UNIVERSITY OF
TORONTO

A Reference Portfolio
for
Evaluating Investment Management

December 2, 2008

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Table of Contents

Executive Summary

A review of UTAM conducted in 2007 concluded that UTAM had essentially achieved the objectives set out for it, but that the University and UTAM had not effectively communicated its achievements to make them well understood by the broader community of stakeholders. The study also recommended that the University explore a means of comparing UTAM's active investment strategies to the simpler investment strategies that would only be feasible in the absence of the more sophisticated infrastructure and expertise available from UTAM.

A reference portfolio is a relatively simple portfolio that could be invested passively, which has a reasonable expectation of meeting the University's return target over the long-term. It would also be expected to achieve performance within the risk targets set by the University for UTAM. A key benefit will be to provide an objective tool for assessing the decision to manage investments actively by comparing active management results to those that could be achieved through this simpler investment strategy.

The reference portfolio was developing by considering candidate portfolios that would reasonably be expected to achieve the University's return targets within the risk targets established. These candidate portfolios were also compared to a pre-UTAM portfolio, the reference portfolio for the CPP Investment Board, and an all Canadian portfolio of 50% equities and 50% bonds. The portfolio that was selected as the reference portfolio was the one that ranked in the top 3 across nine categories, of return, risk and reward to risk for short, medium and long-term periods. The reference portfolio that was selected exhibited the following asset mix, with one-half of the foreign exposure hedged against foreign currency exposure, and with the following benchmarks:

Asset Class	Percentage	Description
Canadian Universe Bonds	35.0%	DEX Universe Bond Index (formely the Scotia Capital Universe Bond Index), name changed from SCUBI to DEX in October 2007.
Canadian Real Return Bonds	5.0%	iShares CDN Real Return Bond Index Fund, indexed against the DEX Real Return Bond Index.
Canadian Equity Index	30.0%	S&P/TSX Composite Index (Total Return)
US Equity Index	7.5%	S&P 500 Index; Total Return, The data source is from the Standard and Poors website. We calculate the C$ return using MSCI CAD/US exchange rates.
US Equity Local	7.5%	S&P 500 (L$) Index; Total return. The data source is from the Standard and Poors website.
MSCI EAFE Equity	7.5%	MSCI EAFE Index (C$) Net; source data: MSCI
MSCI EAFE Equity Local	7.5%	MSCI EAFE Index (L$) Net; source data: MSCI

A review of the appropriate periods for use of this reference portfolio concluded that various audiences would be interested in both short-term and longer-term comparisons, although the longer-term comparison are most relevant for evaluation against the University's risk and return targets, which are established for 10-year periods. Therefore, comparisons would be made for 1-year, 4-year and 10-year periods (a transition period would apply until 10 years of data were available for UTAM's active management). It was also concluded that a three-way comparison between the University's risk and return targets, the reference portfolio, and market benchmarks would be the most useful way of integrated the reference portfolio into the comparison. (It should be noted that peer comparisons, while often quoted in various public media, are a very poor basis of comparison since they do not take differing risk appetites into account.)

Introduction and Purpose

Prior to 2000, University of Toronto managed university assets and pension funds in-house. For many years, university staff had interacted with a President's Investment Advisory Committee (PIAC) to determine investment targets, strategy and execution. Investment targets, asset mix, and other key elements were approved by the Business Board. Asset mix was quite simple, focusing on balanced funds and passive investing. There was not a great deal of work involved in selecting the strategy, implementing it and ensuring compliance. Financial assets were small compared to current levels.

By 1999, however, assets had grown significantly. Large U.S. endowments had diversified broadly into hedge funds and alternative investment strategies and several U.S. universities had incorporated investment subsidiaries to bring appropriate investment expertise to bear on these new and complex strategies. Also, the long-running bull market had raised expectations about the performance that should be achieved that were not being met with the longstanding approach to investments. As a result, the decision was taken to review and consider a new investment governance structure and process.

The resulting report expressed concern about the lack of critical mass of in-house professional talent, about the market competitiveness of compensation, about returns and about whether prudent investment governance and management could be sustained with the existing structures. Its key recommendation was for an investment management organization that was expected to provide improved corporate governance and control, improved investment expertise and the potential for greater returns. The Business Board approved the formation of the University of Toronto Asset Management Corporation (UTAM), effective May 1, 2000.

Pre-UTAM, the investment strategy had focused predominantly on passive investments that could be directed by a volunteer investment committee. UTAM aimed to add value by reducing risk, generating excess returns and by providing infrastructure and controls. UTAM implemented investment strategies involving alternative investment classes demonstrated to generate higher returns for the same risk levels.

A 2007 review of the decision to manage investments through UTAM concluded that UTAM had essentially achieved the objectives set out for it, but that the University and UTAM had not effectively communicated its achievements to make them well understood by the broader community of stakeholders. The review recommended that the University confirm that its overriding objective with respect to investment performance is the achievement of the investment risk and return targets, that there be a secondary emphasis on market benchmarks, and low emphasis on peer comparisons, except with respect to fees and expenses. That has since been done.

The study also recommended that the University explore a means of comparing UTAM's active investment strategies to the simpler investment strategies that would only be feasible in the absence of the more sophisticated infrastructure and expertise available from UTAM. That is the purpose of this paper.

Why Consider a Reference Portfolio?

The University's investment objectives are not achievable without assuming some risk since fixed income investments alone cannot generate a 4% real return over time and the question must be addressed as to what type of riskier assets (than bonds) would make sense.

A reference portfolio helps to address this question. It is a relatively simple portfolio that could be invested passively, while having a reasonable expectation of meeting the University's return target over the long-term. It would also be expected to achieve performance within the risk targets established by the University for UTAM. It would be managed at relatively low cost, without significant infrastructure or number of investment professional personnel, although it should be noted that any investment strategy without significant in-house expertise will incur more substantial consulting costs. Finally, a reference portfolio should be easily understood and independently calculated from publicly available benchmarks or indices.

A key benefit will be to provide an objective tool for assessing the effectiveness of the University's decision to manage investments through a subsidiary by comparing active management results to those that could be achieved through this simpler investment strategy. It will also provide a useful measure for assessing performance over the longer-term. In so doing it will be helpful regarding communication of investment results.

The University has been investigating the merits of a reference portfolio for over a year. This idea arose during the UTAM review that took place in 2006-07 as a potential means of evaluating the ongoing effectiveness of the University's decision to establish UTAM in meeting the University's investment risk and return objectives. Subsequent implementation of a reference portfolio by the CPP Investment Board – the only institution that has done so as far as we know – has convinced us that such an approach has merit.

Selecting a Reference Portfolio

Selection of a reference portfolio for comparison to UTAM's active management investment performance resulted from identification of candidate portfolios and analysis of their returns, risk tolerance and reward to risk ratios for short (2000-2008), medium (1992-2008) and long (1970 to 2008) periods. Also included in the analysis were a pre-UTAM portfolio, the CPP Investment Board portfolio, and an all-Canadian portfolio comprised of 50% equities and 50% bonds.

The portfolio that was selected as the reference portfolio was the one that seemed to dominate across the 9 ranking categories of return, risk and reward to risk for each of the short, medium and long-term periods. This portfolio was in the top 3 across all 9 categories. The only other portfolio with a strong showing (top 3 ranking in 6 of the 9 categories) was the all-Canadian portfolio; however, this portfolio was rejected due to its concentration in the home market, which lacks diversification.

The portfolio that has been selected as the reference portfolio has the following asset mix, with one half of the foreign exposure hedged:

35%	Canadian universe (nominal) bonds
5%	Canadian real return bonds
30%	Canadian equity
15%	U.S. equity
15%	EAFE equity.

A detailed description of the process of developing the reference portfolio can be found in appendix 1.

Application of the Reference Portfolio

The reference portfolio is primarily designed as a simple, understandable and relevant communication tool to support the University's return and risk targets. It is a very simplistic benchmark, and certainly not the only benchmark for evaluating the returns achieved by UTAM. It will be used in semi-annual and annual reports to Business Board by UTAM in addition to the other benchmarks, such as the University risk and return targets and market benchmarks.

To be used in this way, the reference portfolio must be translated into a set of market benchmarks which have been independently determined and are easy to reproduce using public data. We must also decide on the time frame for calculation, the use of the fiscal or calendar year for calculation, and whether any transitional provisions are needed in implementation.

Benchmarks:

The reference portfolio (portfolio # 5) has the following asset mix, with one half of foreign exposure hedged:.

35% Canadian universe bonds
5% Canadian real return bonds
30% Canadian equity
15% U.S. equity
15% EAFE equity

The benchmarks proposed for the reference portfolio are as follows:

Asset Class	Percentage	Description
Canadian Universe Bonds	35.0%	DEX Universe Bond Index (formely the Scotia Capital Universe Bond Index), name changed from SCUBI to DEX in October 2007.
Canadian Real Return Bonds	5.0%	iShares CDN Real Return Bond Index Fund, indexed against the DEX Real Return Bond Index.
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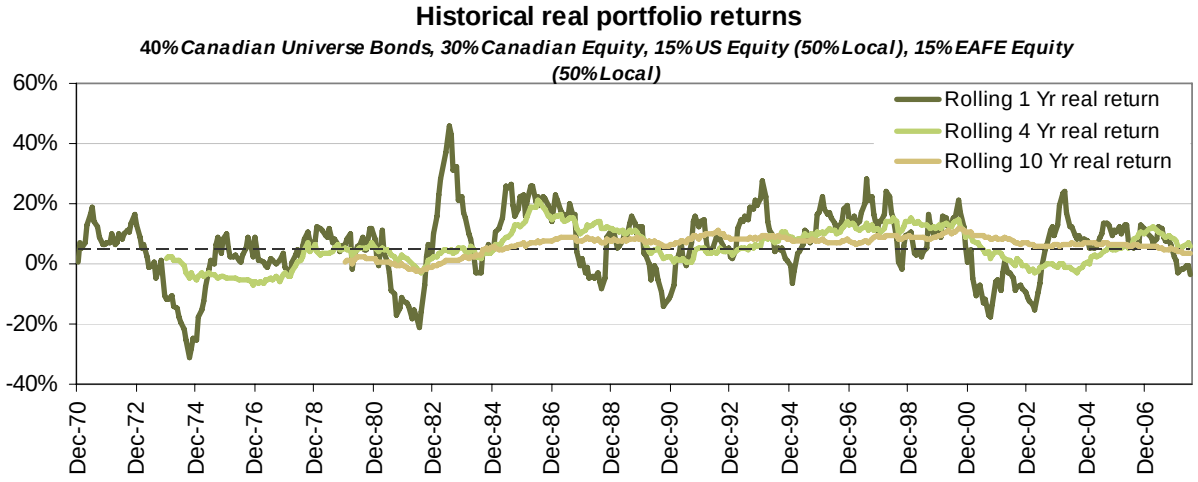
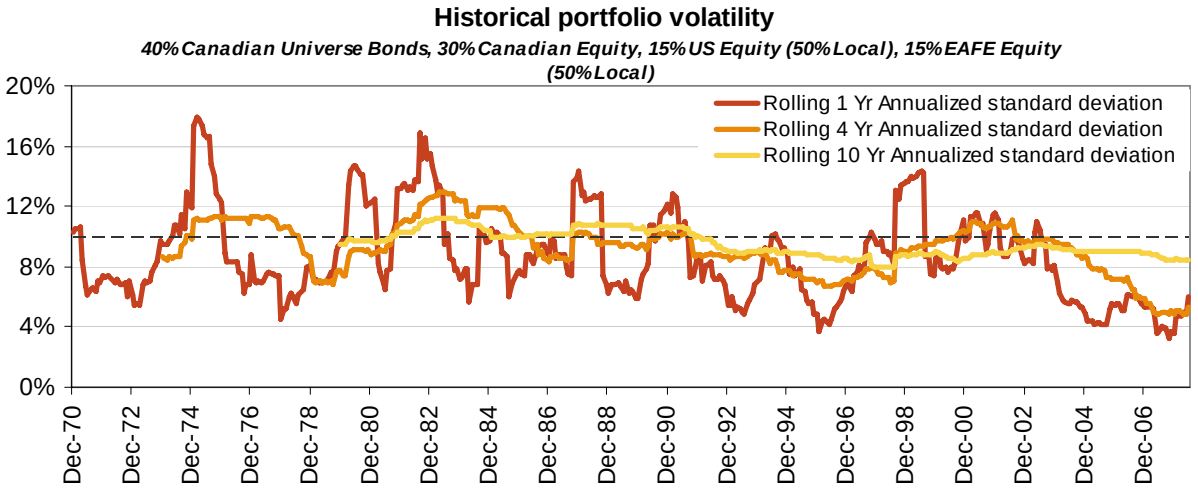
Timeframe

The University's investment risk and return targets are established for 10 year periods. One of the difficulties in assessing investment performance is in comparing those long-term targets to short-term results, whether they are monthly, semi-annually or annually. In the short-term there are large variations in markets and therefore in investment results. The investment risk and return results for several candidate portfolios has been calculated for 1-year, 4-year and 10-year periods, beginning in 1970. The results for portfolio # 5, which is recommended as the reference portfolio, are shown below.





These charts show that the 1-year horizon does not provide a good comparison to long-term risk and return targets because its variability obscures the longer term trend. The 4-year horizon smoothes returns for the 4 year period but allows for some variability to remain, allowing for identification of longer term trends. Since the University's risk and return targets are established for 10 year periods, intuitively the 10-year horizon has appeal; however, it smoothes most variability and market cycles. A close examination of the data will reveal that the 10-year rolling return meets or exceeds the University target in most years. Although there are a few years where this is not the case, the excess return generated in other years more than offsets.

On a practical basis, audiences are interested in all of these time frames and there are different uses for these different time reference points, so it seems to make sense to calculate the reference portfolio using all three time frames for various purposes.

At present, it is possible to calculate 1-year and 4-year results for UTAM; however, UTAM was established May 1, 2000, just over 8 years ago, and therefore 10-year results are not yet available. Additionally, while UTAM was created in Q2 2000, it took some time to hire staff and put the infrastructure and investment strategies in place. Certainly results for 2000 and probably for 2001 also continued to heavily reflect the strategies that had been put in place under the previous Treasury Dept/Volunteer Committee structure. Finally, UTAM follows investment industry standards in reporting results on a January 1 to December 31 fiscal year time frame and for proper comparison purposes, the reference portfolio should be calculated on the same January to December basis. Taking all of these factors into consideration, it makes sense to begin comparison between UTAM and the reference portfolio on January 1, 2001 and to make those comparisons each year on that calendar year basis. At this time, therefore, we can make comparisons on 1-year and 4-year basis, and will gradually work up to the 10-year comparison, with, at present a 7-year comparison to December 31, 2007 available.

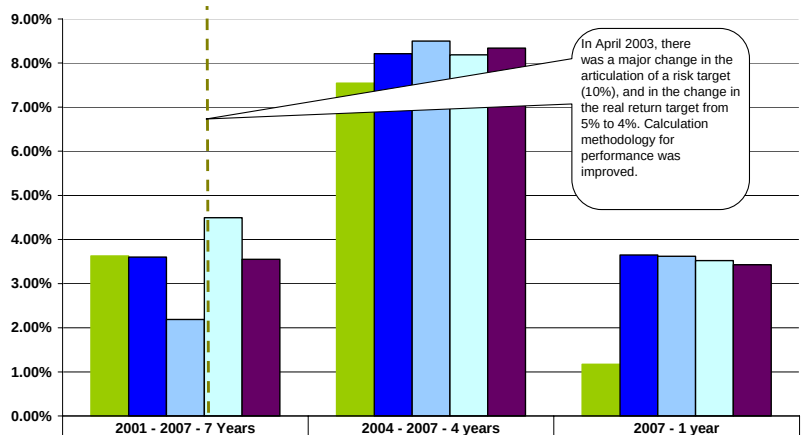
Comparing the Reference Portfolio and UTAM

Now that portfolio # 5 and a calendar year basis comparison have been selected, we should compare the reference portfolio to UTAM's investment performance to see how UTAM's active management strategy has compared to a passive strategy since its inception. **It is very important to note that the selection of portfolio # 5 and timeframe for comparison were made, as they should be, without consideration of the UTAM results. We only turned to the UTAM comparison after the reference portfolio was selected on an independent basis following the analysis described.**

As noted earlier, UTAM was created on May 1, 2000 and the first several months (and probably up to the first couple of years) were spent creating the entity of UTAM, establishing infrastructure and moving the investment strategy and execution away from what existed prior to the creation of UTAM. Additionally, in early 2003, the University significantly changed its target real return from 5% to 4% and introduced a risk target of 10% standard deviation, all over 10 year measurement periods. It is important to view UTAM's results, and the comparison to the reference portfolio, in the context of these shifts and in the context of the lag time between the introduction of those changes and the likely impact on investment results, in part due to transition costs.

The following chart compares the 1-year, 4-year and 7-year real returns for the reference portfolio, market benchmarks, LTCAP and pension. The 7 year return period would be gradually extended over time until the full 10-year data period has been concluded.

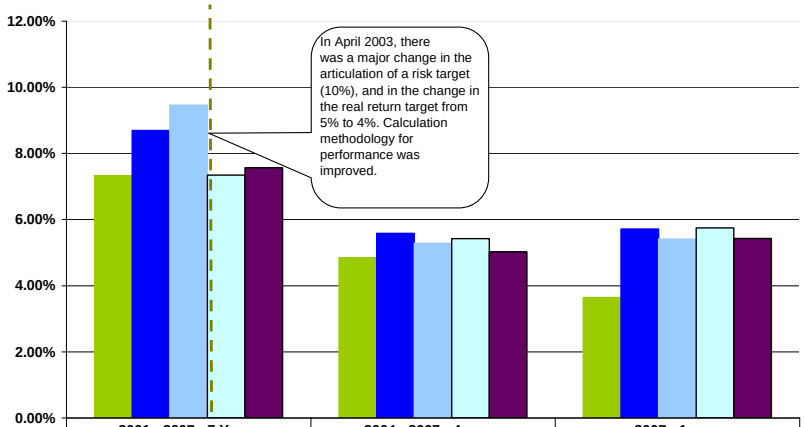
Comparing the Reference Portfolio, Market Benchmarks and UTAM
Real Returns



	2001 - 2007 - 7 Years	2004 - 2007 - 4 years	2007 - 1 year
Portfolio 5 Return	3.63%	7.54%	1.17%
LTCAP Return	3.60%	8.21%	3.65%
LTCAP Benchmark Return	2.19%	8.50%	3.62%
Pension Return	4.49%	8.19%	3.52%
Pension Benchmark Return	3.55%	8.34%	3.43%

The next chart compares the 1-year, 4-year and 7 year standard deviations for the reference portfolio, market benchmarks, LTCAP and pensions.

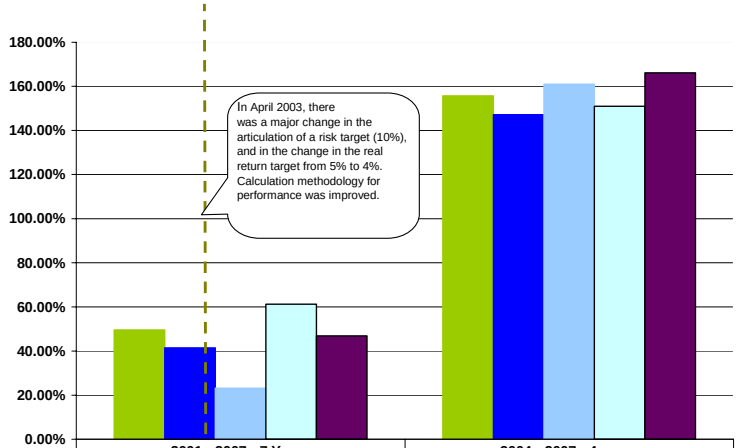
Comparing the Reference Portfolio, Market Benchmarks and UTAM Standard Deviations



	2001 - 2007 - 7 Years	2004 - 2007 - 4 years	2007 - 1 year
Portfolio 5 StDev	7.33%	4.85%	3.64%
LTCAP StDev	8.70%	5.58%	5.72%
LTCAP Benchmark StdDev	9.46%	5.28%	5.41%
Pension StDev	7.34%	5.42%	5.75%
Pension Benchmark StdDev	7.57%	5.02%	5.43%

The following chart compares the reward to risk ratio for the reference portfolio, market benchmarks, LTCAP and pensions, for the 4-year and 7-year periods. It is important to note that this comparison is more meaningful for longer time frames than for annual periods .

Comparing Reference Portfolio, Market Benchmarks and UTAM Reward to Risk Ratio



	2001 - 2007 - 7 Years	2004 - 2007 - 4 years
Portfolio 5 Risk Reward Ratio	49.54%	155.63%
LTCAP Risk Reward Ratio	41.41%	147.11%
LTCAP Benchmark Reward Risk Ratio	23.15%	160.98%
Pension Risk Reward Ratio	61.21%	150.95%
Pension Benchmark Reward Risk Ratio	46.90%	166.14%

Should the University Implement a Reference Portfolio?

In deciding whether the University should implement a reference portfolio, it is worthwhile to return to the discussion contained in the 2007 UTAM review. That review noted that:

> …actual investment performance in a given time period is not absolutely good or bad, but must be compared to something.
>
> Sharpe et al[1] define a benchmark portfolio as "a portfolio of equivalent risk, against which the performance of an investor's holdings can be compared for the purpose of determining investment skill. A benchmark portfolio represents a relevant and feasible alternative to the investor's actual portfolio and, in particular is similar in terms of risk exposure".
>
> In other words, you cannot simply compare performance between different funds. Performance for any given period is a function of the risk which the investor is willing to take, the underlying investment markets, and investment skill. The broad challenge in evaluating performance is to evaluate each of these elements to determine the extent to which performance reflects investment skill, the ability to add returns in excess of those delivered by investment markets*, for that level of risk*. The specific challenge is to find comparators that have similar characteristics.

This review went on to pose the question of what targets does the University want UTAM to achieve for us? Is it the University's risk and return targets, the value added in excess of what can be obtained by simply investing in market index kinds of investments, or by whether U of T's investments do better than those of the Canadian universities, American universities, pension funds, etc.?

The answer, from a University financial health perspective, is that U of T should be primarily concerned with the achievement of the risk and return targets as stated in Business Board approved policies over time. However, it is necessary to make shorter term relative comparisons to also consider performance in comparison to overall market results.

As noted at the beginning of this paper, there are three comparisons currently in place to evaluate UTAM's investment performance, in descending order of importance: University risk and return targets, which are absolute measures and long term targets, market benchmark and peer comparisons, which are relative measures and tend to be reported on a shorter term basis. However, these comparisons do not address the question of whether the University has the right broad investment strategy in place, whether it should manage actively rather than passively, etc. It is important to note that while added value from active management might not seem large in percentage terms, every 1% in added value after fees and expenses is equivalent to approximately $40 million.

[1] Sharpe, Alexander, Bailey, Fowler, Domian, Investments, Third Canadian Edition, Prentice-HA;;, 2000 p. 827.

The reference portfolio attempts to provide an additional measure to help address these fundamental questions. It articulates an alternative, simple, low-cost investment strategy that could be pursued by the University, within the risk and return targets set by the University against which to evaluate UTAM's investment performance results. Due to its simplicity and its reliance on broadly available and well-understood benchmarks, it meets the requirement of being easily understood, calculated and communicated.

However, it is important to note that establishing a reference portfolio also does not answer all the questions about whether the University has the right structure in place for managing investments. For example:

- Risk as measured by standard deviation captures some, but by no means all of the risks inherent in managing investments. Some risks can only be managed by applying the judgment and expertise that are brought to the process by experienced investment professionals, and that cannot be measured by a reference portfolio.

- A reference portfolio cannot measure all the benefits provided by UTAM in addition to investment performance. A key benefit provided by UTAM is the infrastructure, including controls and compliance mechanisms that it has put in place, which the University would otherwise have to establish in-house. The benefit of having these elements managed by knowledgeable investment professionals cannot be factored into benchmarks that focus purely on performance. It is important to note that other market benchmarks are also unable to evaluate these broader risks.

- A reference portfolio cannot directly address investment fees and expenses. Nor can other market benchmarks. However, it does address fees and expense indirectly, since a provision for fees and expenses is made and reference portfolio returns are determined net of those fees. Since UTAM returns are also determined net of investment fees and expenses, they can be properly compared, and the cost of generating the return in each case can therefore be evaluated.

- Finally, it must be emphasized that the most important comparator for evaluating investment performance generated by UTAM continues to be the long-term risk and return targets established by the University for each pool of funds. This reference portfolio is not intended to replace those targets as the top priority for UTAM and for evaluation of investment performance. However, its simplicity, its ease of calculation and its longer term focus do make it a valuable addition to the comparisons that can be made.

In the 2007 report, a hierarchy of comparisons was identified with the U of T risk and return targets as the prime goal to be accomplished, with market benchmarks and peer benchmarks at 2nd and 3rd levels

of priority respectively. At this time, the introduction of the reference portfolio suggests a slightly different approach.

We continue to view the U of T targets as the top priority and continue to believe that comparisons to peers are not very helpful. As noted in the 2007 review, "comparison against peers assumes that the return target and risk appetite of peers are similar. This is not typically the case. As an example, in 2006 UTAM and the Ontario Teacher's Pension Plan had very similar results (approximately 13%). UTAM just beat its relative benchmark while Teacher's reported that it beat its relative benchmark 4%. The current official peer university for UTAM is the RBC Canadian Balance Funds. This universe contains smaller funds with much simpler asset mix and there is no information about risk. UTAM has proposed that peer universes be used at the individual asset class level where the data is more homogeneous. U of T should not be concerned with bragging rights in comparison to other endowments and pension funds and should have our sights firmly fixed on the risk that it is prepared to tolerate."

First, since the reference portfolio is expected to produce returns in keeping with the University's target, comparing actual performance relative to that of the reference portfolio will provide insight (over shorter periods of time) as to whether the actual portfolio is on track to meet the University target. Second, comparing the performance of the benchmark portfolio to the reference portfolio will provide important information into the value-add (positive or negative) that UTAM is providing in terms of its decisions around asset mix. Third, comparing the performance of the actual portfolio to the benchmark portfolio will provide useful insight into whether UTAM is providing value-add through its manager selection activities.That three way comparison is illustrated in the previous section comparing UTAM's actual performance results to the reference portfolio and the market benchmarks.

Recommendations

The foregoing discussion outlined the objectives for establishing a reference portfolio, analyzed a number of candidate portfolios and selected a portfolio and associated benchmarks that would meet the stated objective. A review of the advantages and disadvantages of a reference portfolio suggests that it would be beneficial to add the reference portfolio as an additional comparator to those already in place for evaluating investment performance by UTAM. Therefore it is recommended:

1. That the University implement a reference portfolio for LTCAP and for the Pension Master Trust.

2. That portfolio # 5 be selected as the reference portfolio, with the following asset mix:

35% Canadian universe (nominal) bonds
5% Canadian real return bonds
30% Canadian equity
15% U.S. equity*
15% EAFE equity*
*One-half of foreign components are hedged against foreign currency exposure.

3. That the following benchmark indices be used to calculate the reference portfolio return each year:

Asset Class	Percentage	Description
Canadian Universe Bonds	35.0%	DEX Universe Bond Index (formely the Scotia Capital Universe Bond Index), name changed from SCUBI to DEX in October 2007.
Canadian Real Return Bonds	5.0%	iShares CDN Real Return Bond Index Fund, indexed against the DEX Real Return Bond Index.
Canadian Equity Index	30.0%	S&P/TSX Composite Index (Total Return)
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MSCI EAFE Equity	7.5%	MSCI EAFE Index (C$) Net; source data: MSCI
MSCI EAFE Equity Local	7.5%	MSCI EAFE Index (L$) Net; source data: MSCI

4. That the reference portfolio be calculated on 1-year, 4-year and 10-year time frames to provide a short, medium and longer-term focus for different purposes, using a calendar year time frame following a transitional implementation of the 10-year comparison beginning January 1, 2001 for UTAM results

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5. That the reference portfolio be considered together with market benchmarks in a three way comparison of actual results, the reference portfolio results and market benchmark results in assessing the contribution of the active management approach.

6. That the reference portfolio be reported in the annual and semi-annual reports to Business Board and that it be published on the UTAM web site.

7. That the continued use of the reference portfolio be evaluated after a reasonable period of use, say 3 years.

Appendix 1

Developing a Reference Portfolio

Process

The financial analysis was conducted by Hewitt Associates under the direction of the University. The focus was to develop a reference portfolio for the long term capital appreciation pool (LTCAP) and the pension assets portfolio, both of which have a 10% limit on standard deviation of nominal returns (corresponding to the plan's risk tolerance) over 10 years with a real return target of at least 4%. Various portfolios were constructed and their risk levels (standard deviations) and their real returns were determined for various time periods: short (2000-2008), medium (1992-2008) and long (1970-2008). Several candidate portfolios that most closely matched the risk profile were retained for further study. (A portfolio similar to the pre-UTAM investment strategy was also simulated and evaluated, as was an all-Canadian portfolio, but these did not share the parameters outlined below for the candidate portfolios). The candidate portfolios shared the following asset mix parameters:

The asset mix was set as 60% equities and 40% fixed income. This asset mix is commonly used by pension plans as a good mix of risk and return choices. It is very close to the mean asset mix of Canadian university pension plans as reported in the 2006 CAUBO investment survey, which was 59% equities, 37% fixed income and 4% real estate and other.

The equity component provides the additional return needed to achieve the return targets stipulated in the investment policies for university and pension assets, which reflect the target spending allocation for endowments and the pension contribution strategy respectively. Equities provide a relatively high historical real return.

The fixed income component provides risk reduction due to more moderate volatility and low correlation with equities. To the extent that this component also includes real return bonds, it can also help to mitigate the risk of unexpected inflation. One could ask why this study did not consider an asset mix consisting entirely of real return bonds. The answer is that real return bonds would likely not deliver a high enough return to meet the long-term return targets. Additionally, their limited availability in the market would not likely satisfy the University's level of demand.

As noted earlier, the only institution that we could find utilizing a reference portfolio approach is the Canada Pension Plan Investment Board (CPPIB). Its asset mix, chosen partly to reflect their prior asset mix and non-marketable holdings, is 65% equities and 35% fixed income. However, many pension funds and other institutional investors, including UTAM, do employ "policy benchmarks" as a standard for evaluating performance.

In conclusion, this study utilized an asset mix of 60% equities and 40% fixed income.

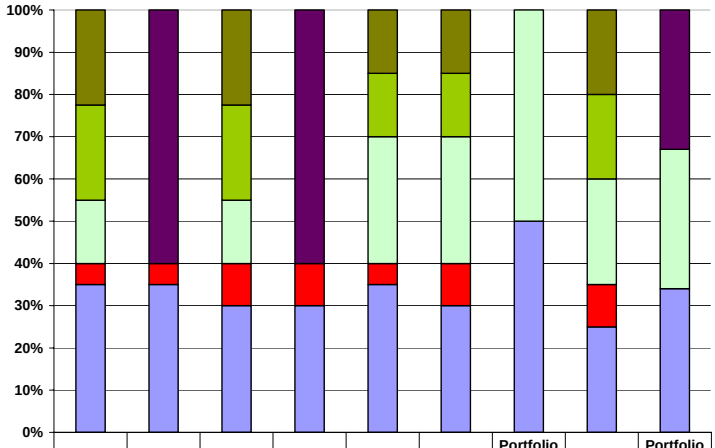
A foreign component has been included for several reasons, but predominantly for diversification, which we view as fundamental to any prudent investment strategy. The Canadian stock markets represent only about 3% to 4% of the world stock markets. The Canadian economy is dominated by natural resources and financial services and Canadian stock markets can be dominated by few stocks at any one point in time. For example, for much of 2008 the TSX was dominated by RIM, EnCana and Potash, while in earlier times it was dominated by Nortel and Bre-X. Over a longer period of time, foreign markets have provided better returns, with lower correlation and a wider range of choices, than Canadian markets. Diversification is fundamental to any prudent investment program. This is why the regulated foreign content limit for pension investments was first raised to 30% and subsequently eliminated altogether and why a foreign component has been included in this analysis.

With a significant commitment to foreign markets also comes exposure to foreign currency movements – another potential source of investment risk (as well as a potential source of incremental return). The risk of unfavourable currency movements can be mitigated through the use of hedging techniques that employ currency futures and forward contracts. In practice, examples can be found of investors hedging anywhere from 0% to 100% of their currency exposure and there is no consensus on what is the “optimal hedge ratio”. It is not uncommon, however, to employ a 50% hedge ratio (the so-called “least regret” ratio) wherein the portfolio is exposed to only one-half of the potential risk (as well as the potential return_ arising from currency exposure. This 50% hedge ratio was used in the candidate reference portfolios analyzed in the study.

A 15 basis points (i.e. 0.15%) provision has been applied to all results to take account of investment fees and expenses. This figure has been determined two ways: firstly by considering the costs in operating a simple passive investment strategy, and secondly by reviewing the actual investments and expenses incurred prior to the formation of UTAM. Both methods suggested that investment fees and expenses would be approximately 15 bps.

The Study Results

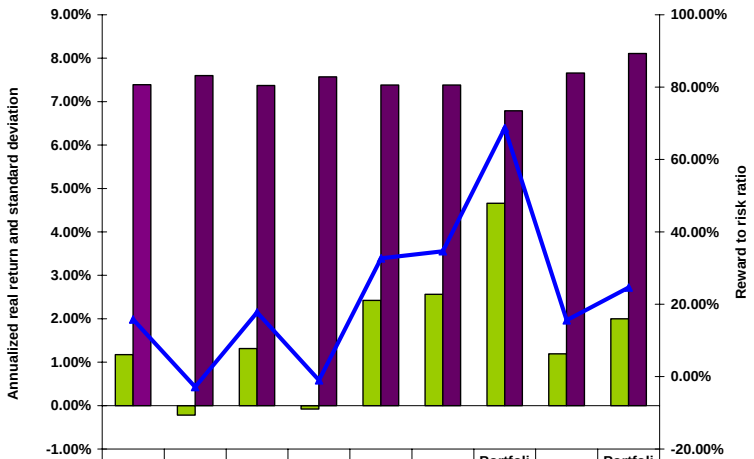
The study considered three time frames. It considered a short-term period from 2000-2008, which approximately covers the period of time during which UTAM has managed the investment of the University and pension assets, and which covers approximately one business cycle. It looked at a medium term from 1992 to 2008, which approximates the period during which endowments and other long-term funds have been pooled in the Long-Term Capital Appreciation Pool. It also looked at a long term period from 1970-2008 to provide a period of analysis over multiple business cycles. For the period 2000-2008 and 1992-2008, the asset mixes for 6 candidate portfolios, for a pre-UTAM portfolio, for an all-Canadian portfolio and for the CPP Reference Portfolio are shown below.



	Portfolio 1	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	Portfolio 6	Portfolio CAD 50/50	Portfolio CPP	Portfolio Pre-UTAM
Global equity (50% hedged)		60.00%	0.00%	60.00%	0.00%	0.00%	0.00%	0.00%	33.00%
EAFE equity (50% hedged, except CPP)	22.50%		22.50%		15.00%	15.00%	0.00%	20.00%	0.00%
U.S. equity (50% hedged, except CPP)	22.50%		22.50%		15.00%	15.00%	0.00%	20.00%	0.00%
Canadian equity	15.00%		15.00%		30.00%	30.00%	50.00%	25.00%	33.00%
Canadian real return bonds	5.00%	5.00%	10.00%	10.00%	5.00%	10.00%	0.00%	10.00%	0.00%
Canadian universe bonds	35.00%	35.00%	30.00%	30.00%	35.00%	30.00%	50.00%	25.00%	34.00%

The next two charts show the annualized real return, the standard deviation and the reward to risk ratio for each portfolio for the 2000-2008 and 1992-2008 periods. [2] The first chart shows a relatively short term of eight years which was characterized by very strong performance of commodity prices and thus Canadian equity prices relative to other assets.

For the Period November 1, 2000 to June 30, 2008

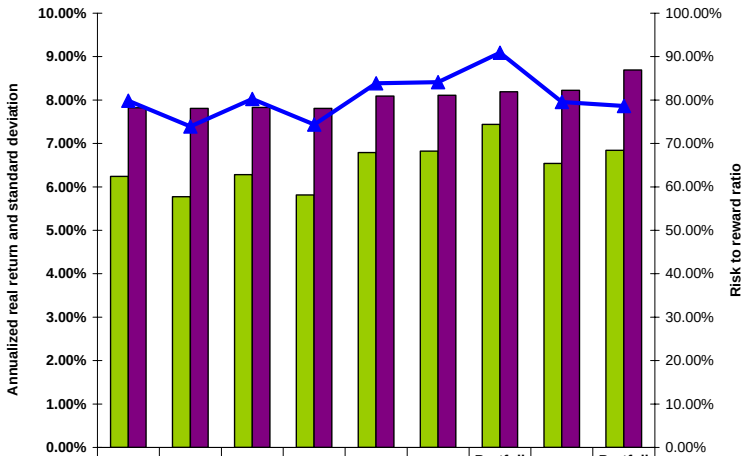


	Portfolio 1	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	Portfolio 6	Portfolio CAD 50/50	Portfolio CPP	Portfolio Pre-UTAM
Annualized real return 2000-2008	1.17%	-0.22%	1.31%	-0.08%	2.42%	2.56%	4.66%	1.19%	2.00%
Standard deviation 2000-2008	7.39%	7.60%	7.37%	7.57%	7.38%	7.38%	6.79%	7.66%	8.11%
Reward to Risk ratio	15.81%	-2.87%	17.78%	-1.01%	32.72%	34.66%	68.68%	15.58%	24.64%

The next chart shows the 15 year period from 1992-2008. You can see a much narrower range of observed returns as short-term market events are somewhat smoothed over this longer time period. The portfolios performed similarly as no single asset class dominated continuously.

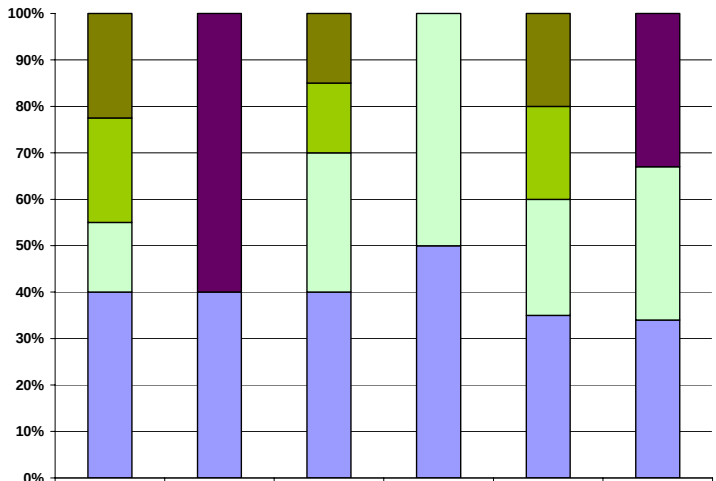
[2] The reward to risk ratio is the ratio of real return to standard deviation and illustrates the return per unit of risk.

For the Period January 1, 1992 to June 30, 2008



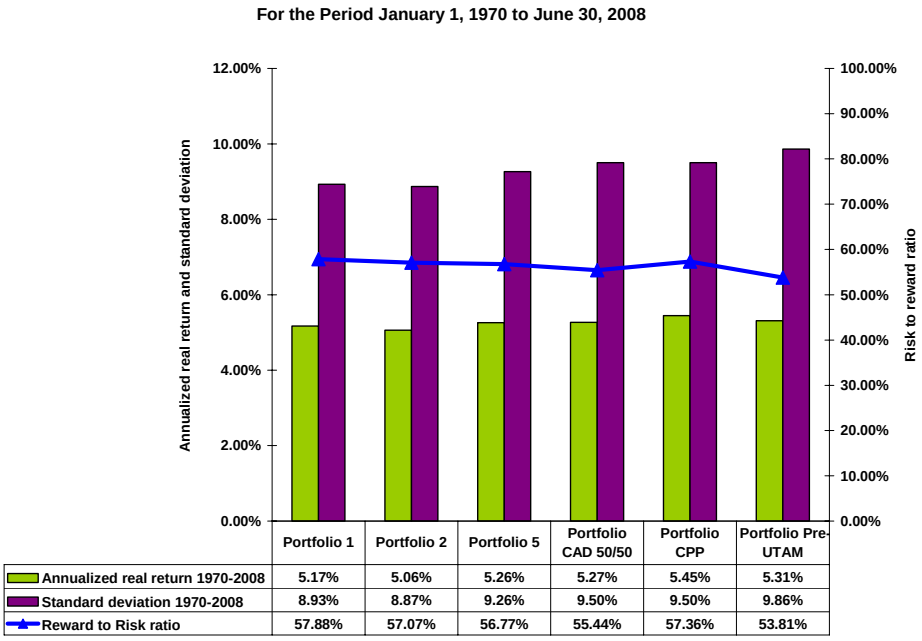
	Portfolio 1	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5	Portfolio 6	Portfolio CAD 50/50	Portfolio CPP	Portfolio Pre-UTAM
Annualized real return 1992-2008	6.24%	5.77%	6.28%	5.81%	6.79%	6.82%	7.44%	6.54%	6.84%
Standard deviation 1992-2008	7.82%	7.81%	7.83%	7.81%	8.09%	8.11%	8.19%	8.22%	8.69%
Reward to Risk ratio	79.84%	73.91%	80.22%	74.34%	83.84%	84.13%	90.89%	79.54%	78.64%

The consideration of the 1970-2008 period required some adjustment to the portfolios since real return bonds are a relatively recent market offering and were not available throughout this 38 year period. For the period 1970-2008 the asset mix for candidate portfolios 1, 2 and 5, for a pre-UTAM portfolio, for an all-Canadian portfolio and for the CPP Reference Portfolio are shown below. Real return bonds were subsumed into universe bonds, thus eliminating portfolios 3 and 4 as separate alternatives. Global equities were proxied by a static mix of 4% Canadian equities, 48% EAFE equities and 48% U.S. equities.



	Portfolio 1	Portfolio 2	Portfolio 5	Portfolio CAD 50/50	Portfolio CPP	Portfolio Pre-UTAM
Global equity (50% hedged)		60.00%				33.00%
EAFE equity (50% hedged, except CPP)	22.50%		15.00%		20.00%	
U.S. equity (50% hedged, except CPP)	22.50%		15.00%		20.00%	
Canadian equity	15.00%		30.00%	50.00%	25.00%	33.00%
Canadian universe bonds	40.00%	40.00%	40.00%	50.00%	35.00%	34.00%

The result for these adjusted portfolios is shown on the next graph. Again, the smoothing effect of the longer time period is visible.



Discussion

The following table summarizes the annualized real return, the standard deviation and the reward to risk ratio for each of the portfolios considered.

	Portfolio 1	Portfolio 2	Portfolio 5	50/50 CAD	Pre-UTAM
Real Returns:					
1970-2008	5.17%	5.06%	5.26%	5.27%	5.31%
1992-2008	6.24%	5.77%	6.79%	7.44%	6.84%
2000-2008	1.17%	-0.22%	2.42%	4.66%	2.00%
Standard Deviations:					
1970-2008	8.93%	8.87%	9.26%	9.50%	9.86%
1992-2008	7.82%	7.81%	8.09%	8.19%	8.69%
2000-2008	7.39%	7.60%	7.38%	6.79%	8.11%
Risk to Reward Ratios:					
1970-2008	57.88%	57.07%	56.77%	55.44%	53.81%
1992-2008	79.84%	73.91%	83.84%	90.89%	78.64%
2000-2008	15.81%	-2.87%	32.72%	68.68%	24.64%

The question is: which portfolio appears to be the best choice for reference portfolio? The three portfolios with the best return and the lowest risk are highlighted in yellow for each period. Looked at in this fashion, portfolio # 5 and 50/50 seem to dominate with the highest number of top three rankings, although there are not wide divergences in terms of return or risk in either of the medium or long term periods.

If we focus on reward to risk ratios, there appears to be little to choose between portfolios # 5 and 50/50 in the 1970-2008 period and the 1992-2008 period, as the difference is unlikely to be statistically significant. Only in the 2000-2008 period does portfolio 50/50 dominate, but this is a relatively short period. Viewed from another perspective, portfolio # 5 is a much less concentrated the 50/50 portfolio but still has a significant commitment to the home market. Since diversification is fundamental to any prudent investment program, it appears that portfolio # 5 is the best choice of reference portfolio for meeting the University's objective of a real return of 4% or more with a risk (measured by the standard deviation of nominal returns) below 10%. Because longer term performance is more in keeping with the University's goals and risk tolerance, more weight was given to the 1970 to 2008 simulations.

Although portfolio # 5 did not exhibit the highest return, lowest risk or highest reward to risk ratio in any one of the periods, it held up credibly across all of the time series considered. Therefore, the conclusion of the analysis is that portfolio # 5 is the best choice for a reference portfolio for University LTCAP and pension assets