



UNIVERSITY OF NEW BRUNSWICK REPORT ON LONG-TERM INVESTMENT FUND

2015-2016



JUNI
University of North Carolina at Chapel Hill
Raphael Beaulieu
PhD
Joint Research Exhibition



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SCHOLARSHIPS & BURSARIES

“At \$264.5 million, the Fund ranks in the top 1/3 of Canadian university endowments.”

We are pleased to present the Annual Report on the University of New Brunswick Long-Term Investment Fund (“the Fund”) for the year ended April 30, 2016. Key sections include a report on Fund performance, an overview of key governance arrangements for the Fund including highlights of Board approved investment and endowment spending policies, and an overview of key activities carried out by the Investments Committee during the year.

WHAT IS THE FUND?

The Fund is a pooled investment fund for philanthropic gifts provided by donors to the University of New Brunswick in support of its mission. This includes endowed gifts that are intended to be held in perpetuity, and non-endowed gifts that have a long-term spending horizon.

WHAT IS THE SIZE OF THE FUND?

The Fund had a market value of \$264.5 million as at April 30, 2016, ranking in the top 33% of Canadian university endowments.

WHAT DOES THE FUND SUPPORT?

Gifts are generally restricted by donors for specific purposes. Major categories of support include scholarships and bursaries, chairs and professorships, research, library support and capital projects. The university’s fundraising priorities are aligned with the key academic and research priorities of the institution. Of note, approximately 50% of UNB’s total annual spending on scholarships and bursaries is funded from donor support and related investment income.

Donor gifts may be expendable or endowed. An endowed gift is one where the gift amount must be retained and invested in perpetuity; only the income earned can be used for the purpose specified by the donor. Endowments are intended to create a sustainable and predictable long-term source of funding for high priority programs and activities. Expendable gifts are also important, providing support for immediate needs such as required investments in infrastructure, programs and activities that can have a long-term impact on the university.

The university has a fiduciary responsibility to ensure that expendable gifts and endowment income are used only for the purposes specified by the donor. In keeping with this fiduciary responsibility, individual gifts and major categories of gifts are tracked separately within the university’s trust accounting system. However, gifts are pooled for investment purposes.

WHY ARE GIFTS POOLED FOR INVESTMENT PURPOSES?

The pooling approach provides a number of benefits for donors, beneficiaries, and the university:

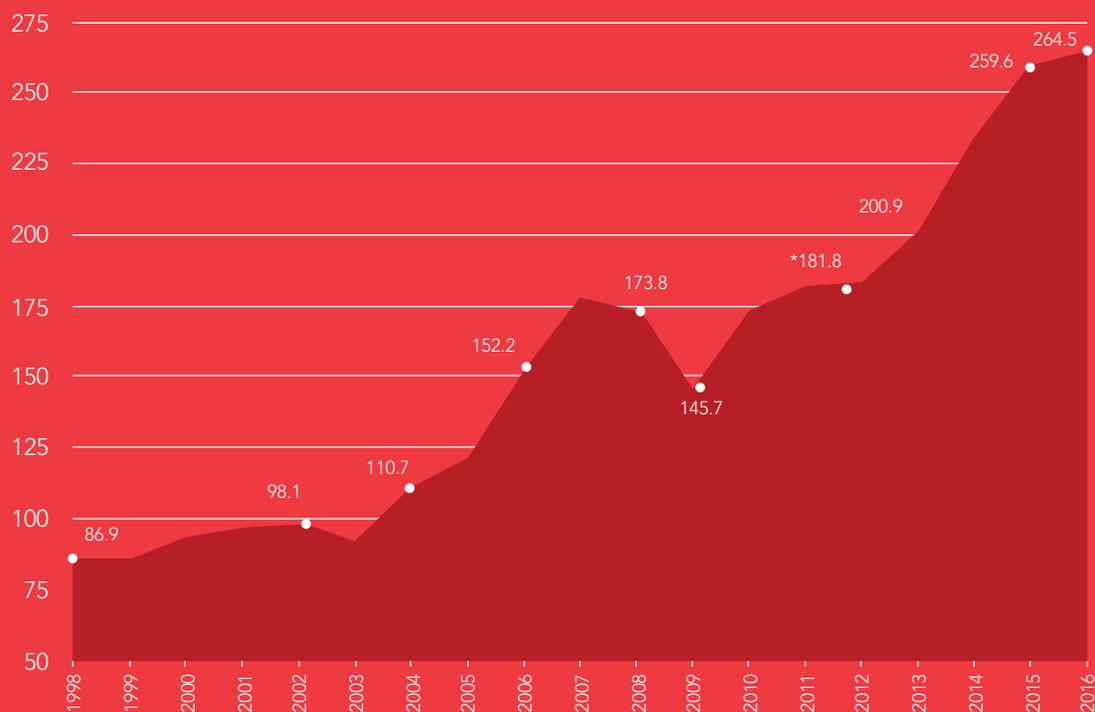
- provides opportunities for diversification, risk management, and economies of scale;
- allows access to best-in-class investment managers;
- provides opportunities for above-average long-term risk adjusted returns;
- supports a competitive annual spending rate; and
- facilitates prudent governance and oversight.

WHO MANAGES THE FUND AND WHAT ARE THE PERFORMANCE GOALS?

All assets are managed by external professional investment management firms in accordance with a Board approved Statement of Investment Objectives and Policy, and within specific mandates approved by the Board Investments Committee. Performance targets are established by the Committee for each mandate and at the total fund level. Performance is monitored by the Investments Committee with the assistance of an independent performance measurement firm.

Fig. 01 MARKET VALUE LONG-TERM INVESTMENT FUND (\$ MILLIONS)

As at April 30, 2016



*\$9 million transferred to Short-Term Investment Fund in December 2010

Fig. 02 FISCAL YEAR RETURNS (%)

	4-year periods ending April 30 (Annualized)		10-year (Annualized)
	2016	2012	2016
Fund Nominal Return	9.60	2.57	5.81
CPI	(1.22)	(1.87)	(1.63)
Investment Management Costs	(0.40)	(0.42)	(0.42)
Fund Real Return	7.98	0.28	3.76
Target Real Return	4.00	4.25	4.25

Fig. 03 ANNUALIZED RETURNS (%)

	1 YEAR	2 YEAR	3 YEAR	4 YEAR	10 YEAR
Fund Return	1.91	6.41	9.62	9.60	5.81
Investment Policy Benchmark	(0.69)	5.43	8.91	8.83	5.73
Excess Return	2.60	0.98	0.71	0.77	0.08

“Fund had net growth of 1.9% in 2015-16.”

The Fund had a market value of \$264.5 million as at April 30, 2016, a net increase of 1.9% over the April 30, 2015 value of \$259.6 million (see Fig. 01). This net growth resulted from a combination of new gifts and investment income net of spending.

FOUR-YEAR ANNUALIZED RETURN EXCEEDS PRIMARY RETURN OBJECTIVE

- The Fund achieved a nominal annualized return of 9.60% for the four-year period ending April 30, 2016. The resulting four-year annualized real return of 7.98% after inflation fees and investment related expenses significantly exceeded the endowment spending rate target of 4%.
- The Fund’s nominal return for the year was 1.91%, outperforming the policy benchmark return by 2.60%. The policy benchmark return is the weighted average of the returns of the benchmark indices for each asset class.
- On a risk adjusted basis the Fund continues to compare favorably with similar funds in the RBC Investor Services Endowment and Foundations Universe over the longer term. For the four-year period ending March 31, 2016 the Fund’s standard deviation or volatility of returns was lower than 53% of measured funds, a second quartile ranking.

CONTINUED FOCUS ON SUSTAINABLE INVESTING

In 2015-16 the Committee sought and achieved Board approval of a Committee-developed UNB Statement on Sustainable Investing. The Statement provides a broad policy framework to guide UNB’s approach to sustainable investing and provides a basis for communicating with stakeholders about sustainable investment practices at UNB. Following Board approval of the Statement, the Committee developed a statement of Environmental, Social and Governance (ESG) Reporting Protocols for the Fund’s investment managers. The statement sets out the Committee’s approach to interacting with its investment managers to achieve the Board’s sustainable investment objectives.

ASSET ALLOCATION TARGETS AND ENDOWMENT SPENDING POLICY WERE STABLE IN 2015-16

- There were no changes in strategic asset allocation in 2015-16. The current strategic asset mix was adopted in 2013-14 following completion of a strategic asset allocation review.
- The Investments Committee began a strategic asset allocation review process in 2015-16. The review will be completed in 2016-17 and is expected to result in changes to the current targets with a view to optimizing the Fund’s risk adjusted returns.
- An annual review of endowment spending policy was conducted in 2015-16. The review resulted in confirmation of the endowment spending rate target of 4%, and approval of spending in 2016-17 at the target rate.

CONTINUED FOCUS ON GOOD GOVERNANCE

In 2015-16 the Committee completed a number of initiatives to further enhance governance structures and processes, including:

- Major review and update of Committee Terms of Reference;
- Development of a Skills Matrix for Committee members; and
- Development of a Committee Self-Assessment Process and Self-Assessment Survey Tool.



An Empirical Analysis of Android Banking Malware

Information Security
Centre of Excellence

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ABSTRACT

In general, any financial operation on the mobile platform potentially exposes a user to a variety of threats including data leakage, theft and financial loss. Driven by financial profits, banking malware leverages user's characteristics, openness of mobile platforms, and a lack of security measures. In this work, we aim to give insight into mobile banking malware and explore unique characteristics of its communication patterns. Given popularity of Android platform, in this work we focus on Android banking malware detected since the first appearance of Android platform in 2008. Through static and dynamic analysis combined with visualization, we analyze patterns of benign and malicious APKs employed by malware, their common characteristics, encryption techniques, and relationships with other types of malware. Through our study, we reveal methods (e.g., heuristic exception technique) currently adopted by malware. As a part of this study, we compile and offer to the research community a dataset containing 977 samples representing 33 Android banking malware.

What is Android Banking Malware?

What is Banking Malware?

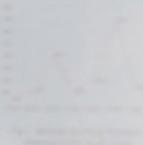
Then...
Capturing authentication information to access online financial institutions

Now...

- Can capture SMS messages and record video of user's screen while logging in.
- Can theft, steal, attack, information stealing, etc.

Why Android?

- Malware gain mobile targets & attacks



Why Android?

- Android popularity
- Ease of use
- Lack of defense



How to detect Android Banking Malware?

Industry Solution

- Signature-based
- Heuristic
- Behavior-based

Academic Research

- Machine Learning
- Network-based
- Dynamic Analysis



2 factors that should be taken into account when developing techniques for Android banking malware detection

1. Behavioral similarity of Android banking malware
2. Evolution of Android banking malware



A Dynamic Graph based

Information Security
Centre of Excellence

Hossein Hadian Jazi, and
Faculty of Computer Science, University of New Brunswick

Problem Statement

- The anti-virus industry receives a great amount of new malware samples on a daily basis. The prevalence of new sophisticated malware, for most of which no signature is available, coupled with the significant growth of potentially harmful programs have made the detection of an effective automated malware classifier almost infeasible.
- Due to the vast majority of detection techniques employed for malware detection, these graphs provide detailed information of a binary that is difficult to be static of malware samples.

Our contribution

- Employing dynamic analysis to generate dynamic CFG and FCG.
- Designing a new algorithm to generate dynamic FCGs.
- Improving the simulated annealing algorithm to compute similarity between graphs by employing dynamically grown search context & improving the accuracy of the classification while maintaining low computational cost.

Dynamic FCG Generation

We design a new algorithm to generate dynamic...

RESEARCH

“In 2015-16, Fund managers added value in challenging markets.”

The Investments Committee regularly monitors the performance of the Fund against Committee-approved performance objectives. Performance is reviewed at a total fund level, by manager, and by asset class.

PRIMARY PERFORMANCE OBJECTIVE:

The total annualized portfolio real rate of return (net of inflation, fees and expenses) should meet or exceed 4.0% over moving four-year periods, with an acceptable level of risk. The 4% real return objective is consistent with the target endowment spending rate of 4% annually.

The Fund's annualized real rate of return over the four-year period ending April 30, 2016 was 7.98%, exceeding the 4% target. Fig. 02 illustrates the impact of the 2008 financial crisis on longer term returns. The annualized real return for the four-year period ending April 30, 2012 was a modest .28%, well below the target. Over the longer term, the Fund achieved a real return of 3.76% over the ten-year period ending April 30, 2016.

The investment environment in 2015-16 was challenging, marked by slow global economic growth, low interest rates, and increased market volatility. In this environment, global equities, as measured by the MSCI World Index, returned a negative .77% in Canadian dollars. Canadian equities, as measured by the S&P/TSX Composite Index, returned a negative 5.43%. Canadian bonds, as measured by the FTSE TMX Canada Universe Bond Index, returned 2.09%. The Fund's external investment managers' goal is to outperform these benchmark indices through active management of the portfolio. In 2015-16 the Fund's fixed income manager earned 2.89%, outperforming the benchmark by 80 basis points. Two of three global equity managers and both Canadian equity managers also outperformed the respective benchmarks, with the overall result that the Fund outperformed the composite policy benchmark by 2.60%.

RISK ADJUSTED RETURNS

The Committee also reviews and evaluates the Fund's risk exposure and risk adjusted returns on a quarterly basis. Risk adjusted returns are assessed at both a total fund and individual manager level, and are compared with comparable funds and mandates.

The Fund compares favorably on a risk adjusted basis with similar funds in the RBC Investor Services funds universe over the long-term (see Fig. 04). For the four-year period ending March 31, 2016, the standard deviation or volatility of returns was in the bottom 50% of measured funds. Lower volatility is important when striving for consistency in spending.

SECONDARY PERFORMANCE OBJECTIVE:

The annualized return on total assets over moving four-year periods should exceed the weighted aggregate return of the passive investment benchmark indices for the Fund.

Over the four-year period ending April 30, 2016 the Fund's annualized return of 9.60% exceeded the policy benchmark by 77 basis points (see Fig. 03). For the one-year period ending April 30, 2016 the Fund returned 1.91%, exceeding the policy benchmark by 2.60%. This followed returns of 11.10% for the year ended April 30, 2015 and 16.34% for the year ended April 30, 2014.

PERFORMANCE COMPARED TO OTHER UNIVERSITY ENDOWMENTS

The Committee also compares performance at a total fund level to that of other Canadian university endowment funds and to a broader basket of Canadian endowment funds. Comparisons are made on the basis of both nominal and risk adjusted returns. Over the long term the Fund has performed well when compared with other funds. Of note, UNB's annualized policy returns for the four-year period ending March 31, 2016 outperformed the RBC Investor Services Endowment and Foundation universe median policy returns by 93 basis points annually. The Fund's actual performance also exceeded the median actual performance by 17 basis points annually over this period.

Fig. 04 KEY RISK METRICS

For rolling 4-year periods ending March 31

	2016			2015		
	UNB	MEDIAN	QUARTILE RANKING	UNB	MEDIAN	QUARTILE RANKING
RISK EXPOSURE (Volatility)						
Standard Deviation	5.30	5.31	3	5.84	5.90	2
RISK ADJUSTED RETURNS						
Tracking Error	1.08	2.51	1	1.00	2.02	1
Value Added	.79	.79	2	(.07)	.51	3
Information Ratio	.73	.54	2	(.07)	.20	3

Fig. 05 COMPARATIVE RETURNS vs. RBC INVESTOR SERVICES ENDOWMENT AND FOUNDATION FUNDS UNIVERSE (%)

Annualized returns for periods ending March 31, 2016

	1-YEAR	4-YEAR		1-YEAR	4-YEAR
UNB Policy	(1.65)	8.59	RBC Universe Policy – Median	(1.65)	7.66
UNB Actual	0.86	9.38	RBC Universe Actual – Median	(.61)	9.21

Fig. 06 POLICY TARGETS AND ALLOWABLE RANGES (%)

	POLICY TARGET	ALLOWABLE RANGE	ACTUAL APR 30, 2016
FIXED INCOME			
Canadian Bonds	25	16-42	25.5
Emerging Market Debt	5.5	0-11	1.9
High Yield Bonds	4.5	0-11	3.1
Mortgages	2.0	0-11	2.0
Cash	-	-	2.9
EQUITIES			
Canadian	25	20-30	24.3
Global	30	25-35	31.7
Low Volatility Global	8	3-12	8.6

UNB's management of endowment accounts is based on an integrated approach to endowment spending policy and investment policy.

ENDOWMENT SPENDING POLICY

The university's endowment spending objective is to maintain a reasonably stable, competitive, inflation-adjusted spending rate. The goal is to achieve intergenerational equity by ensuring that the endowment provides a similar level of support to future generations as it does to current beneficiaries. To this end, the university establishes a target endowment spending rate that reflects the Investment Committee's expectations for a long-term sustainable real rate of return net of inflation and investment expenses.

The Investments Committee completes an annual review of the endowment spending rate. The purpose of the review is to consider the appropriateness and sustainability of the long-term target spending rate, and to confirm the approved spending rate for the next fiscal year.

UNB's target spending rate was lowered from 4.25% to 4.0% in 2013-14. Following the 2015-16 review, the target rate remains at 4.0% and spending in 2016-17 has been approved at the target rate. The Canadian Association of University Business Officers (CAUBO) conducts an annual investment survey of member institutions. At 4%, UNB's endowment spending rate is at the median of other Canadian universities.

INVESTMENT POLICY

Investment policy for the Fund is set out in a Board approved Statement of Investment Objectives and Policy (SIOP). The SIOP establishes target allocations to major asset classes, and the allowable ranges within which actual allocations are allowed to deviate from the targets.

The target asset mix set out in the SIOP has been established to meet the endowment spending policy and capital preservation requirements, at an acceptable level of risk. Historical returns and capital market assumptions generally indicate that fixed income securities alone will not generate the returns necessary to provide income to fund current needs while maintaining the purchasing power of the endowment for future generations of students. To meet these dual objectives, the asset allocation is biased in favor of equities. However, to reduce volatility and diversify against adverse equity markets, the Fund's policy asset mix also includes a significant allocation to fixed income securities.

Asset mix is regularly reviewed by the Investments Committee for appropriateness and for its ability to achieve the real return objective over the long term. The current Board-approved strategic asset mix has been in place since 2013-14. The Investments Committee began a comprehensive review of strategic asset allocation in 2015-16. The review will be completed in 2016-17 and is expected to result in changes to the current targets with a view to optimizing the Fund's risk adjusted returns.



HANS W. KLOHN COMMONS

CAPITAL PROJECTS

“ Investments Committee provides oversight within an approved policy framework. ”

INVESTMENTS COMMITTEE

The Investments Committee, a standing committee of the University's Board of Governors, oversees the investment of the Fund. Members of the Committee are appointed under the authority of the Board, and are accountable to the Board. The Committee has been delegated responsibility and authority by the Board to make decisions within parameters established in the Committee's Terms of Reference.

The Committee meets at least four times per year. Agenda planning is informed by a rolling twelve-month work plan, which helps ensure the Committee stays focused on three key strategic areas: risk, returns and endowment spending rate.

POLICY FRAMEWORK

The Committee has developed a policy framework for managing Fund investments and endowment spending. Key elements of the policy framework include:

- Statement of Investment Beliefs;
- Statement of Investment Objectives and Policy;
- UNB Statement on Sustainable Investing;
- Risk Management Framework; and
- Endowment Spending Policy.

These policies and additional information about the governance and management of the Fund can be found on the university's website.

ROLE OF MANAGEMENT

Management's role is to:

- Support good governance by providing ongoing support and advice to the Investments Committee with respect to investment policy, endowment spending policy, investment manager structure and related matters;
- Implement approved policies and decisions and provide regular reports on compliance and performance; and
- Carry out the day-to-day administration of the Fund including overseeing the work of external investment managers and other service providers.

EXTERNAL PROFESSIONALS AND SERVICE PROVIDERS

All assets are managed by external professional investment management firms in accordance with mandates approved by the Investments Committee. The Committee has engaged the services of an independent performance measurement firm. Other external specialists are used as required to provide advice on a variety of topics including asset allocation, risk management, endowment spending policy and investment manager searches.



LIBRARY SUPPORT

INVESTMENTS COMMITTEE MEMBERS

VOTING

BRIAN E.H. BAXTER

*Vice-Chair of the Board of Governors
CEO and Chair, Botsford Investments Inc.*

NORMAN M. BETTS

*Member of the Board of Governors
Associate Professor
Faculty of Business Administration
University of New Brunswick*

CHRISTOPHER W.J. BOYLE

*Advisor to the BOG Investments Committee
Senior Vice-President, Institutional and Strategic Alliances
MacKenzie Investments*

H.E.A. (EDDY) CAMPBELL

*Member of the Board of Governors
President and Vice-Chancellor
University of New Brunswick*

BARRY COOPER

*Member of the Board of Governors
Chairman of BMO Global Asset Management
Bank of Montreal*

TOM GRIBBONS

*Member of the Board of Governors
Vice-President and Associate Portfolio Manager
Branch Manager, Saint John Group
RBC Wealth Management, Dominion Securities*

KEVIN LEBLANC

*Advisor to the BOG Investments Committee
Managing Director, Operations
Jarislowsky, Fraser Limited*

DUC LUONG

*Member of the Board of Governors
President, Butterfly Energy Systems Inc.*

PAUL MORRISON

*Member of the Board of Governors
Chair, Investments Committee
Consultant*

JULIEN RENAUD

*Member of the Board of Governors
Student
University of New Brunswick*

JOHN SINCLAIR

*Advisor to the BOG Investments Committee
Chief Executive Officer
New Brunswick Investment Management Corporation*

JORDAN TRACEY

*Member of the Board of Governors
Student (Alternate)
University of New Brunswick*

NON-VOTING

SARAH DEVARENNE

*Secretary of the Board
University of New Brunswick*

MATIN FARSHIDIAN

*Student Advisor
Undergraduate Student
University of New Brunswick*

LARRY GUITARD

*AVP (Administration & Finance) and University Treasurer
University of New Brunswick*

KAREN CUNNINGHAM

*Member of the Board of Governors
Vice-President (Administration & Finance)
University of New Brunswick*

EXTERNAL SERVICE PROVIDERS

CUSTODIAN/PERFORMANCE MEASUREMENT

RBC Investor Services

INVESTMENT MANAGERS

Phillips, Hager & North (*Fixed Income*)

Fidelity Investments (*Canadian Equity*)

Scheer Rowlett & Associates (*Canadian Equity*)

Seamark Asset Management (*Total Equity*)

Sprucegrove Investment Management Ltd. (*Global Equity*)

Hexavest Inc. (*Global Equity*)

New Brunswick Investment Management Corporation

(*Low Volatility Global Equity*)

