited the response to date.

MNAA took various actions following the attacks to conserve cash, including deferral of most capital projects and some early retirements and other work force reductions due to attrition.. Even with these measures, if air travel had remained at the low level typical of October, then MNAA management projected that there was a significant risk of breaching some of the debt covenants. This would have required raising costs for the airlines, which were already struggling financially.

Use of derivatives

For those less familiar with derivatives, Appendix III contains explanations of some of the key concepts that will be utilized throughout this report

Derivatives are a set of tools that can be put to many uses. Derivatives in general and interest rate swaps in particular have seen explosive growth in their use since their introduction in the early 1980's. The main driving force was not speculation, but instead was allowing borrowers (or investors) to exploit their comparative advantages. For example, a borrower can benefit financially by borrowing in the market where it has the relative lowest costs, and swapping the debt payments into the type of borrowing that it preferred from a liability or debt management perspective at a lower cost than it could have borrowed in that market directly. This type of derivative use can generally be applied by any user, without undue risk, provided normal and customary commercial practices are employed, such as allowing competition to assure that a fair quotation is received. This does not mean that the debt management decision to raise fixed or floating funding is without risk, merely that, given that decision, the choice between issuing directly in a market and issuing in another market and swapping back to slightly better conditions than were available in the desired market does not add undue incremental risk if the swap counterparty is of an acceptable creditworthiness.

MNAA transacted a total of six different derivative contracts which are still on the books: one floating to fixed rate swap, one liability documented as a derivative, a fixed to floating interest rate swap callable by the counterparty, and three written swaptions. These are discussed in more detail within the analysis section of this report.

Procedures Performed

To achieve the objectives cited above, our procedures included:

- Interviewing finance and accounting personnel at MNAA;
- Reviewing relevant internal memos, finance committee & board minutes, airline lessee ballots, derivative confirmations, credit support annexes & master agreements and financial statements related to MNAA's derivatives' risk characteristics and/or their risk monitoring process to gain an understanding of MNAA's policies and procedures by which derivatives are traded and monitored;
- Requesting and obtaining dealer supplied derivatives valuations for certain transactions;
- Developing a pricing model for certain derivatives transactions, which, when benchmarked to market rates and dealer supplied valuations will provide the basis for a form of risk analysis.

(Appendix I lists the documents that were reviewed as part of this process.)

Analysis

Reading note 4 of the Comprehensive Annual Financial Report for the fiscal year ended June 30th, 2001, supplemented by information provided by MNAA, revealed six derivatives to be potentially considered in this report. These are:

- | | |
|---|----------------------------------|
| ■ Sogen Swap | ■ 6.0% Knock-In Barrier Swaption |
| ■ 1995 Series A Swap | ■ 6.5% Knock-in Barrier Swaption |
| ■ Synthetic Advance Refunding, Series 2001A | ■ 7.0% Knock-in Barrier Swaption |

Sogen Swap

Transacted: November 1, 1993

Matures: July 1, 2019

Notional: \$53,500,000

Value\$2,685,700 liability (as of 6/30/2002)

Hedge eligibility: Yes, cash flow hedge

Counterparty: Société Générale, NY Branch

The oldest outstanding derivative transaction, with Societe Generale, which was used in conjunction with a floating rate issue (Airport Improvement Revenue Bonds, Adjustable Rate Refunding Series 1993) to lock in fixed rate funding at better terms than could be obtained at that time in the fixed rate market, is a textbook example of the appropriate use of derivatives. Even though it was transacted well before the SFAS 133 hedge definitions were even considered, it appears to qualify for the "shortcut" method, whereby there can be a presumption of no ineffectiveness, due to matching critical terms. The one area we believe might be evaluated is the

manner of calculating the expected savings from issuing floating with a swap. When MNAA issues on a fixed rate basis, it typically does so with the right to call the issues after a certain date, initially at a premium call price that gradually declines to par. Should rates decline sufficiently on or after that time, MNAA could save money by calling and refinancing. If instead, they elected to issue without a call feature, they might be able to issue at a slightly lower coupon.

The analysis which generally should be performed to evaluate this potential transaction is one which compares either a callable swap with the callable debt MNAA usually issues, or a non-callable swap with non-callable debt. Matching these call features incorporates the optionality of both the derivative and the underlying. While it is possible to perform the calculation with a cross, such as non-callable swap against callable debt, one should note the mismatch and estimate its impact in the decision process. It was not clear in the minutes of the finance committee meeting whether the comparison was with a callable or non-callable fixed rate issuance. The minute taker may not have been aware of the relevance of this distinction, so its absence from the minutes does not indicate a material issue. It does, however, provide a point as to the complexities of evaluating derivative transactions and the need for understanding by both the analyst and the decision makers.

The minutes clearly show the governance process that was followed, the presentation made to the finance committee, and the approval by the board which would have been followed by airline lessee balloting. There was extensive analysis of the creditworthiness of the counterparty, and with the aid of hindsight, we can see that the analysis proved to be correct. Therefore, neither the market risk nor the credit risk should have been considered to raise any issues at inception. Given the matching nature of the hedge, there would not have normally been any occasion to revisit the market risk issue during the life of the transaction. We discuss the ongoing monitoring of credit risk in a later section.

1995 Series A Swap

Issued: July 8, 1999

Matures: Called as of July 1, 2002

Notional: \$72,955,000

Value: n/a

Hedge eligibility: No, written options excluded

Counterparty: Goldman Sachs

The 1995 Series A Swap was written as an option, allowing the swap counterparty, Goldman Sachs, the opportunity to terminate the swap. Goldman has exercised that option, which has led to the transaction's termination in June 2002. The residual risk on this transaction is now insignificant.

In 1998, MNAA had remarketed their Airport Improvement Revenue Bonds Series 1995 as fixed rate issuance. In 1999, a swap agreement was executed whereby MNAA paid a floating rate linked to a short-term tax-exempt rate index published by the Bond Market Association ("BMA"), and received a fixed rate that offset their cost of the debt. The swap had a more favorable rate than then currently available in the market, in exchange for giving MNAA's counterparty the right to terminate the swap in 2002, which has happened. This ends MNAA's ability on this debt to continue benefiting from the current low floating rate environment, but they paid a lower rate than they could have during that time period.

While this transaction is now effectively over, it could serve to illustrate the handling of such non-purely hedging decisions in the past. MNAA chose to sell an option, and to receive the benefit in the form of a temporarily lower borrowing cost. MNAA was therefore exposed to increasing volatility, as that causes option values to rise. More significantly, by swapping its fixed debt to floating, MNAA created an exposure to increasing rates. As almost all of its other debt was either originally fixed rate or swapped into fixed rate, there is no indication that the amount of floating rate debt was unreasonable. In fact the debt capacity study done later indicated that such an amount of floating rate debt could be supported. The point is rather to review what kind of exposure was being created. MNAA created an exposure to high floating rates where the counterparty would not have elected to terminate the swap and MNAA would have been paying high rates, potentially continuing until 2015. MNAA was fortunate that short-term rates did not increase and remain high. Thus, compared to doing nothing, executing the cancelable swap saved MNAA some interest costs until the termination date. However, actual volatility was probably higher than indicated by market prices at the time the trade was initiated, so it was not generally an auspicious time to sell an option, but given the directional nature of the exposure, this proved not to matter.

It should be noted that while MNAA has the ability to sustain higher borrowing costs, either in the form of additional liability exposure or a increase in the cost of the current debt, such a cost is ultimately borne by the greater Nashville community. Though the airlines would be required to initially fund the cashflow requirements, in the form of higher landing fees and leases, this cost would be passed through to the users of the airport facility, creating a direct impact to the community. This fiscal responsibility to the community as a whole should be part of any and all financing and derivative decisions of MNAA.

If MNAA had forecast the extent of the decline in interest rates, it would have been better served by executing a normal, non-optional, fixed-to-floating interest rate swap. While it is inappropriate to criticize anyone for not having 20-20 foresight, what actually happened does illustrate the concept of opportunity cost. In writing an option, by granting the right to the counterparty to cancel the swap, MNAA limited its ability to swap that liability into a floating rate basis, which would have been the optimal strategy with the benefit of hindsight. Putting it another way, MNAA's strategy on this derivative would have performed better than either of the two non-optional strategies: doing nothing (staying with fixed rate liabilities) or swapping into floating rate liabilities, in a range of rates slightly above to somewhat lower than the levels of rates prevailing at inception. While it is possible to analyze one derivative in isolation, it is more appropriate to consider it in the context of all the other interest rate exposures being faced. Thus, while it is probably abundantly clear by October 2001 that the swap would be cancelled as soon as the optional termination date arrived, a proper analysis of trades initiated at that time should have factored in the remaining slight exposure from this swap position from October 2001 through its termination in June 2002 when evaluating other derivative transactions.

Synthetic Advance Refunding Series 2001A

Issued: 1998

Matures: July 1, 2015

Notional: \$7,947,134

Value: n/a

Accounting Method: as a liability

Counterparty: n/a

This transaction, although described as a derivative, was instead simply a borrowing. MNAA took advantage of lower rates to refinance (with the Synthetic Advance Refunding, Series 2001A) some callable bonds and thereby reducing future debt service. Rather than have the benefit spread over the remaining life of the bonds, they chose to collect the present value of their future savings up front. This implicitly meant borrowing at the counterparty's (a financial institution) taxable cost of funds when normally MNAA benefits from being able to issue on a tax-exempt basis. However, given the relative small size of the borrowing (\$7.9 million) the costs of a separate issuance might have made the method chosen cost effective. Since this derivative really is simply the advance payment of the savings under the refinance, there is no on-going derivative issue to be evaluated. Whether the benefit should have been received in lump sum, as with was, or spread over the life of the refinance is an issue to be addressed by the debt policy of MNAA, which is out of the scope of this review.

Three sold "Knock-In Barrier" Swaptions

Issued: October 26, 2001
 Matures: July 1, 2019
 Total Notional: \$147,585,000

Total Value: \$5,557,861 liability (as of 6/30/02)
 Hedge eligibility: No, written options excluded
 Counterparty: Morgan Guaranty

Consisting of:

<u>Barrier level</u>	<u>Maturity</u>	<u>Notional</u>	<u>Liability (6/02)</u>	<u>Premium rec'd</u>	<u>Net</u>
6.0%	July 1, 2019	\$53,500,000	\$2,347,749	\$1,628,000	(\$719,749)
6.5%	July 1, 2015	\$64,730,000	\$2,393,573	\$1,700,000	\$(693,573)
7.0%	July 1, 2016	\$29,355,000	\$836,539	\$525,000	\$(311,539)
TOTALS		<u>\$147,585,000</u>	<u>\$5,577,861</u>	<u>\$3,853,000</u>	<u>(\$1,724,861)</u>

The Liability shown above is the value of the instruments as of June 30, 2002, based upon the valuation provided by the counterparty, Morgan Guaranty. The Net represents the change in the value of the liability since inception, assuming the premium received as the initial value of each contract.

Due to the complexity of these derivatives, the analysis has been split into three sections, covering the background and description, qualitative analysis and valuation.

Background and Description

In response to the potential cash squeeze and risk of breaking borrowing covenants, MNAA asked Morgan Guaranty for current pricing on a kind of transaction they had been considering for at least a year previously. Apparently, various dealers had occasionally shown MNAA various types of swaption transactions. Of these, the one that seemed to be most suited to MNAA's market views was described as a knock-in barrier swaption. The three separate swaptions have different notional amounts, amortization schedules, termination dates, fixed coupons, premiums and barrier levels, but they are the same type of transaction. A swaption is an option to enter a swap transaction. In this case, the counterparty, Morgan Guaranty, now part of JP Morgan Chase, paid an upfront premium of \$3,853,000 to MNAA for the right to enter into the underlying swaps. The underlying swaps are for MNAA to pay a floating rate at BMA plus 1.2% and receive

a fixed rate. The fixed rates were set in such a manner to match the debt service on a particular series of bonds. Thus the three swaptions cover three different bond series.

A knock-in barrier is a feature that restricts the ability of the option buyer to exercise the option. In this case, the BMA rate must average above the barrier level agreed for a swaption for 6 months in order for Morgan to be entitled to exercise the option to enter into the swap. The barrier levels on the three different swaptions are set at 6%, 6.5% and 7%. The amortization schedule for the swaption with the 6% barrier matches the maturity profile and average interest cost of MNAA's Series 1993 borrowings. The swaption with the 6.5% barrier bears the same conformance to MNAA's Series 1995 borrowings. The swaption with the 7% barrier is tailored to match the details of the series 1998C borrowings. Thus it could be possible for the swaption with the 6% barrier to be exercised and not the others, if the average BMA rate for the last 6 months were 6.2%.

The BMA rate does not have to have been above the barrier for the whole six-month period, merely that the average is above the barrier. For example, if in a six-month period, the BMA rate increased steadily from 5.76% to 6.26%, averaging 6.01%, Morgan would be able to exercise, even though the BMA rate had been above 6% for only about three months. Similarly, if the rate could have peaked briefly but significantly at rates above 6% and subsequently declined back slightly below 6%, provided the average was over the barrier, Morgan could exercise. Unlike typical knock-in options, where once the barrier is breached the buyer retains the right to exercise until maturity, in these swaptions, if the average declines back below the barrier, Morgan's ability to exercise is suspended. Thus, some would refer to this as conditional exercise feature rather than as a knock-in feature. Morgan should be able to track the likely average for one period ahead, based on the prior rates going into the average and current market conditions, and thus is unlikely to miss an opportunity to profitably exercise a swaption by being caught unaware if the rate were to drop suddenly.

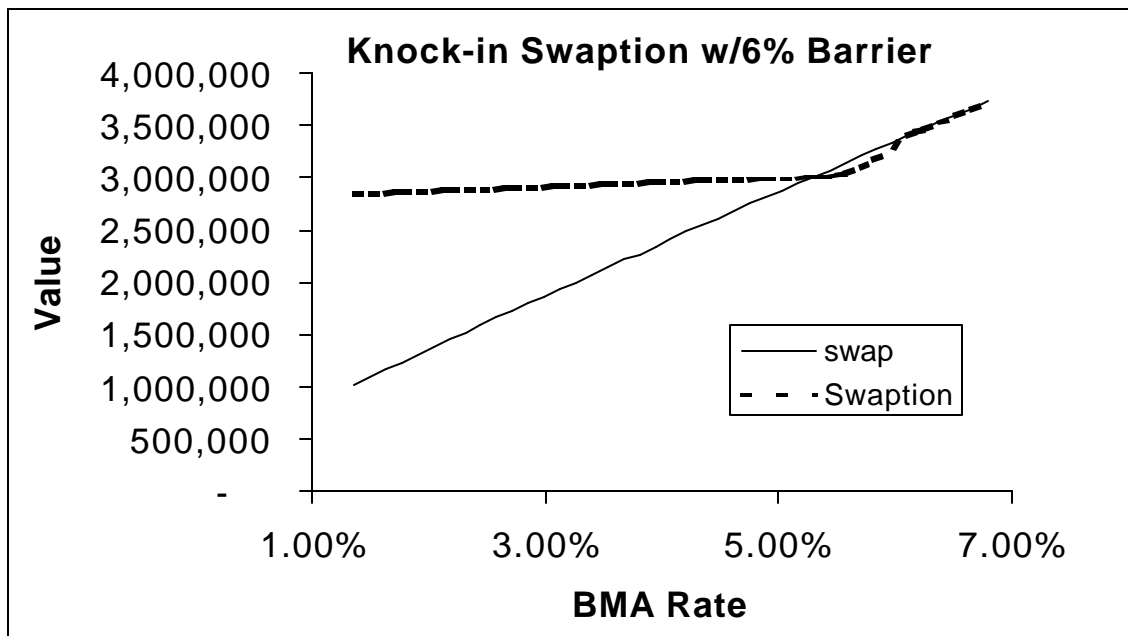
Even though the current cashflows on the underlying swap, if it were already in place, would be positive for MNAA due to the low level of the BMA rate, the swap has a positive value for Morgan, due to the 1.2% spread above the BMA rate that MNAA would have to pay and the level of the long-term rates at which they could hedge the transaction. An unrestricted option to enter that swap is more valuable than the underlying swap, as it enables Morgan to avoid the negative cash flows in the initial periods. By the time these swaptions would be exercisable, the immediate cash flows would be most likely be positive for Morgan, unless rates had shot up sharply and then declined drastically in the six-month averaging period. Barring that scenario or a strongly negatively sloped yield curve, Morgan would most likely exercise as soon as the barrier was breached.

If we were to stick to the barrier option terminology, this would be referred to as an "up-and-in" call. The BMA rate must increase to cross the barrier, and when it crosses the barrier, the option is already in the money. Also, formally speaking, this would be considered an "outside" or "cross-market" barrier, as the barrier, while related to the underlying (a fixed rate amortizing swap), is not the same tenor as a short term BMA rate. If the underlying were the current fixed rate on a BMA swap, then it would be a normal or "inside" barrier. Thus, to model the valuation of such a product requires modeling the changes in both short and long term rates. This combined with the amortization schedule, BMA based floating rate index and the six month averaging feature make it extremely unlikely that any of the relatively inexpensive financial valuation software packages would be able to model these types of deals directly.

Qualitative Analysis

In this section, we seek to illustrate how qualitative analysis could be applied to these swaptions using only limited quantitative tools. The purpose of such an evaluation is to gain a general understanding of the characteristics of the derivative, those key items which will affect its pricing, and its relationship to its underlying components.

Without even being able to model the swaption value, it is possible to construct an illustrative, generic diagram of how the value of such a conditionally exercisable swaption changes qualitatively with changes in the BMA rate, holding the longest-term rates constant. A sample of such a diagram is provided below. The underlying swap value is also shown. The valuation is as of the end of March 2002, and uses the indicative value supplied by the counterparty, and reasonably modeled swap values. The swaption values below the barrier are necessarily approximate, but still provide a reasonable indication of how one class of changes to the yield curve would impact the valuation. A more precise analysis would require the use of a more sophisticated pricing tool.



Were we to assume different spreads between short and long term rates or the actual BMA rate at the time the average breaches the barrier, the curves on the diagram would have different shapes. Shifts in volatility, the ratio of BMA to LIBOR, the passage of time and other factors would shift the curves as well. For example, while it is likely that any shift in the yield curve that would breach the barrier, allowing a swaption to be exercised, would have a substantial element of flattening of the yield curve, it would be probable that the longest-term rates would increase some as well. This would have the effect of raising the value of the swap at the point where the barrier is breached, thus making both the swap and swaption valuation curves steeper as well, as those curves must connect their current values to the point on the swap curve where the barrier is breached. However, the general presentation shown in the graph would be visible under each of these different assumptions; intersections, shapes of the curves and slope each could be different.

Actually, between inception and the end of March 2002, the short-term rates declined while longer-term rates, particularly BMA vs. fixed rate interest rate swap rates increased substantially. Representing that kind of movement on such a diagram, by displaying the swap rates instead of the BMA rates on the horizontal axis, would show how a swaption and underlying swap would perform. However, the two curves would not cross, as the relatively stable short-term rates would not lead to the barrier being breached. Thus, one couldn't trace an approximate swaption valuation curve without access to a more sophisticated pricing tool, as only one point (that supplied by the counterparty) would be available. An approximation could be made, if short term rates were relatively stable, by collecting monthly swaption valuations from the counterparty and plotting them on a diagram above the level of a BMA vs. fixed rate interest rate swap rates whose duration was similar to that of the underlying swap. Such an effort would provide another graph which could be used to further understand the performance of the asset, though the pricing would be dependent on the counterparty and not directly from the market.

Due to the long tenor and the current steep yield curve, the swaption is more valuable to Morgan than the underlying swap at present short term rates, as the initial negative cash flows of the swap are avoided, and the exercise only occurs in higher rate environments, when the swap is more valuable. Of course, should the swaption be exercised, a subsequent decline in rates could turn the cash flows positive for MNAA and could, if longer term rates declined as well, also make the swap an asset rather than a liability. The characteristic profile of an up-and-in call, where the value increases sharply as the barrier is approached, is somewhat muted for this swaption, for the reasons cited at the beginning of this paragraph, although it is illustrated in the region between 5% and 6% BMA rates where the swap value exceeds the swaption value, as there would be the potential that the barrier might not be breached, and thus the positive value of the swap would not be captured. The other swaptions would have similar diagrams, but with curves shifted to the right to reflect the higher barrier levels.

Valuation

In this section we are going to investigate initial and ongoing pricing considerations.

A derivatives dealer seeking to price these barrier swaptions would do so in the context of the rest of his exposures as measured by his existing models. Depending on the yield curve model selected, different dealers could calculate somewhat different values for a less standardized transaction such as this one. The assumptions they would chose, for the most part, would be dictated by those already in use for the rest of their trades. Assumptions that might vary between dealers would be those less dependent on market observations. For example, they would tend to agree on the ratio between LIBOR and BMA as they both would refer to the same set of LIBOR and BMA swap rates to calculate it, even though both of their estimates would deviate from the historical average. To make a different assumption would create the risk of making prices on which the market would deal in great volume and the resulting transactions would not be able to be hedged without a loss. They could tend to differ on something more esoteric like the correlation between short and long term rates or the relationship between LIBOR volatility and BMA volatility.

To attempt to model the prices of the barrier swaptions without duplicating the entire infrastructure of an interest rate derivatives dealer requires certain simplifying assumptions. These would include that BMA and LIBOR volatility are the same for equivalent strike prices, and something about the shape of the yield curve when the barrier would be breached. Given that the lowest barrier is a BMA rate of 6%, this would imply LIBOR in excess of 8%. It is less likely

that the yield curve would be positively sloped under such conditions, so an assumption was made that the yield curve would be slightly downward sloping to flat at barrier level (or its equivalent in LIBOR) the time any of the barriers would be breached. Given that there would be no particular expectation for the future direction of rates from that point, without making some complex and difficult to justify assumption about the mean-reverting level for interest rates in the U.S., the swap value at that time would be an unbiased indicator of the present value of the future cash flows on the swap. A table of swap values at various future dates conditional of their having just moderately breached the barrier (the rate being 0.4% higher than the 6 month average) is presented below, using an assumption of BMA at 74% of LIBOR. Adding across the columns would imply that each swap was hedged when the barrier was breached, as it is otherwise inappropriate to add values calculated at different interest rate levels. The purpose of the chart is to present a worst case scenario of all three swaptions being exercised in the same year; were this to happen, would MNAA realize a gain or loss on the overall strategy.

Breach Date	Barrier level			Sum	Net PV
	6%	6.50%	7%		
7/1/2003	7,148,667	9,590,541	4,208,615	20,947,823	(\$16,252,657)
7/1/2004	6,325,585	8,545,006	3,746,689	18,617,281	(\$13,071,300)
7/1/2005	5,450,463	7,488,137	3,293,701	16,232,301	(\$9,966,303)
7/1/2006	4,595,379	6,447,337	2,853,372	13,896,088	(\$7,221,782)
7/1/2007	3,811,298	5,433,861	2,425,088	11,670,247	(\$4,845,347)
7/1/2008	3,112,563	4,458,814	2,013,270	9,584,647	(\$2,824,070)
7/1/2009	2,512,028	3,534,427	1,620,003	7,666,458	(\$1,140,490)
7/1/2010	2,026,389	2,674,712	1,250,486	5,951,587	\$231,947
7/1/2011	1,673,790	1,891,656	920,326	4,485,771	\$1,303,111
7/1/2012	1,473,940	1,204,690	627,616	3,306,246	\$2,097,166
7/1/2013	1,259,541	639,670	379,971	2,279,181	\$2,721,166
7/1/2014	1,029,334	226,564	186,090	1,441,989	\$3,183,210
7/1/2015	784,688		55,705	840,392	\$3,487,875
7/1/2016	524,352			524,352	\$3,639,924
7/1/2017	274,322			274,322	\$3,748,738
7/1/2018	95,657			95,657	\$3,818,988

The figures in the “Net PV” column discount the potential future liability at rates based on LIBOR and compare it to the premium originally received. Given that those funds are being expended via a reduction of the lease rates to airlines, the calculation is purely theoretical, as any future loss will have to be made up with higher lease rates, which will end up being paid, indirectly, by local residents and businesses. From this analysis, we can see that rates need to remain below the barrier until 2010 in order for MNAA to realize a profit from the transaction, based upon our assumptions. Should interest rates differ from the assumptions above, the net present values and breakeven points may be different.

In such volatile market conditions, dealers tend to price deals, particularly complex derivatives, less competitively. Sophisticated clients will help to counter this by inquiring what amounts of which liquid instruments would constitute an initial hedge portfolio, and ask for a quotation to include the reference prices for the hedge instruments. By monitoring the changes in the prices of the initial hedge portfolio from one quotation to the next, it is possible to detect if the dealer is

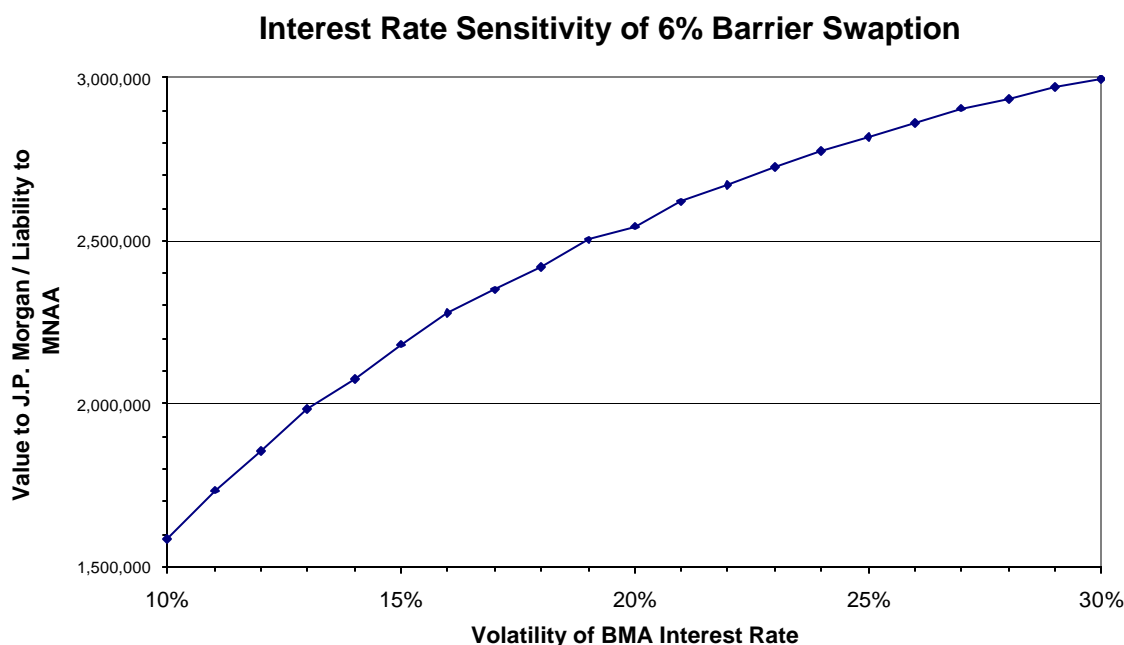
making the quotation less competitive. For example, it is a common practice for the client to come back and ask if the prior quotation is still valid. The dealer will say “yes” if the rates are unchanged or more favorable, thus benefiting from any improvement if the client then deals on that quotation.

Upon MNAA’s request, Morgan provided indicative prices for the swaptions as of 3/29/02, and it was agreed that they would update those indications monthly. While it is a typical practice, but not universal, to generate such valuations automatically from their internal valuation system without manual intervention, it may be the case that Morgan elected to show a relatively high price for the swaptions, anticipating second thoughts about the derivative strategy. Should MNAA actually request a quotation to unwind one or more of the swaptions, it would be in Morgan’s best interest to price the swaptions high, in order to place Morgan in a favorable negotiating position should MNAA desire to unwind the transaction. Unwinding refers to the process of reversing a derivative position and generally involves either a cash settlement directly or the acquisition/sale of the same contracts in reverse of the transaction which created the exposure. It should be noted that while MNAA had not yet fully implemented Statement on Financial Accounting Standards No. 133 related to hedges and therefore were not valuing the positions on a recurring basis for accounting purposes, such pricing should have been requested and used for analysis of the position and for reporting to the Board on the current exposure.

This presents an aspect associated with the pricing of financial instruments. Most instruments sold in financial markets have both a bid (offer to buy) and ask (offer to sell) price. There is a spread between the bid and ask, such that a dealer can buy at a lower price than he or she sells, netting the difference, or spread, as profit. Derivatives are no different and have a bid/ask spread. The more complex the contract, the larger the spread. While MNAA would generally expect a mid market price, or the average of the bid and ask, since this is traditional in the market, it may not receive such price if the dealer, Morgan, had reason to alter the price, such as an expectation that MNAA may be seeking to unwind. The only way to find a true price is to actually buy or sell the derivative.

Given that it is difficult to model an arbitrary spread on top of a mid-market price, the sensitivity analysis is based on modeled values that are lower than Morgan’s figures. It is however thought the conclusions to be drawn from an analysis based on either starting point would be fairly similar. The dv01 or sensitivity of the price of the swaption with a 6% barrier to a change of 1 basis point in the LIBOR curve is \$7,352. This is equivalent to being long 294 Eurodollar future contracts. As BMA rates shift less than LIBOR, this is roughly equivalent to a sensitivity of \$10,000 per basis point on the BMA swap curve. Given that the notional is \$53.4 million, the duration would be 1.37 years.

Morgan benefits from greater volatility, as that increases the likelihood of the barrier being breached. An increase of 1% in volatility increases the value of this swaption by about \$74,000. A graph of this appears below.



The value shown above is the asset value to J.P. Morgan Chase or the liability that exists for MNAA related to 6% swaption. Volatility refers to the standard deviation of interest rates, such that a higher volatility value indicates greater variability in the daily changes in interest rates over recent history. It should be noted the above graph does not pass through the value indicated by Morgan based upon the assumed volatility, nor does it reflect, due to the simplifying assumption used to generate it, the positive convexity implicit in the swap for MNAA if the swap were in place. This is due to differences in assumptions used in the pricing model and the complexity of identically replicating the swaption transactions. It is however scaled to be generally consistent with the two levels provided by Morgan (the initial quotation and the one indication) and the information provided is consistent with the contracts sold and the exposure borne by MNAA. The characteristic shape of the curve, becoming less steep as volatility increases is typically only found in options with a greater than 50% chance of being exercised. Although the chance of BMA breaching the barrier at any one date is less than 50%, the cumulative probability could exceed 50% given the long time involved and the lack of any mean reversion assumptions about interest rates in the model. As the other swaptions have higher barriers, they are somewhat less likely to breach the barrier, so the value as a function of volatility would be more linear. Should the probability of breaching the barrier become significantly less than 50%, then the function would instead flatten toward the left and steepen towards the right. In other words, the convexity would reverse.

The profit and loss impact for a full basis point move upwards in the LIBOR curve is a loss of \$7,271. The profit and loss impact for a full basis point move downwards in the LIBOR curve is a profit of \$7,352, for a difference of \$125, which is a measure of convexity. This illustrates that the duration is not constant, so the value impact of large price shifts is not simply the dv01 times

the number of basis points shifted. Morgan quoted a mid-market value on 6/30/02 of \$2,347,749, down from \$2,850,000 as of 3/29/02.

Analyzing the swaption with the 6.5% barrier, we find a dv01 of \$9,962, equivalent to 398 Eurodollar futures contracts, or a modified duration of 1.86 years. Although the underlying swap is shorter, the effective duration is longer. This apparently contradictory result is due to the barrier being further away, so an increase of one basis point makes a larger marginal change in the likelihood of breaching the barrier. Morgan's mid-market quotation as of 6/30/02 was \$2,393,573, down from \$2,934,000 as of 3/29/02.

Analyzing the swaption with the 7% barrier, we find a dv01 of \$2,775, equivalent to 110 Eurodollar futures contracts, or a modified duration of 0.97 years. Morgan's quotation as of 6/30/02 was \$836,539, down from \$1,004,000 as of 3/29/02.

The aggregate dv01 is about \$20,000 per LIBOR basis point, or the equivalent of 800 Eurodollar futures contracts. This is equivalent to about \$27,000 per BMA swap curve basis point. However one might prefer to view this figure, it is far less than the protection against higher rates currently provided by MNAA's fixed rate borrowings, which have a sensitivity 5 to 7 times greater. But to focus on that relationship is to ignore the precipitous changes that are brought about when barriers are breached.

In summary, if all three were breached, it would put slightly over half of the borrowing on a floating rate basis, with a spread of 1.2% over BMA and a drastic increase in borrowing costs from the previously fixed level.

KPMG Commentary

Evaluation process

A qualitative evaluation can be made, but both quantitative and qualitative analyses depend on the benchmark, objective function or implicit assets considered to represent what the liabilities and associated derivatives are to be judged against. Looking at the liabilities and associated derivatives in isolation doesn't necessarily give the clearest view of the risk, but it is one of the most common methods, so we are obliged to consider it.

Prior to the execution of the swaptions, and assuming that the fixed to floating rate swap was highly likely to be called away, MNAA had primarily fixed rate liabilities. This represents one end of a spectrum between all fixed and all floating, minimum risk in terms of future variability of contracted debt service cashflows. If revenue from operations will be sufficient to cover all the debt service (no refinancings with longer maturities are made to stretch out payments on assets whose economic lives prove to be longer than the original financing), then this would be the minimum risk for future variability of all debt service cashflows covering existing capital projects. It had the least risk of loss from increases in rates, but had what many term "potential opportunity cost" of not being in a position to benefit from declining rates. After executing the swaptions, MNAA created an exposure to increasing rates, and can benefit, up to the amount of the premium received if rates decline or short-term rates simply stay low for an extended period of time. The impact of changes in the yield curve is most clearly observed by the impact of rate

changes on the termination or fair value of the swaptions. MNAA personnel stated that changes in the termination value were not their primary concern, as they were not considering unwinding the transaction. Others find it a useful metric, for a variety of reasons. It allows one to compare whether it would have been better to execute the strategy at an earlier or later date, or to compare it to alternative strategies. It also allows one to estimate what the market expects will be the expected cost of fulfilling the liability, or if an estimate were available for the probability of breaching the barrier, what the expected cost would be conditional upon that event.

Alternative strategies that could have been considered include:

- Raise the same amount of cash by borrowing \$4 million. It would risk breaking the tradition of identifying borrowings with specific capital improvements (although perhaps some already in progress project could have been identified), and would have had some impact on borrowing covenants. This would have left the interest rate risk exposure essentially unchanged and would have had the advantage of paying lower interest rates assuming the borrowing could be done to benefit the tax exempt status of MNAA. The derivative transaction does not provide Morgan with any tax advantage and therefore its pricing must take into account the impact of taxes to the counterparty. Given the finance department's market view, it is assumed that this borrowing would be on a floating rate basis. The size is smaller than the average borrowing, so the fixed administrative costs would be a higher percentage than usual.
- Accept the same approximate initial exposure to changes in the BMA rates and swap rates by entering an interest rate swap to pay floating and receive fixed rate on some or all of the same debt series as covered by the swaptions. The initial cash raised would normally be zero, but adding a spread on to the floating rate would increase the value to the counterparty, and so could be built into an up-front payment to MNAA. That implicitly involves borrowing based on the LIBOR curve plus a spread, so if there were an ability to borrow in the tax-exempt market, as discussed in the prior alternative, combining that with a market level swap could be more efficient. If BMA rates stay low, as the finance department projected, then the cash flow on the swap would remain positive for longer than yield curve would project. In any case, the initial cash flows would be more positive, benefiting the present and immediate future periods when the need seems to be more acute.

Another question that comes to mind is why were all three swaptions transacted on the same day when it had been two years since the prior derivative transaction? Given that the credit line had been obtained from the counterparty, a more prudent approach would have been to transact each contract separately over time which would have allowed enhanced market monitoring to see whether the conditions were becoming more or less favorable. It could also allow MNAA to assess if its needs changed, or simply to analyze the transaction in greater depth, either independently, or with the aid of outside resources such as a finance academic, a consulting firm or another interest rate derivative dealer.

At the time of the swaption transactions, long-term interest rates were quite low, having fallen rapidly. The fixed rate on a 10-year BMA swap is an appropriate proxy for the rates that would be used to price and/or value the swaps underlying the swaptions. This rate was near 3.83% when MNAA dealt in October. The trend continued until they reached their low point about a week later at 3.65% and then proceeded to rebound to significantly higher levels, trading as high as

4.47% in December, and still being up at 4.4% at the end of March. The fair value of the swaptions declined as long term rates declined, as it makes the underlying swap less valuable, as well as making the barriers less likely to be breached. Thus, MNAA would have received more premium or been able to negotiate better terms had it dealt earlier or waited a month or more before completing the transaction. The point is not to second-guess the timing, but to point out the utility of monitoring the value of the transactions, to effectively appreciate the impact of market changes on the pricing. Since the end of March, the 10-year BMA swap rate has declined to about the level prevailing at the time the swaptions were initiated, so the value of the liability would have declined as well, although the 5-year BMA swap rate is still a bit higher than the levels prevailing at inception. In taxable rates, the short-end (less than three years) of the yield curve is now lower than it was back on October 26, 2001, but the longer rates are about 10 basis points higher.

The first graph, as an example of a one-dimensional analysis shows how it is insufficient to fully evaluate the exposure with swaptions. It is slightly easier to analyze the choices between a swaption transaction and the alternatives mentioned above. Although there would be some forward-starting, amortizing, receive-fixed, pay-floating swap that would have had the same duration and all the same key rate durations as the swap, like one version of the second alternative, that transaction would not have had the same risk profile. The duration of the swaption, in a declining rate environment, would eventually drop near zero, as the potential benefit is limited to the premium received, while the duration of the swap would increase (albeit slightly), so potential benefit from a swap would be greater. The potential cost due to higher rates is greater with swaptions, as the swaption notional would be greater than the swap notional. This illustrates the negative gamma or negative convexity from having written options. Even without rates moving, the value of the swaptions would change due to changes in the markets expectations for future rate volatility.

In terms of credit risk, during the period before the swaption is exercised, MNAA has no credit exposure on the counterparty. MNAA received the premiums up front. A credit support annex was signed, allowing Morgan to call for collateral if the termination value rises from the initially specified independent amounts that were set at approximately the premium received. (Given that the end of March indicative valuations were higher than at inception, Morgan could call for collateral, which could begin to constrain MNAA's cash management. Since MNAA is subject to the accounting standards of SFAS 133, it would be required to present the total exposure of the barrier swaptions on its financial statements, to the extent it is considered material. This would have the effect of disclosing the potential capital call in the financial statements in terms of presenting the liability. Whether the notes presented details regarding the possibility of transferring cash to J.P. Morgan is best evaluated by the current auditor and is outside the scope of this review. Morgan might well refrain from requesting collateral until either the amount got bigger or until they had some reason to be more concerned about MNAA's creditworthiness, like MNAA being placed on a credit watch list with negative implications.) If the swaption were able to be exercised and were, then initially it would still be the counterparty that was exposed to MNAA's credit rather than the other way around. This could change if there were a significant decline in rates after the swaption was exercised.

Prior to transacting the swaptions, Morgan sent materials including a PowerPoint presentation, that we reviewed, which described three alternatives for MNAA to achieve certain objectives. These objectives are listed below in italics, with our commentary following in normal type:

- *Achieve potential interest rate savings by converting a portion of the Airport's outstanding fixed rate obligations to variable rate obligations with an interest rate swap to take advantage of historically low rates provided by the BMA Index.* This objective was not met as the swaption could and would only be exercised after the current period of historically low rates had ended. Until that point, MNAA would continue to pay fixed rates of interest on its debt, although it would have received a one shot benefit of the swaption premium.
- *Limit tenor or provide termination flexibility on any potential swap contracts associated with restructuring of outstanding liabilities.* Tenor (length of time of exposure to the contract) of the swaptions matched the longest tenor of any of MNAA's borrowings, so it was hard to see how it was in any way limited. While any derivative can be offset contractually, exotic derivatives such as these swaptions have wider bid-ask spreads than plain vanilla swaps, so the costs of termination are apt to be higher.
- *Use optionality features in swap contracts to create value for MNAA.* This statement risks confusing cash and value. The sale of an option provided immediate cash, but if it were fairly priced, an equal sized liability would have to be recorded, so there would be no immediate value to MNAA in executing the transactions. The existence of the counterparty's profit margin means that the initial value was in fact negative for MNAA. MNAA hopes to reap value over the life of the contract, if BMA stays below the barriers, as MNAA personnel speculated.

A barrier swaption strategy substantially similar to that actually transacted was one of the strategies proposed. The document purported to discuss the disadvantages and risks of the transaction, by listing:

- *If swap is delivered, MNAA will have interest rate risk.* MNAA was exposed to interest rate risk the moment it agreed to the swaptions.
- *MNAA will also have additional Counterparty risk.* MNAA receives the premium upfront, so has no immediate exposure to the counterparty. If the BMA rate breaches the barrier and the swaption is exercised, the value of the swap will be in the counterparty's favor, so MNAA still wouldn't have any current exposure. They would have potential exposure as, if after exercise the BMA and/or swap rate should decline substantially, they would then have an exposure on the counterparty.

It should be noted the materials presented by Morgan Guaranty are best described as marketing materials, meant to convince a party to enter into the derivative transaction; they were not an independent evaluation of the financial risk and exposures to be faced by MNAA. In fact, were they to have provided some form of analysis on the deals, it would have been considered a conflict of interest, since Morgan was not independent to the transactions and stood to benefit substantially from the deal.

MNAA personnel presented an analysis of the swaptions to the finance committee and board based on the historical rate levels of BMA rates for the past ten years. The rate rarely reached the levels of the barriers and only was above those levels for a brief period of time, not sufficient to create the necessary average above the barrier. As such, MNAA is speculating that there was very little likelihood that the barrier would be breached, or if it was, it was likely to be very late in the life of the deals, when the amounts had amortized down sufficiently that the cost would be low. As can be seen from the pricing table above, that is 2010 or later.

Observations and Recommendations

The observations will be divided into four sections: market risk, credit risk, risk monitoring and general.

General

Observations

Many of the financial decisions facing MNAA have the potential of creating a conflict within the Airport Authority. Since the airlines servicing Nashville approve most financial decisions, there is the desire by these current users of the facility to approve decisions which would benefit them currently. Such financial decisions may have the potential to disadvantage future users of the facility, such as new carriers or passengers. The trade-off for the airlines when considering whether to initially approve a particular derivative would be between lower current lease costs versus potential higher future costs in a higher interest rate environment. It would not be unexpected for the airlines to choose the more short-term solution. Given that, under normal circumstances, most of the costs and benefits of such decisions flow through to the airlines, the responsibility of MNAA might be considered as one of selecting and presenting the best deals of the appropriate type, rather than exercising market judgment to try to pick the optimal deal. MNAA has a duty to balance the needs of the short term with those of the long term, selecting and presenting opportunities which meet the overall, and balanced, objectives of the Nashville community.

We have found that MNAA does not have a defined overarching objective with regard to its financing decisions. While more complete than a mission statement, an integrated debt management strategy would serve to present the financial objectives of the capital financing side of the balance sheet. It would work to help balance both the needs and desires of both the current and future users of the facility by framing the process upon which all financing decisions would be made. This strategy would coordinate with the Debt Policy, or potentially be the preamble to the debt policy, by stating the basis for which the specifics of the Policy are based. The reasons for fixed or variable rate debt, the terms to be considered, refinancing and call provisions, derivative usage and other issues associated with the funding and financing of MNAA would have their basis in such a debt management strategy.

As well, we discovered MNAA has no comprehensive derivative policy. At this time, there is no stated criteria for the types and sizes of derivative contracts into which MNAA can enter, no prohibited types of derivatives or restrictions on their use, no formalized process for performing due diligence or on-going monitoring and no stated requirements for exit strategies or the evaluation of economic conditions which would require changes in derivative usage or hedging current exposures. Without a formalized and comprehensive policy statement, credit risks issues and changing credit of counterparties mandates no action by MNAA staff, nor do changes in market conditions. We believe a well structured policy would help to guide the use of derivatives by MNAA and should coordinate with the Debt Policy and the debt management strategy.

Historical analysis, of the type MNAA presented to support MNAA's recommendation to sell the swaptions, is a necessary but not sufficient analysis for such transactions. That type of analysis is one method of deciding whether a fairly priced transaction with an acceptable risk level is likely to be profitable. The other necessary components, at a minimum, are an evaluation of whether the transaction represents good value (that there is not an unreasonably large expected profit for the

counterparty) and that the overall position, with the prospective position included, would produce a risk profile that is within the authorized and prudent bounds. Some would supplement these with an evaluation of how the position would fare under a particular economic forecast.

The PowerPoint presentation received from Morgan did not do a good job of highlighting the actual risks of the transaction. As such it should probably be understood to be a sales document rather than one containing a risk disclosure. The expressed objectives do not appear to be delivered by the proposed transactions. The objective of taking "...advantage of historically low rates..." was not met as the swaption could and would only be exercised after the current period of historically low rates had ended. The objective "...to create value for MNAA" was not in the cards either, as at inception, the pricing created substantial value for Morgan. MNAA received cash, but for incurring a greater liability. Although the liability would have been booked at inception for the amount of cash received, due to the bid/ask spread in such contracts, the cost to unwind would be materially higher.

It is usually the case that if a sophisticated dealer in financial derivatives is willing to pay a premium to you, the dealer either has an expectation of collecting more back from you in the future, or more typically, can execute a series of other transactions to collect at least that much value immediately. It is therefore a good idea to ask oneself, "What is the dealer doing on the other side?" If that strategy is clear, then consider whether a transaction in that market would provide a superior alternative. Even if not, the exploration of the strategy will likely produce a better understanding of the risks involved.

General Recommendations

- | We recommend MNAA adopt an integrated debt management strategy. Such a strategy would detail the objectives of the MNAA in terms of debt issuance, use of fixed and variable interest rates, expectations of interest rates and their impact on financing and operations budgets. Such a strategy would coordinate with the Debt Policy and Derivative Policy, and would change through time as markets, expectations and financing needs change.
- | We recommend MNAA draft and adopt a comprehensive derivative policy. This policy would also clarify the objectives for use of specific instruments and necessary reporting, indicating whether objectives are being met. It should detail due diligence requirements prior to entering into a contract, pricing requirements and ongoing monitoring. Counterparty credit risks, market risks and risk monitoring would be detailed within such a document, and the reporting required both internally and externally would be specified, in terms of its contents and frequency as well as its audience.
- | When making recommendations concerning potential derivatives to the finance committee and to the board, the finance area should clearly distinguish between hedges that due to matching critical terms would qualify for the short-cut method (in terms of presentation on the financial statements), hedges that are expected to be highly effective but that wouldn't qualify for the short-cut method, risk reducing transactions that would not qualify for hedge treatment, and derivative transactions that are not risk reducing. This would allow the board to understand the categories of contracts, their general effectiveness in terms of meeting financial needs of MNAA and the impact each new contract would have on existing exposures.

- | MNAA should refrain from transacting derivatives that it cannot price, or whose prices are not widely available from a number of reputable dealers, unless the terms of the derivative closely match an existing or proposed financing transaction, such that the combination of the debt and the derivative synthetically create a standard structure, such as fixed or floating rate borrowing, which is closer to a market created financial instrument.
- | When transacting a number of contracts, it may be prudent to stagger the implementation dates, in effect dollar cost averaging the derivative positions, which would allow for enhanced market monitoring and evaluation of the pricing of the derivatives.
- | MNAA should better evaluate the pricing of derivatives prior to their execution. The most recent transaction with Morgan was the equivalent of a negotiated contract. While this is not unusual in the derivative marketplace, especially with unique and complex contracts, it does not lend itself to effective price discovery by the non-dealer. This fact could be helped by asking for prices on an initial hedge portfolio, which can be compared during the negotiation process for price changes relative to the derivative contract to detect whether the dealer is improving the pricing or not. Alternatively, bids from other dealers could be obtained to evaluate the quote received by the initial dealer.

Market Risk

Observations

If two sets of deals can be called a trend, MNAA has displayed a tendency to sell options in recent years. The premium received, either in cash or a lower rate on a swap shows up as a near term financial benefit for the airlines, which helps their earnings. If they were to write the same option themselves, it wouldn't necessarily benefit their earnings, as the change in value of a written option is what flows through to earnings, not the premium. The scheduled to be terminated swap would have benefited their earnings, but the written swaps would have created a loss for them to date, one that they can ill afford. Writing options is not a universally winning strategy. Although profits are more frequent than losses, the losses tend to be bigger than the profits. MNAA has profited in the past by issuing callable bonds and taking advantage of the call feature, which shows that they can benefit from implicitly buying options. It is not clear that this source of value is recognized.

It is beyond MNAA's present capability to be able to price the knock-in barrier swaptions.

The indicative prices shown by Morgan for the three swaptions, which show that these liabilities have increased since inception (\$2,347,749 for one with the 6% barrier originally sold for \$1,628,000, \$2,393,573 for one with the 6.5% barrier originally sold for \$1,700,000, and \$836,539 for one with the 7% barrier originally sold for \$525,000) would have likely been priced using generic inputs, such as mid market rates and not taking into consideration the change in their risk profile should they actually execute such a transaction with MNAA. To the extent that rates from the appropriate side of the market (from the dealer's point of view) were used, the actual transaction price they might propose could be less favorable than the indication. However, given that offsetting one or more of the transactions would reduce their credit risk on MNAA and also potentially any residual unhedged specific market risk, they could be motivated to quote a better price than the generically based mid market indication. The net effect of these two conflicting influences cannot be determined without negotiating. Valuations derived from an

independently developed binomial tree based model, with certain simplifying assumptions based on the shape of the yield curve at the point the barrier is breached were sufficiently different from the indicative figure shown by the counterparty so as not to allow a reasonable implied volatility to be determined. This could be due to differences in modeling or perhaps that indicative prices provided were higher than the offered side, thus inclusive of an additional margin to provide them negotiating flexibility in case MNAA sought to unwind the transaction.

MNAA has different sets of objectives, debt service covenants, cash-basis earnings, earnings, etc. Market risk measures could be adapted to each of these metrics.

Market Risk Recommendations

- | When making recommendations concerning potential derivatives to the Finance Committee and to the Board, the finance area should analyze the range of short and long-term impacts of the proposed trade not only from a cash flow basis, but also on a fair value basis. This can be performed either through evaluation internally at MNAA, which would require specialized software and a high level of expertise in exotic derivative contracts, the retention of an outside consultant or the utilization of resources at the dealers used for certain contracts. Should the latter be considered, MNAA would need a high level of internal expertise to allow it to evaluate the work performed by the dealers, since there is an inherent conflict of interest. MNAA would need to be able to recognize and identify areas where information or analysis provided has been impaired by the conflict and would need to be able to direct corrections to address those shortcomings. We would consider this approach the least desirable because, though the most cost efficient, it has the greatest exposure for errors and incomplete analysis.

Credit Risks

Observations

The counterparties to the derivatives in question are reputable with acceptable credit ratings. Sogen is Aa3/AA-, and JP Morgan Chase is Aa2/AA-. Thus there seems to be no problem with the actual exposures. The counterparties' ratings are monitored by MNAA but no explicit report is generated on a regular basis showing the amount of current and potential exposure by counterparty, their current rating, the rating trend, any collateral pledged or received and other indicators as may enhance the report such as the stock price trend or credit spread of the counterparty.

Credit Risk Recommendations

- | MNAA should consider developing a derivative counterparty credit report, to be updated monthly, showing the amount of current and potential exposure by counterparty, their current rating, the rating trend, any collateral pledged or received and other indicators as may enhance the report such as the stock price trend or credit spread of the counterparty.
- | Although it deals infrequently, MNAA should consider adopting a derivative counterparty credit policy, perhaps as part of a complete derivatives policy, that would specify what quality counterparties are acceptable, what the limits for current and potential exposure are, and what procedures are needed to assure compliance with the policy.

Risk Monitoring

Observations

The other kind of analysis usually considered is a range of favorable and unfavorable scenarios that include some where the strategy does quite poorly. When the strategy being considered is a long term strategy, it is also appropriate to consider how the fair value of the strategy could change in a shorter time (a month to a year), as it is often hard to develop truly long term scenarios that illustrate the full range of potential performance.

It would be appropriate to develop a contingency plan as to what actions to take should a barrier be breached. This is not an immediate concern, but getting the necessary approvals in a rapidly moving market could create substantial opportunity costs, so some preparation would be appropriate.

Risk Monitoring Recommendations

- | MNAA should calculate or otherwise obtain valuations for its derivative transactions on a regular basis. Monthly would seem appropriate, although in no circumstances should it be done less than quarterly.
- | MNAA should calculate or otherwise obtain sensitivities including duration, convexity, key rate duration and gamma for its derivative transactions on a regular basis. This should be aggregated with similar figures for existing debt transactions, and reported on a regular basis to the finance committee.
- | MNAA should calculate, either directly from modeling the positions or indirectly from the sensitivities, the Value at Risk for its combined liability and derivative position. An appropriate time horizon would be one month. An appropriate confidence level would be between 90% and 97.5%. The efficacy of the VaR calculation should be back-tested annually by comparing the changes in values each month with the previous month's VaR calculation, excluding any trades executed during a month. The VaR should also be included in the regular report to the finance committee. MNAA should consider establishing a guideline or limit on the acceptable level for VaR.
- | MNAA should calculate the impact of less probable but more extreme market rate moves on its combined liability and derivative position. It might consider certain historical periods that were impacted by large rate shifts, or a set of standardized shifts, including a 3% parallel increase in taxable rates, and significant twists in the yield curve. If a guideline or limit is established for these stress or "event risk" scenarios, it would be larger than for VaR, but should be set at a level that would ensure that the financial condition of MNAA is not severely adversely affected in such a scenario.

If resource constraints make it impractical to calculate both VaR and stress risk, preference should be given to monitoring the exposure to extreme events.

Appendix I – Items Reviewed

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Morgan Guaranty Trust Company of New York, ISDA Master Agreement, October 26, 2001

Morgan Guaranty Trust Company of New York, US Municipal Counterparty Schedule to the Master Agreement, October 26, 2001

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Appendix II – Specified Objectives

In amendment no. 2 to contract no. 14431 between the Metropolitan Government of Nashville and Davidson County and KMPG LLP the objectives are specified as:

“Contractor shall assist the Metropolitan Government of Nashville and Davidson County with a detailed review of the risks associated with all swap contracts currently held by Metropolitan Nashville Airport Authority. This risk assessment will include a review of the terms and conditions associated with each existing swap contract held by Metropolitan Nashville Airport Authority, modeling the financial aspects of the swap contracts against various financial market conditions in order to determine Metropolitan Nashville Airport Authority’s financial and economic sensitivity to various changes in the financial markets, review of counterparty risks, and our suggestions as to how the Metropolitan Government of Nashville and Davidson County and Metropolitan Nashville Airport Authority could monitor and oversee its exposures going forward. We will provide the Metropolitan Government of Nashville and Davidson County with a report summarizing our analysis and results and will provide you with our comments regarding the prudence of the current swap program at Metropolitan Nashville Airport Authority.”

Appendix III – Derivatives Primer

Derivatives in General

Derivatives have been an area where there has been significant investment in modeling and pricing exotic structures and products, many of which were not previously available. This had permitted users to express market views that were not previously available through cash instruments or simple (plain vanilla) derivatives. Often such exotic derivatives are grafted onto a debt issue, often called a structured note, whereby the investor (or issuer) accepts a particular risk in exchange for a higher (or lower) coupon. This eliminates the need for a credit check on the investor who would not otherwise qualify as a derivative counterparty, as the amount invested serves as adequate collateral. Unlike the early growth of interest rate swaps, there is generally not an exchange of relative market advantages involved in the transaction of an exotic derivative. The dealer involved will generally hedge away most of the risks using other, more liquid and less exotic derivatives at an expected profit. Thus, the client transacting an exotic derivative, which is not an offset to a pre-existing position, is typically paying a “retail” price for a product customized to suit his market views. The dealer is not usually finding someone with an opposing view; instead they would most likely hedge off the resulting risks in a “wholesale” fashion, using more standard markets at an expected profit. The only exchange of comparative advantage being exchanged is the dealer’s superior modeling ability and the client’s strong market view. Excesses in this field have occurred, with some of the most notorious provoking court cases and headlines (Proctor & Gamble, Gibson Greetings). Dealers have learned to avoid the practices that made them liable in such cases, but numerous smaller disappointments occur regularly that never see the light of day. To avoid such an unequal exchange, knowledge is the key. Some relatively inexpensive software can go a long way to closing the gap with dealers on those exotic products that have been around for while, and can assist in pricing approximations to more recently developed ones. As these products are, by definition, less standardized, just trying to use competition to get a fair price is a less viable strategy.

Yield curves:

LIBOR stands for London Inter-Bank Offered Rate, and is the rate at which prime banks can readily access deposits from other banks in the offshore market, which is free from reserve requirements. There are various surveys conducted at 11 AM London time on business days, although the most popular is that conducted by the BBA (British Bankers Association), which receives submissions from a dozen prime banks, discards the two highest and lowest and averages the rest. Various market quote vendors, like Reuters, Telerate and Bloomberg distribute the average, or it can be accessed on the BBA website later that day. They also provide an historical archive of prior rates. Rates are collected for 15 maturities: one day, one and two weeks, and monthly out to a year, and for 7 currencies, including the US dollar. The BBA monitors the quality of the banks surveyed, or more specifically the reputation of those banks in the market, and will replace any bank no longer considered prime. Although actual transactions do occur in the interbank market, LIBOR serves as a basis for coupon settings on floating rate notes and syndicated loans. An interest rate swap is a contract to exchange a fixed rate of interest on a notional amount for a floating rate of interest, for a specified time. As some of the original

participants in the interest rate swap market were seeking to fund such syndicated loans, and others were locking in the cost of such loans, LIBOR was the most popular floating rate index in interest rate swaps. Its popularity has increased with development of the Eurodollar futures market and the FRA (Forward Rate Agreement) markets that allow individual LIBOR fixings in an interest rate swap to be hedged. Although the LIBOR market only goes out to one year, with the aid of futures and/or interest rate swaps, it is possible to build a LIBOR based yield curve out to 30 years. Valuation of an interest rate based derivative requires construction of a yield curve, which is used to discount the expected future cash flows. Except for the maturities under one year, rates are either collected for swaps that pay periodic interest, and thus are blend of rates applicable to cash flows occurring on different dates, or futures that only cover a segment of the yield curve. To facilitate the evaluation of the expected future cash flows, it is helpful to calculate a zero-coupon or spot rate yield curve or set of discount factors. This is constructed using a process called bootstrapping, as the spot rate for a given date is calculated from a coupon or futures based yield in conjunction with the spot rates or discount factors for the shorter maturity cash flows arising from that interest rate swap or futures contract. Futures contracts have margin flows which occur earlier than the period covered, and the revenue or expense that will arise from investing or borrowing those margin flows until the period covered are correlated with the futures gain or loss. Thus the impact of the correlation of the interest on margin should tend to make futures contracts trade cheaply. Thus an estimate of this effect, called a convexity adjustment, is used to equilibrate futures yields and the implicit forward yield for the same underlying period. It is called a convexity adjustment as Eurodollar futures contracts always change in value by \$25 per basis point, thus displaying no convexity, but a contract on a forward rate, which would be discounted at LIBOR, does. This convexity has value, hence the need for an adjustment.

When short-term rates are low, yield curves tend to have a steep positive slope, often starting from whatever point the Fed might plausibly begin to tighten interest rates. When rates are moderate, the yield curve tends to have a slight positive slope, perhaps just reflecting liquidity preferences, although the slope could be positive or negative, depending on expectations. When rates are high, the yield curve tends to have a negative slope, although if the Fed's last move was a tightening and they still maintain an upward bias, there might be an initial positive slope leading to a "hump" in the yield curve before it turn negative. Such configurations are more normally seen when rates are moderately, rather than extremely high.

Municipal Derivatives:

Derivative contracts where the floating rate is linked to either a specific issuer's short-term tax-exempt borrowings or an index of short-term tax-exempt borrowing rates is called a municipal derivative. Market practice is trending towards standardization, with contracts being linked to the BMA rate, which is published weekly. Dealers prefer this as it insulates them against specific credit related events impacting a single borrower. Payments received by a dealer on a municipal derivative dealt with a tax-exempt issuer are not tax exempt. Thus, the valuation of municipal derivatives involves estimating the expected future cash flows and then discounting them at taxable rates (usually by using the LIBOR-swap curve, although derivatives that imply an extension of credit could use the LIBOR-swap curve with a credit spread added on). The law of supply and demand ultimately determines any price, including derivatives. This is most clearly expressed in the assumed ratio between the short-term LIBOR rate and the BMA rate. Although the BMA rate usually averages below 70% of LIBOR (it averaged 62% in 1998, 63% in 1999, 65% in 2000, and 68% in 2001) it has averaged 74% year to date and the implicit ratio expected for the next 10 years, which calculated by comparing the fixed rates on a BMA swap with the

fixed rates on a LIBOR swap, is also about 74%. This is affected by expectations, particularly about tax rates, and of course the relative supply and demand by tax-exempt issuers for pay fixed and pay floating BMA swaps.

Arbitrage, Modeling, and Assumptions:

Certain derivatives can have their cash flows replicated in all circumstances by a portfolio of other transactions. It is axiomatic that if the cash flows are always identical then the values are also identical. Some derivatives are able to be valued in this manner. Other, usually more complex derivatives require a pricing model or procedure to be used to arrive at a value. Some standard assumptions are made (like that the dealer can borrow or lend at the rates on the LIBOR based yield curve, or that the distribution of percentage changes in interest rates follows a particular distribution, such as normal, bell-shaped curve) and market parameters (prices, yields, volatilities, and correlations) are collected for actively traded instruments. If these parameters are not in the form required by the model, an iterative process called calibrating the model is used. Potential model inputs are tried to make sure that the prices of liquid instruments are properly priced using that input. Once calibrated, the model can then be used to price the derivative in question.

Models, except for those that merely rely on pure arbitrage relationships, are necessarily simplifications of reality. Frequently, more complex models can be constructed that would more closely represent what seems to be observed in the market place. For example, many market practitioners find that models that use the normal distribution for interest rate percentage changes does not do a good job of recreating market prices for caps and floors of different strike prices, but a blend of that distribution with another one does a better job. However, moving to a more complex model, besides requiring more analytical and computing power, also needs additional parameters to be estimated (such as the relative weight of each distribution in the blend). This can cause problems is the additional parameters seem to jump around extensively from one calibration to the next. Other examples of additional assumptions that have been adopted by some interest rate derivative dealers include mean-reverting interest rates, volatility dependent on time, the rate level and a random element. Simpler models are more likely to have an analytical solution, meaning that a formula can be specified that will result in the valuation. Certain others, like American style options, where a choice of when to exercise is involved are more typically valued using a discrete lattice or tree of possible future states with combinations of different underlying rate levels and times before maturity. If the number of possible states in the lattice becomes too large, then a sampling from among the possible paths via a Monté Carlo simulation is frequently needed.

For some derivatives, another layer of complexity in the pricing model will make a significant difference. This is most often true when some aspect of the assumptions of the simpler model is stretched unduly. However, the highest accuracy is only required for pricing purposes. Many large banks handle complex derivatives for risk management purposes using a simpler model, as the same degree of accuracy is not required. A 1% error in pricing is usually unacceptable, but a 5% error in a risk management statistic is often tolerable.

Efficient market hypothesis or no-arbitrage opportunities

Various forms of the efficient market hypothesis have been put forward and tested, with mixed results. It is often used to support arguments against technical or chart based trading systems that detect patterns in past prices that imply something about future price movements. This has drifted

into the common consciousness in the standard disclaimer “past results are not an indicator of future performance”. Another common observation is that once news has been released, the impact of that news on the market is instantly reflected, as evidenced by extreme volatility in today’s market in reacting to surprises and the common saying “buy on the rumor, sell on the news”.

The “no-arbitrage” assumption is built into almost every derivative pricing model. It implies that no combination of trades, at market prices, could produce a riskless, self-financing profit. With care, this can be extended to trades involving statistical relationships, that no combination of trades produces a “risk-adjusted” self-financing, expected profit. Obviously risk aversion varies between participants, so one with a lower risk aversion than average would find certain risky trades to more than amply reward the amount of risk to be borne, so such participants portfolios would tend to have more of such trades in them. For certain risks, there is no compensation available, as they can be diversified away. One implication of this is that if one receives an up front payment from a transaction, then a payment of an equal expected present value (on a risk-adjusted basis) will be made back to the counterparty during the life of the deal. If the probability of making that payment is lower, then the amount of that payment, should it have to be made will be larger.

Another implication of the efficient market hypothesis or no-arbitrage assumption is that the range of possible future prices is well reflected in the current market prices. This is easiest to apply to non-optional contracts. For example, while interest rates can move up and down, and thus the future payments on an interest rate swap are unknown, their expected present value is the current value of the swap.

Types of risks

Bank regulators in the leading financial centers worldwide have agreed on three “pillars” of risk. These risks are generally identified and evaluated in most reviews, both internal and external:

- ‡ Credit risk – the risk of loss from failure of counterparties or debtors to perform on their obligations in a complete and timely fashion,
- ‡ Market Risk – the risk of loss due to fluctuations in interest rates, foreign exchange, equity and commodity prices and their volatilities,
- ‡ Operational Risk – it is tempting to say everything else, but it specifically includes risk of loss due to improper processing of financial derivative transactions, whether from ignorance, error, or fraud, and legal risks relating to the enforceability of contracts supporting such derivatives.

Credit risk is mentioned explicitly in the objectives of this engagement and “financial and economic sensitivity to various changes in the financial markets” is an excellent definition of market risk. Although the engagement focus includes potential enhancements to monitoring and managing credit and market risk going forward, we also evaluated the operational risk issues associated with evaluation, due diligence and on-going monitoring of the contracts held by MNAA.

Credit Risk

Credit risk can be divided into current and potential exposure. The immediate loss if a counterparty defaults now is the cost of replacement of the derivative. While there might be some additional risk due to market movements while trying to sort through the documents to determine what is the procedure to follow in case of counterparty default, the normal practice is to quantify current exposure as the current market value, not less than zero. If a counterparty defaults and the swap (or other derivative) has positive value to the defaulting counterparty, then the receiver appointed is generally entitled to claim that value. Thus there is no possibility of a windfall profit from having a counterparty default.

Potential exposure is an estimate of what the current exposure might be in the future, under a range of possible market assumptions. How much might be lost in future is measured by potential exposure. Often, new swaps have no value at inception. Thus the current exposure is zero. That does not mean that there is no credit risk in entering such a transaction. Active derivative dealers and users set credit limits on the current and potential exposure profile they permit themselves to run on a counterparty. There are various ways that current and potential credit risk exposure can be mitigated. Multiple contracts with same counterparty, if some have positive and some have negative values can be netted if there is a master agreement in place. Credit support annexes are often signed, which require collateral to be posted once the exposure grows beyond a certain threshold. Other agreements have downgrading clauses where a counterparty can request immediate settlement at a market quotation based termination value if the other counterparty is downgraded below a specified debt rating. Other agreements have an optional termination date where either party can request a market quotation based settlement of the derivative. As it normally costs something to replace the contract (one half of the bid-ask spread), such clauses are not usually exercised unless credit has become a severe concern.

Market Risk

Measurement and management of market risk has developed dramatically in the past 25 years. Much of the development has been pioneered at financial institutions, as the traditional systems of notional limits were rendered obsolete by the development of derivatives. Three broad categories of risk measurement techniques have been developed: sensitivities, Value at Risk, and Stress Testing, each of which will be surveyed below.

Sensitivities

Sensitivities are measures that assess the local or short-term impact on a position or portfolio due to a small change in a key variable. Mathematically speaking, they are often derivatives, but reusing that term would confuse the matter. They are also sometimes called “Greeks” as option traders have labeled their more commonly used sensitivities with Greek letters. The focus of this engagement is the impact of derivatives use on MNAA’s interest rate risk management. The main interest rate sensitivities are duration, convexity, and the value of a basis point.

Duration is the average life, weighted by the present value of each cash flow of a financial instrument. It is useful when comparing coupon bonds to zero coupon bonds with the latter having a duration equal to their maturity. A related measure, modified duration, which is duration divided by one plus the yield divided by two, is more commonly used as that allows one

to predict the change in the bond value for a small change in yield. Duration and modified duration are usually denominated in years. For duration this is clear since it is a weighted average time, and it also works for modified duration, since when it is multiplied by an interest rate change (for which the units are percent per annum) the result is a percent change.

For most instruments, duration changes with the level of rates, so a profit and loss estimate made just using duration will be progressively less accurate the larger the magnitude of the rate shift. Convexity is the measure of how modified duration changes per 1% change in rate. Normal coupon bonds have positive convexity, as their duration becomes longer as rates decline. Callable bonds have a region of negative convexity, as a decline in rates that makes the call more likely shortens the duration. For some instruments, like mortgage-backed securities, standard modified duration and convexity calculations would give misleading results, as the impact of changes in rates on prepayment expectations would be omitted. Practitioners have developed related concepts called effective duration and effective convexity to handle such instruments, based on how they seem to trade in the market. But for derivatives or instruments with embedded derivatives, more direct calculations using pricing models can calculate these sensitivities directly, although other terms, borrowed from options jargon, are sometimes used.

The modified duration multiplied by the amount of the instrument and by one basis point is the value of a basis point, which is a useful way to measure and compare various exposures. As changes in rates are not always parallel shifts of the yield curve, a means of measuring the sensitivity to each significant point on the yield curve, called key rate duration has been developed.

For options, the primary tool of an option dealer seeking to hedge an option they have written or purchased with the underlying instrument is the sensitivity of the option premium to changes in prices of the underlying (security). This sensitivity is called delta, since that term already meant a small incremental change. It is also referred to as the hedge ratio, as it indicates the amount of the underlying instrument to transact to offset an option's risk to changes in the underlying price level. Delta is not constant; as the underlying price moves relative to the strike price, the delta will change. The sensitivity of delta to changes in the underlying price is called gamma. For fixed income derivatives, gamma is a concept similar to convexity, although the amount of gamma in an option can be very much more than the amount of convexity found in a normal bond. Option prices are also sensitive to the level of volatility. Various practitioners have tried to assign a Greek letter to this sensitivity, but the term vega is most commonly used. The sensitivity of an option premium to the passage of time is labeled theta, but is just as frequently referred to as time decay.

Value at Risk

Tools were developed that answered the question, "how much might we lose?" while before the focus had been on "how big is the position?" A concept called VaR, for Value-at-Risk was developed, and made mandatory at large banks. It is a confidence level, now usually set at 99%, that the losses on the current positions will not exceed the calculated level in set time horizon. Active traders frequently calculate VaR for a one day horizon, although banks are required to hold capital based on a multiple of the 10 day, 99% VaR. Roughly translated, this means that for 99 days out of 100, losses would be expected to be less than the measured VaR, and on average, they would be higher than that figure one day out of 100. Less active market participants will

frequently calculate VaR for a one-month horizon, but, as 100 months is a long time, they often prefer a lower confidence level, like 90%, 95% or 97.5%.

Various methods have been used to calculate VaR. The most common are variance-covariance matrix, historical simulation and Monte Carlo methodologies. The earliest method publicized was referred to as Risk Metrics, or generically as a variance-covariance matrix. It is relatively simple, good for handling a large number of positions in different markets, but as originally developed, not well adapted to handling options. It uses as inputs the current positions, their historical volatilities and historical correlations with the other positions in the portfolio and assumes that the distribution of market price changes can be fairly characterized by a bell-shaped normal distribution. This allows a direct calculation of the portfolio standard deviation, which is then multiplied by the required factor to get the desired confidence level, which would be 2.33 for 99%.

The major alternative to this has been historical simulation, which makes no normality assumption, but does assume (as does variance-covariance based methods) that the kinds of movements that occurred in the historical period used to collect data will be representative of what could happen in the near future. A typical implementation is to take four years of historical price data, which is roughly 1,000 days, and calculate how the portfolio would have behaved if either the historical market changes were applied to the current portfolio or the relative market changes that occurred on those days were applied to the current market parameters, which would then be used to revalue the portfolio. Whichever of these methods is used, the tenth worst of those thousand possible results would be the 99% confidence level VaR. Although historical simulation based VaR calculations are better at dealing with options, they are more difficult to implement and take longer to calculate. They have also been criticized for not considering combinations of movements that could have occurred, but didn't.

To address this issue, some practitioners prefer to use Monte Carlo based techniques to calculate VaR, where the range of historical movements determine what can happen, but the actual market shifts used to calculate the VaR are drawn randomly from among those shifts. This can be even slower (due to the number of scenarios needed to be evaluated to get the desired degree of accuracy) and more difficult to implement than historical simulation, but is probably better at handling situations where there is less historical data in some markets than others. Monte Carlo simulation methods have also been criticized as the same positions will not necessarily produce the same VaR measurement, due to the impact of the random draws, although this can be controlled. All three of the methods typically rely on historical data to determine the range of what is possible. This has been criticized as ignoring the information content in the market prices of options, which often trade at implied volatility levels different than the historical volatilities used in the VaR calculations. Some work has been done to adapt the Monte Carlo methodologies to use implied rather than historical volatilities. Unfortunately, correlations are also needed, and implied correlations between markets are much less readily available than implied volatilities, so typically there is still a reliance on historical correlations in such modified Monte Carlo methods.

Stress Testing:

Stress testing was developed by users of VaR who were concerned about how much they might lose on that one day out of 100, or what would happen to their position in a crisis situation, what has come to be described as event risk. The solution adopted is to value the portfolio in a set of hypothetical scenarios that represent more extreme moves, therefore less probable than would be typical of a VaR calculation, but not so extreme so as to be implausible. Various means are used to develop these scenarios. Some just use six to ten standard deviation market movements. Others select particularly significant times from market history, like the crash of '87, the Russian debt crisis, etc. This is called using the "market's greatest hits". More recently exploited techniques include principal component analysis and extreme value theory.

Operational Risk

Operational risk details the control environment in which derivative transactions are made. It can tend to be a difficult area to effectively evaluate, since it addresses a number of potential issues, including the risk of fraud, errors in accounting and legal exposure in the creation and enforcement of the contracts. These risks are not unique to derivatives, since they are a risk of most investment organizations. They are best mitigated by the existence of strong policies and procedures, a well constructed and functioning control environment and on-going evaluation of the internal processes. Since derivative contracts can be complex, their enforceability, financial reporting and valuation can require the use of external expertise, since it is quite plausible that an infrequent purchaser of derivatives would not have the requisite expertise on staff.

Derivatives Accounting for Governmental Entities

MNAA follows GASB, and where it is not contradicted by GASB, it also follows FASB as well. SFAS 133, "Accounting for Derivative Instruments and Hedging Activities" therefore applies to MNAA. SFAS 133 requires that the fair value of derivatives be shown on the balance sheet as assets or liabilities, and, unless otherwise permitted, the changes in their fair value would flow through to current period earnings. While there are several exceptions to treatment identified in SFAS 133, since MNAA is a governmental entity, these exceptions tend not to apply. One exception which would apply is a fair value hedge. MNAA would document a fair value hedging relationship if it issued fixed rate debt that it swapped to floating. The change in the fair value of the derivative would be posted to earnings, but the changes in the value of the liability due to changes in the hedged risk could be also posted, to the liability and earnings, thus offsetting the impact on earnings to the extent that the hedge was effective.

There is additional guidance for handling purchased options and zero-cost collars used as hedges, but a severe restriction generally precludes net sold options from qualifying for hedge accounting. (The main exception being when an offsetting purchased option is embedded in the hedged item. An example of this would be issuing callable debt and selling off a swaption to monetize and hedge the embedded call privilege.)

MNAA has implemented SFAS 133, effective for its fiscal year ending June 30, 2002. Its effect on the financial statements had been considered to be immaterial by their independent auditors for its previous fiscal years. The fair value of all derivatives are presented in the financial statements for June 30, 2002, with changes in their fair value being shown as a non-operating expense. Since we do not prepare the financial statements for MNAA nor perform a review of those statements, further discussion of the accounting treatment of derivative contracts is outside the scope of this review.