APPENDIX B

ESTIMATION OF THE MARKET RISK PREMIUM

Introduction

In this appendix I estimate the market risk premium by examining realised rates of return on different broad classes of securities over long periods of time.[1] The reason for doing this is that if the underlying relationship generating these returns has remained reasonably constant then these realised returns can be used as a forecast of the market's future requirements. The difference between these returns is then commonly used as an estimate of the market risk premium. In analysing the actual data, however, we first need to be aware of some estimation problems and the impact of changes that have occurred in the markets.

Different Risk Premium Estimation Procedures

Suppose an investor puts $1,000 into an investment. If the investment doubles, i.e., a 100% return, to $2,000 and then halves, i.e., a -50% return, to $1,000, we can calculate two rates of return. The ***arithmetic*** rate of return would be 25% i.e., the average of +100% and -50%. The arithmetic rate of return is the average of the two per period rates of return. However, it would be difficult to convince an investor, who after two years only has the same $1,000 that he started with, that he has earned an average rate of return of 25%. Quite obviously, the investor is no better off at the end of the two periods than he was at the start! To counterbalance this potentially misleading statistic, most mutual funds advertise geometric or ***compound*** rates of return. This compound rate of return is often called the true rate of return. It is calculated as the nth root of the terminal value divided by the initial value, minus one. In our case, there are two periods, so that n=2 and the compound rate of return is calculated as $(1/1)^{1/2}$ which is 1, indicating a zero rate of return. This gives the common sense solution that if you started and

[1] This appendix covers similar material to that covered in Laurence Booth "Equities Over Bonds: But By How Much?" *Canadian Investment Review*, Spring 1995 and "Equity Risk Premiums in the US and Canada," *Canadian Investment Review* (Spring 2001). The latter paper is available for download from Professor Booth's web site http://www.rotman.utoronto.ca/~booth

finished with $1,000, then your rate of return is zero.

Both the arithmetic and compound rates of return are normally calculated when evaluating investments. If we need the best estimate of *next* period's rate of return, this is the arithmetic return. If we need the best estimate of the return over several periods, the arithmetic return becomes less useful and more emphasis is placed on the compound return. If we want the best estimate of the annual rate of return earned over a long period of time, this is the compound rate of return, since this indicates the long run expected change in wealth. Moreover, if we ignore intervening periods, then the arithmetic return over a very long period is the compound rate of return, that is, the difference between the arithmetic and compound returns is essentially the definition of the period over which the investment is held.

What causes the two rates of return to differ is the uncertainty in the per period arithmetic rates of return. If the arithmetic rate of return is constant, then both rates of return are identical. However, the more uncertain the arithmetic rate of return, the larger the discrepancy between the two estimates. For instantaneous rates of return the following equation approximately describes their relationship:

$$Compound\ rate\ of\ return = Arithmetic\ return - (var/2)$$

In the previous example, there is a large amount of uncertainty, that is, high variance (var), so that the difference between the arithmetic return and the geometric return is very large. Moreover, as we estimate over a longer and longer period, the estimated arithmetic rate of return earned on an investment approaches that of the compound return. In estimating the market risk premium, I believe that the correct time period for calculating arithmetic rates of return is a **one-**year holding period. The reason for this is primarily because most regulated firms are regulated on the basis of annual rates of return and rates are almost always expressed as annual percentages.

In addition to the arithmetic and compound rates of return I also estimate the arithmetic rate of

return by means of an ***ordinary least squares*** regression model. This is a statistical technique that estimates the annual rate of return by minimising the deviations of the annual values around the estimate. Ordinary least squares (OLS) is the standard technique for estimating economic models and is commonly used for estimating other annual growth rates, such as the growth rate in dividend growth models.

Market Risk Premium Estimates Going Forward and Backwards

In Schedule 1 I graph the market risk premium using Canadian data and these three estimation techniques in two ways.[2] In the top graph starting in 1924-1928 the realised market risk premium is estimated using each of the three techniques and is then updated each year with the new data so the second observation is for the period 1924-1929. In this way the graph captures the "learning" that goes on from 1924. The instability in the 1920s is evident: as the estimates are very high, due to the strong equity markets in the 1920's, and then in the 1930s it declines precipitously as a result of the great stock market crash. However, the market risk premium stabilises by the late 1950s, and then begins its long gradual decrease. Note that with almost ninety years of data, the impact of any one-year is now very small and the market risk premium is "stuck" around 5.0%. However, it is apparent that the realised market risk premium has been **declining** almost continuously since the mid 1960's as the importance of the prewar period gets smaller and smaller and the impact of the post war bond market uncertainty increases.

An alternative to the above procedure is to work backwards, that is, start in the five-year period 2008-2012 and then go back in time, which is the lower graph in Schedule 1. In this way we capture what current market participants have experienced. Note that whereas the previous graph always includes the period 1924-1928, this graph always includes the most recent five year period. In this case the last five years includes the recent stock market volatility that mimics in many ways what was observed in the 1920's and 1930's. However, as we work back through time and add in progressively older data the influence of the recent market volatility recedes and

2 The graphs use data from the Canadian Institute of Actuaries, "Report on Canadian Economic Statistics" April 2011 updated for 2011 and 2012.

once we get back to the 1950's we finally get a market risk premium about 4.0%. However, this graph illustrates why current market participants generally assess the risk premium of equities over bonds as much lower than 5.0%, since this is what they have experienced over the last 20-30 years.

In Schedule 2 is the earned risk premium (using arithmetic returns) for various holding periods. If we look at the last row we have the earned risk premium for various start dates finishing in 2012, this is essentially a subset of the data graphed in Schedule 1. Note for example, that the most recent ten-year period has an earned risk premium of 2.40%, as this period goes back successively by adding an extra ten years of data the earned risk premium drops and then increases until for the sixty year period 1943-2012 it goes above 5.0%.

The usefulness of the different holding periods in Schedule 2 is simply to note the variability in the experienced risk premium that results from individuals choosing to base estimates on a subset of the data. A high estimate could, for example, be generated by ending the time period in the early 1980s by using stale data from old textbooks, since this was the period when interest rates were at their peak and as result realised returns on bonds were much less than anticipated. Equivalently a low market risk premium could be generated by emphasizing the most recent period since 1981 when the very high returns from holding bonds during this declining interest rate period gives a negative market risk premium.

We can illustrate this problem simply by graphing the behaviour of interest rates which is done in Schedule 3. Note for example, that there was very little interest rate variability in the 1930's but then starting in the 1950's interest rates started to increase with inflation, thereby causing losses to anyone holding long term bonds. This process ended in 1981, since when this process has gone into reverse and until we reach the current period of very low interest rates when long Canada bonds ended 2012 at just 2.26% (V122501). For 2012 the average long Canada bond yield was 2.35% actually lower than the average level for 1936 of 2.97% as globally investors fretted over the Euro crisis and US deficit problems and sought the safety of Canadian government bonds.

Changes in the Market Risk Premium

The fact that estimates of the market risk premium change over time indicates that some adjustments are in order. In my judgement the riskiness of the equity market is relatively stable. In fact, going back as far as 1871, there is substantial evidence that the real return on US equities has been quite stable at under 9.0%.[3] However, there is ***no*** support for the assumption that either bond market risk or average bond market returns have been constant. As Schedule 3 shows, from 1924-1956, there was very little movement in nominal interest rates as monetary policy was subordinate to fiscal policy. As a result, the standard deviation of annual bond market returns was only 5.20%. In contrast from 1956-2012, monetary policy became progressively more important and interest rates much more volatile. As a result, the standard deviation of the returns from holding the long Canada bond increased substantially. Effectively bond market risk doubled, while equity market risk was much the same if not less.

This changing bond market risk is illustrated in Schedule 4 which graphs the equity market risk divided by the bond market risk, where each is estimated as the standard deviation of returns over the prior ten year period so the series start with the first observation for the period 1924-1933. We can clearly see the dramatic decrease in relative equity market risk starting in the 1950s, where equities dropped from being six times riskier than long term Government of Canada (GOC) bonds to their low point prior to the Internet Bubble crash of essentially the same risk. Since then the increased equity market volatility combined with relative stability in long Canada bond yields has caused equities to revert to being over three times riskier than GOC bonds.

However, what is crucial for the investor is whether this risk is diversifiable, that is, is the bond market beta or risk positive? In Schedule 5 I show that the Canadian bond market beta was very large during the period since 1991 until the early 2000's. This was the period when governments

[3] See Laurence Booth, "Estimating the Equity Risk Premium and Equity Costs: New Ways of Looking at Old Data", *Journal of Applied Corporate Finance*, Spring 1999.

had severe financing problems and flooded the market with government debt. This caused both the bond and equity markets to partly be moved by a common risk factor: interest rates. This is why adding long Canada bonds to an equity portfolio during the 1990's did not reduce portfolio risk to the extent that it did in the 1950's and more recently. However since the Canadian government solved its structural budget problems we have seen the bond market beta revert to its more typical negative or insignificant relationship

Schedule 5 shows that the beta on the long Canada bond was close to zero until the late 1980s; then increased dramatically peaking at almost 0.60 before receding to "normal." It was this increase in bond market risk that caused risk premiums to shrink throughout the 1990's. In fact it is quite clear that with a Canada bond beta of say 0.50, a low risk utility in the mid-1990s did not require a significant risk premium**.** This conclusion was reinforced by the observation that the Canada bond income (interest) is fully taxed, whereas the utility income would predominantly come as dividend income, which is preferred by every taxable investor in Canada.

In Schedule 6 are the results of a regression analysis of the real Canada bond yield against various independent variables. The real Canada yield is defined as the nominal yield reported by the Canadian Institute of Actuaries minus the average CPI rate of inflation, calculated as the average of the current, past and forward year rates of inflation. The regression model explains a large amount of the variation in real Canada yields, and four variables are highly significant. The two "dummy" variables represent unique periods of intervention in the financial markets. Dum1 is for the years from 1940-1951, which were the "war" years, when interest rates were controlled. The coefficient indicates that government controls reduced real Canada yields by about 5.0% below what they would otherwise have been. This of course was the objective of the war-time controls. Similarly, Dum2 is for the years 1972-1980, which were the oil crisis years, when huge amounts of "petrodollars" were recycled from the suddenly rich OPEC countries back to western capital markets, where they essentially depressed real yields. The sign on Dum2 indicates that, but for this recycling, real yields would have been about 3.5% higher. These dummy variables are included because during these two periods real yields were depressed by special "international" factors.

The remaining two independent variables capture the risk and endemic problem of financing government expenditures. Risk is the standard deviation of the return on the long Canada bond over the preceding ten years. In earlier periods when monetary policy was not used, interest rates barely moved and the returns on long Canada bonds were very stable. As a result the risk of investing in them was very low. The coefficient on the bond risk variable indicates that for every 1% increase in volatility, real Canada yields increased by about 27 basis points. That is, the approximate 5% increase in the standard deviation of bond market returns before and after 1956 was associated with about a 135 basis point increase in real Canada yields between these two periods. This was the extra risk premium required by investors to compensate for the higher risk attached to investing in long Canada bonds. Absent any increase in equity market risk, the result was a 135 basis point reduction in the market risk premium between the two periods.

The deficit variable is the total amount of government lending (from all levels of government) as a percentage of the gross domestic product. As governments increasingly ran deficits, this figure became a very large negative number, indicating increased government borrowing. For 1992, the number was about -9.1%, a record peacetime high, indicating that government net borrowing was 9.1% of GDP and was flooding the markets with Canada bonds. For 1997, this deficit turned into a surplus, which increased every year until 2000 when the surplus hit almost 3.0% of GDP. The coefficient in the model indicates that for every 1% increase in the aggregate government deficit, real Canada yields have increased by about 24 basis points. That is, increased government borrowing by competing for funds has driven up real interest rates. At the peak of the government's financing problems in 1992 a 9% deficit was adding well over 2.0% to the real Canada yield relative to what would have been produced with a balanced budget.

When these two effects are added together we can explain the huge increase in real yields in the early 1990s. In 1994, for example, when real yields were over 7%, the deficit added about 1.75% and the bond market uncertainty about another 2.65% or in total almost 4.5 % to the real yield. It is easy to see that with this dramatic increase in real yields in the bond market there was very little "extra" risk for low risk equities over bonds at this time. This is why in the mid 1990’s I

was recommending very "skimpy" utility risk premiums.

The effect of increased interest rate risk and government "over borrowing" are clearly two sides of the same coin. Their effect was to crowd the bond market with risky long Canada bonds that could only be sold at premium interest rates, frequently to non-residents. This driving up of Canada bond yields reduced the spread between Canada bond yields and equity required rates of return and the market risk premium. It is this deficit and risk phenomenon in the government bond market that created the narrowing market risk premium, and the large Canada bond betas in the mid 1990's.

In Schedule 7 is a graph of the real yield produced directly from the real return bond. Unfortunately this data is not available for earlier periods since these bonds did not exist. However, we can see directly the huge decline in the real yield over the last ten years as governments have got their budgets under control and uncertainty in the bond market has declined. For the period 1991-2000 the real yield was 4.0-4.5%, whereas prior to the financial crisis it has been 1.50-2.0% or a decline of 2.50% consistent with bond betas of 0.50 and a 5.0% true market risk premium.

Since the onset of the financial crisis we have had the impact of a new variable, which is global investor interest in GOC bonds. Before the foreign property rule was removed Canadian investors could only hold 30% of their tax preferred portfolio in foreign assets.[4] These assets tended to be foreign equities. Once this rule was removed Canadian institutions could buy foreign bonds and we have seen the emergence of the Maple bond market During the current financial crisis foreign investors have flocked to the GOC bond market as Canada has been seen as one of the few stable AAA rated bond issuers in the global bond market. This had the effect of lowering real yields in Canada to under 0.50% by the end of 2012 even in the presence of aggregate government deficits in Canada of approximately 3.6% of GDP. 5

If we use the regression model in Schedule 6 the real yield should be about 3.7% with the current

4 Mainly registered retirement savings plans (RRSPs) and institutional pension plans.
5 Full annual data is not yet available

aggregate deficit and bond market volatility. The current government deficit adds about 0.85% to the intercept or real yield of 0.93% and the slight increase in bond market volatility adds another 1.91%. At a 2% forecast inflation rate[6] this implies a long Canada bond yield consistent with current government deficits of about 5.69%. If Canada were still insulated from the rest of the world, these increased budget problems of the Canadian government and the associated additional financing would have driven up Canadian bond yields. Instead, the dire shape of the rest of the developed world has generated incredibly loose monetary policy and made Canada look good and caused bond prices to go up and yields to go down. Recently real yields in Canada have increased as the market has begun to anticipate the withdrawal of some of this excessive monetary stimulus. However, what is clear is that current government of Canada long term real bond yields of barely 1.0% are still well below what would be regarded as "normal" given the government deficit problems and the bond market uncertainty.

US Estimates

The Canadian data is one time series of equity and bond market returns and reflects unique events that happened in Canada; looking at US data we can assess whether these estimates are reasonable. The main source of this US data comes from the work of Ibbotson and Sinqufield, who calculated holding period return data from December 1925 for common equities, long term US government bonds, treasury bills, and the consumer price index. Schedule 8 provides US estimates of the market risk premium along with the comparable Canadian estimates for the period 1926-2012.

Based on annual holding periods the US realised equity risk premium is slightly higher than the Canadian equivalent. Given the "higher" quality of the US data as well as the volatility of the estimates, many put greater faith in the US estimates, even for the Canadian market. This is also frequently justified by the doubt expressed at the "higher risk"[7] Canadian market having a lower

[6] This is the Bank of Canada's inflation target agreed to with the Federal Government.
[7] Note, however, that the standard deviation or variability of the S&P500 equity returns was 20.18% or 1.41% higher than that for the Canadian market. Over this whole period US equities were marginally ***more*** risky than Canadian equities.

realized market risk premium, as well as the increasing integration between the two capital markets, which "presumably" moves Canada closer to the US experience.

However, the difference between the US and Canadian AM market risk premium estimates of 1.29% (5.82%-4.53%) is split between a difference in the average equity return of 0.63% and a difference in the average government bond return of 0.66%, that is approximately a 50:50 bond market-equity market split. In explaining this, note that:

- The difference between the equity market returns can partly be explained by the historic efforts of Canadian governments to deliberately segment the Canadian equity market from that in the US[8] as well as by the historically lower risk of the Canadian market.

- The difference in the returns on Canadian and US government bonds reflects the pivotal role of the US government bond market in the world capital market as the US $ has became the world's reserve currency.

If we take the US equity market return as a better estimate of the "true" Canadian equity market return, now that most of the protectionist policies in Canada have receded, this would increase the Canadian market risk premium estimate to just over 5.0%.

Finally we have to bear in mind that currently Canada is in a favourable position and has been since the late 1990s when "government" moved into fiscal surplus. The favourable finances have resulted in low inflation and interest rates, and allowed the removal of the foreign property restriction on tax preferred investments. We can see this in the graph of long term interest rates in Canada and the US in Schedule 9. In the mid 1990s the nominal yield on long Canada bonds was routinely higher than that on equivalent US bonds. However, this started to change as the Government of Canada move into a surplus position and since the mid 2000's long Canada bonds have usually had lower yields than US treasuries. As of the end of September 2013 long US Treasuries were yielding 3.69% or 0.62% more than long Canada bonds. This is consistent with the emergence of Canada as a capital exporter and lower required returns in Canada. It also

[8] The dividend tax credit only applies to dividends from Canadian corporations; foreign withholding taxes apply to foreign source income, while portfolio restrictions have existed in tax-preferred plans.

means that the lower historic market risk premium in Canada estimated over higher Canadian GOC bond yields may no longer reflect expected market risk premiums over the currently lower Canadian GOC bond yields. As a result although my direct estimate of the Canadian market risk premium is under 5.0% I judge a reasonable range to be 5.0-6.0%, since this reflects the recent behaviour of real yields in Canada and the removal of regulatory protection in the Canadian equity market.

Reasonableness of the Estimates

The prior statistical work indicates that the Canadian market risk premium has been about 5.0% while that for the US has been about 1.0% higher. These estimates are consistent with the judgment of professionals in the area of capital markets. At the height of the financial crisis Professor Fernandez[9] surveyed finance professors around the world to find out what they used for the market risk premium. A key result is his table 2 reproduced below.

Table 2. Market Risk Premium used in 2008 by 884 finance professors

		USA	Euro	UK	Canada	Australia	Other	Sum
MRP used in 2008	Average	6.3%	5.3%	5.5%	5.4%	5.9%	7.9%	
	St. dev.	2.2%	1.5%	1.9%	1.3%	1.4%	3.9%	
	MAX	19.0%	10.0%	10.0%	8.0%	7.5%	27.0%	
	Q3	7.2%	6.0%	7.0%	6.0%	7.0%	10.0%	
	Median	6.0%	5.0%	5.0%	5.1%	6.0%	7.0%	
	Q1	5.0%	4.1%	4.0%	5.0%	6.0%	5.5%	
	min	0.8%	1.0%	3.0%	2.0%	2.0%	2.0%	
	Number	487	224	54	29	23	67	884

This table confirms the results in Schedule 10 that the US market risk premium has averaged about 1.0% more than in Canada. Interestingly the median or middle person in the US (and Australia) thought the market risk premium was 6.0%, in Europe 5.0%, in the UK 5.0% and in Canada 5.1%.

9 Market risk premium used in 2008 by professors: a survey with 1,400 answers," April 2009.

Professor Fernandez followed up this survey with further surveys in 2009, 2010, 2011, 2012 and 2013 and extended the responses to include financial analysts and companies as well as professors of finance. The 2013 survey[10] was answered by 7,012 respondents out of about 21,500 emails sent out, where 775 did not answer the survey but only 61 said "the CAPM is not very useful." The 2,394 US responses indicated an average market risk premium estimate of 5.7% and a median 5.5%. For Canada the 110 responses indicated a lower market risk premium with an average of 5.4% and a median of 5.3%. The maximum estimate of the market risk premium by the Canadian respondents was 12.0%, the minimum 3.0%.

Also Professor Fernandez reports the trend over time in the estimate of the market risk premium for the US, where there are the most responses, as follows:

2008	2009	2010	2011	2012	2012
6.3%	6.4%	6.0%	5.50%	5.50%	5.70%

Consistent with the prior table in 2008 the average market risk premium was 6.3%. This then marginally increased in 2009 to 6.4%, but has then subsequently dropped to 6.0%, then 5.5% and is now slightly higher at 5.7%, probably for reasons will come to. However, there is no sign of a heightened market risk premium due to the aftermath of the financial crisis. In fact, the US market risk premium seems to have dropped quite significantly.

One feature of Fernandez' 2013 survey results is that he also surveyed the use of the risk free rate in estimating the required rate of return. Textbooks normally use a Treasury Bill yield rather than the long term bond yield used before regulatory boards. For the US the risk-free rate used averaged 2.40% while that in Canada was 2.0%. This is broadly consistent with the 20 year yields graphed in Schedule 10 where the US yield was 2.55% and the Canadian 2.41% about the time of the survey (May-June 2013).[11] Fernandez then directly estimated the overall required return on the US and Canadian equity markets, which is simply the product of the market risk premium and the risk free rate. For the US the average equity market required return was

10 P. Fernandez et al, Market risk premium and Risk Free rate used for 51 countries in 2013: a survey with 6,237 answers. June 26, 2013.

11 Note some respondents probably used Treasury Bill yields resulting in the lower survey results.

estimated at 8.0% while that in Canada 7.40% or 0.60% lower due to both the lower market risk premium and the lower risk free rate.

Finally Fernandez's surveys have in the past discovered that professors of finance have traditionally been "high" in their market risk premium estimates, which was in part due to their use of historic estimates. In his latest survey for the US, the professorial respondents had an average estimate of the overall required equity market return at 8.1% versus 8.0% for analysts working for financial institutions, as well as non-financial firms. In Canada the difference was slightly larger, where professors estimated the equity market return at 7.60% whereas analysts working for financial firms pegged it at 7.10% and those at non-financials 7.70%.

Conclusions

Fernandez's survey work supports my own direct estimates; that the market risk premium is generally regarded as between 5.0-6.0% as well as indicating that the overall equity market return is about 7.0-8.0%. This is also confirmed by professional opinion in Canada, where on October 19, 2012 TD Economics came out with a report "An Economics Perspective on Canadian Long Term Financial Returns."[12] The following table captures the TD Economics analysis:

FINANCIAL PROJECTIONS OVER THE NEXT DECADE	
Financial Instrument	Average Annual % Return
Cash (3-Month T-bills)	2.00%
Bonds (DEX Universe Bond Index)	3.00%
Equities	
Canada (S&P/TSX Composite)	7.00%
U.S. (S&P 500)	7.00%
International (MSCI EAFE)	7.00%
Source: TD Economics	

The TD analysis placed long run Canadian equity returns at 7.00%, the same as in the US and internationally, whereas bond returns were forecast at 3.0% for the Dex universe bond index, that

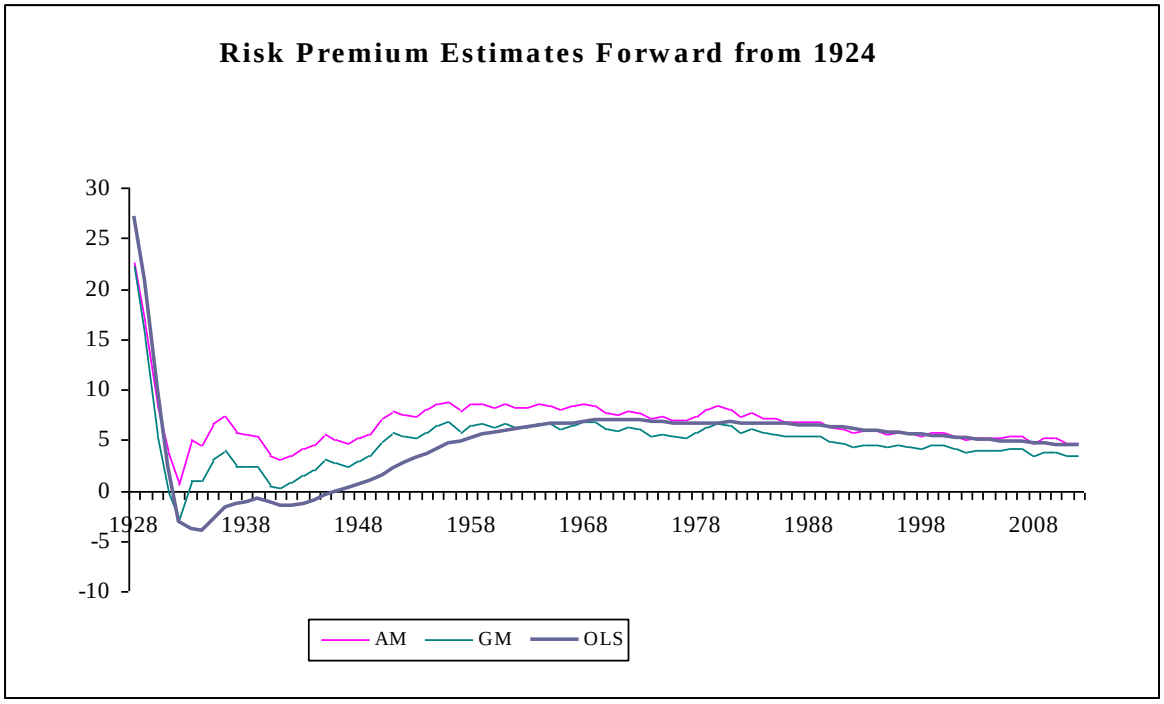
12 http://www.td.com/economics/special/ca0311_long_run_returns.pdf

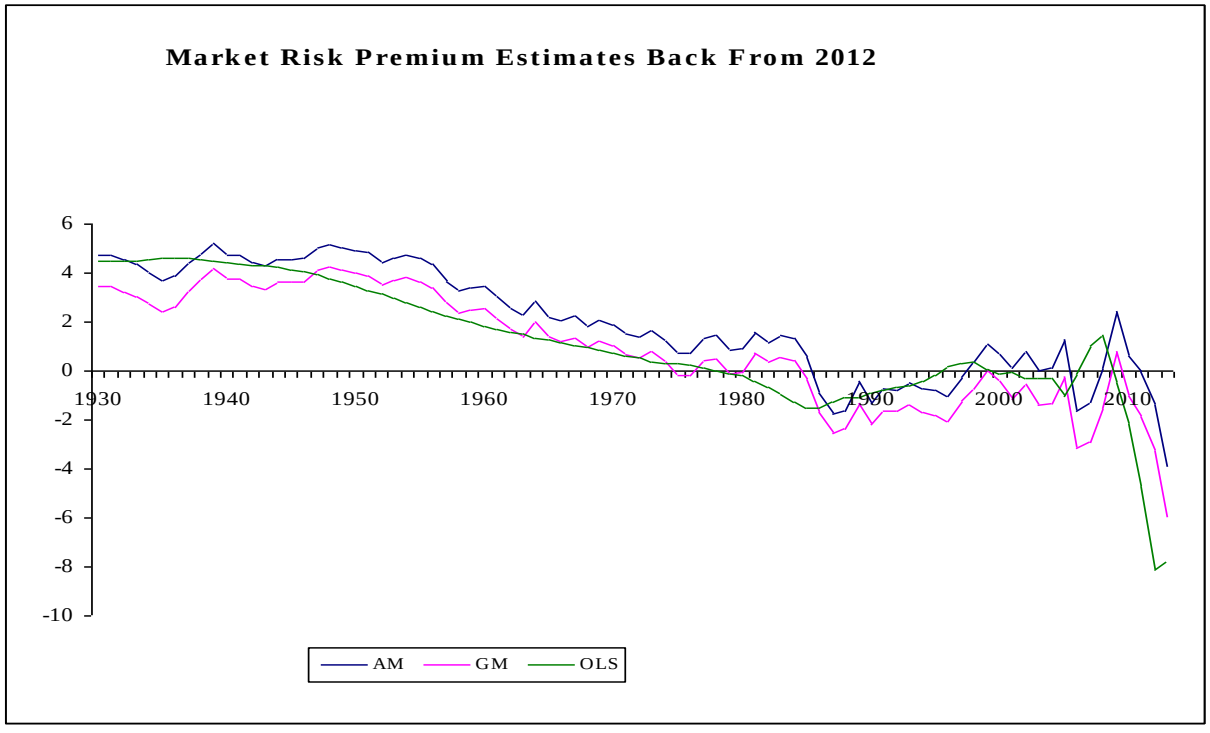
is, including corporate as well as government bonds. The implication is for a long run market risk premium of 4.00% of equities over bonds and slightly higher over government bonds. This is an increase compared to a similar report in March 2011, where Canadian equity returns were forecast at 7.5% and bond returns at 4.00%.

TD Economics is predicting a return to a balanced portfolio of 4.0-6.0%, which with 2% inflation implies a real return at a maximum of 4.0%. This is the same sort of analysis that underlies most defined benefit pension plans. Since these are long run or geometric (compound) returns an adjustment to arithmetic returns would move the equity risk over bonds to about 5.5% with that over long Canada bonds slightly higher at about 6.0%.

As a result while my own direct estimate of the experienced market risk premium is less than 5.0%, I judge it to currently be in a range of 5.00-6.00**%.** This estimate reflects the survey results of Fernandez and gives weight to the evidence from the US with regards to equity returns and the role of international capital flows in the US bond market. However it is significantly in excess of the long run historical experience of equity over long term bond returns in the major capital markets, including that of the US and UK, as well as Canada.[13] It is also significantly in excess of a recent report by the Royal Bank of Canada that while acknowledging historic equity returns of about 9.4%, forecasts future US equity returns over the next ten years at 4.9%, that is, the total return from the equity market is forecast by RBC to be less than the market risk *premium* I am using.[14]

13 The latest issue of Credit Suisse' "Global Investment Returns Yearbook 2013," has the equity market risk premium over bonds from 1900-2012 at 3.5% for Canada; 4.3% for the US and 3.7% for the UK.
14 RBC, US Equity Strategy Weekly, July 18, 2012.


Risk Premium Estimates Forward from 1924
30
25
20
15
10
5
0
-5
-10
1928
1938
1948
1958
1968
1978
1988
1998
2008
AM
GM
OLS

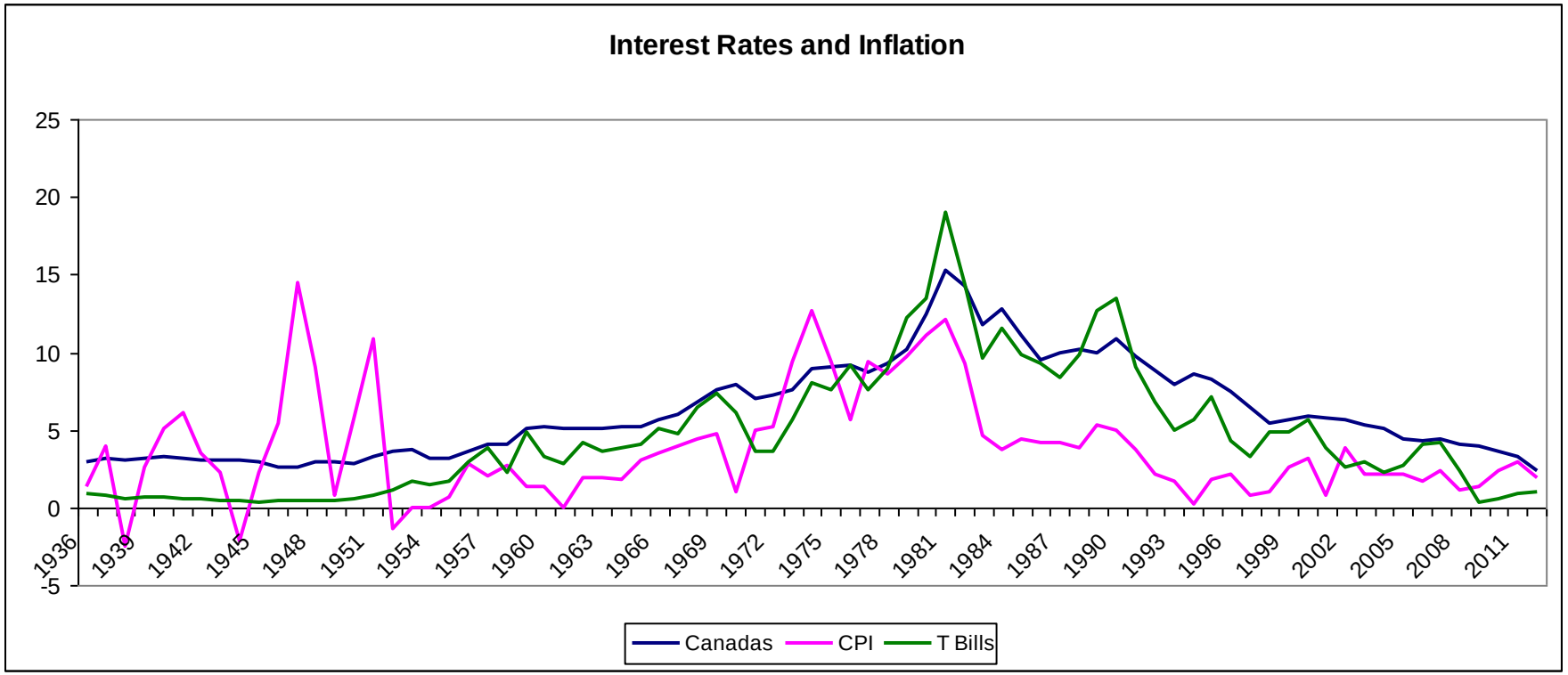

Market Risk Premium Estimates Back From 2012
6
4
2
0
-2
-4
-6
-8
-10
1930
1940
1950
1960
1970
1980
1990
2000
2010
AM
GM
OLS

SCHEDULE 2

Earned Risk Premiums for Different Holding Periods

Start dates on the horizontal and ending dates on the vertical. For example, an investor would have earned a 2.26% arithmetic risk premium investing from 1963-2001.

	1933	1943	1953	1963	1973	1983	1993	2003
1942	6.15							
1952	10.69	15.22						
1962	10.44	12.59	9.95					
1972	9.55	10.69	8.42	6.88				
1982	8.56	9.16	7.14	5.74	4.60			
1992	6.56	6.64	4.50	2.68	0.58	-3.43		
2002	5.59	5.50	3.55	1.95	0.31	-1.83	-0.23	
2012	5.19	5.06	3.36	2.04	0.83	-0.42	1.08	2.40


Interest Rates and Inflation
25
20
15
10
5
0
-5
1936
1939
1942
1945
1948
1951
1954
1957
1960
1963
1966
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1984
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1993
1996
1999
2002
2005
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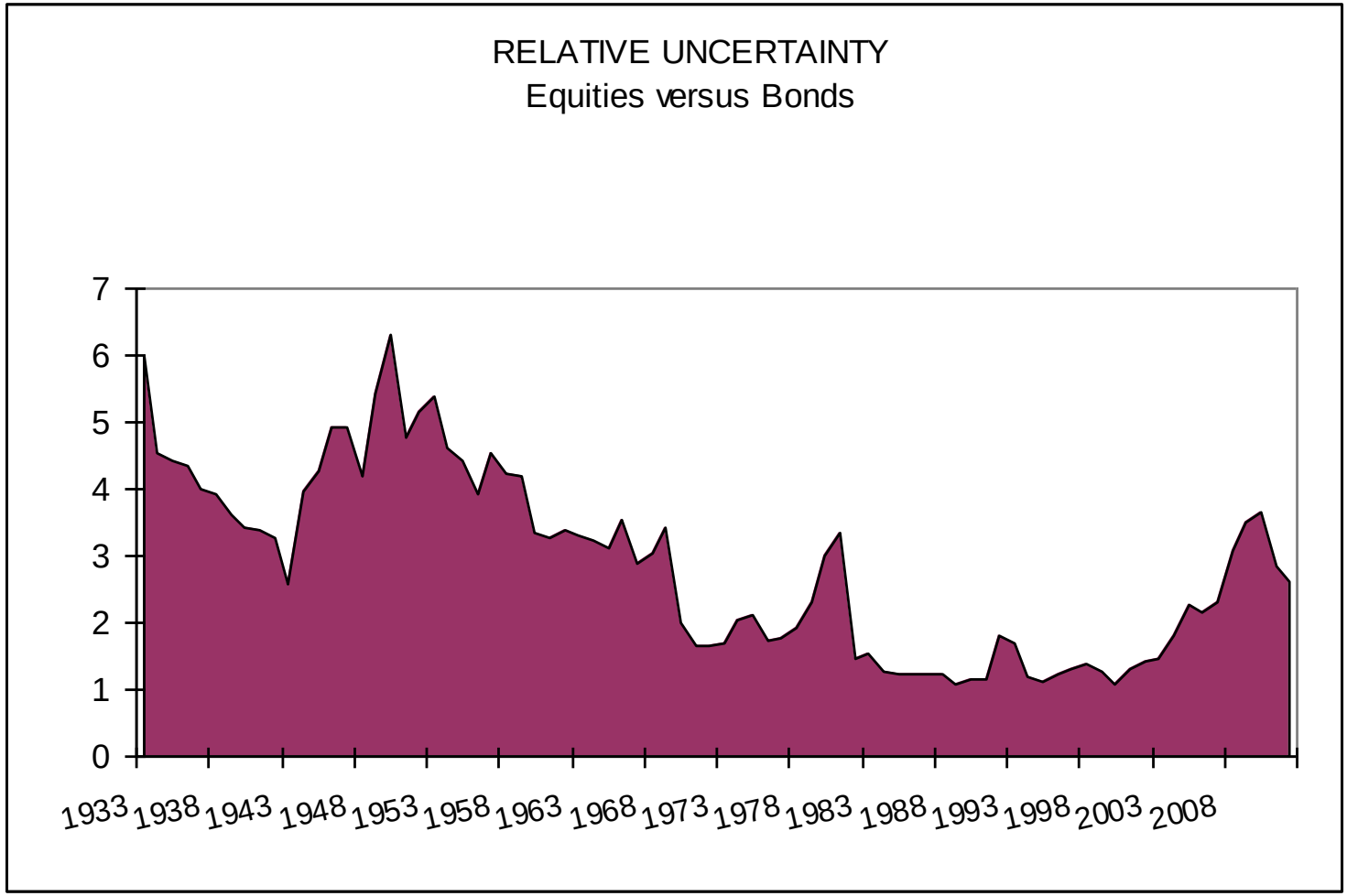
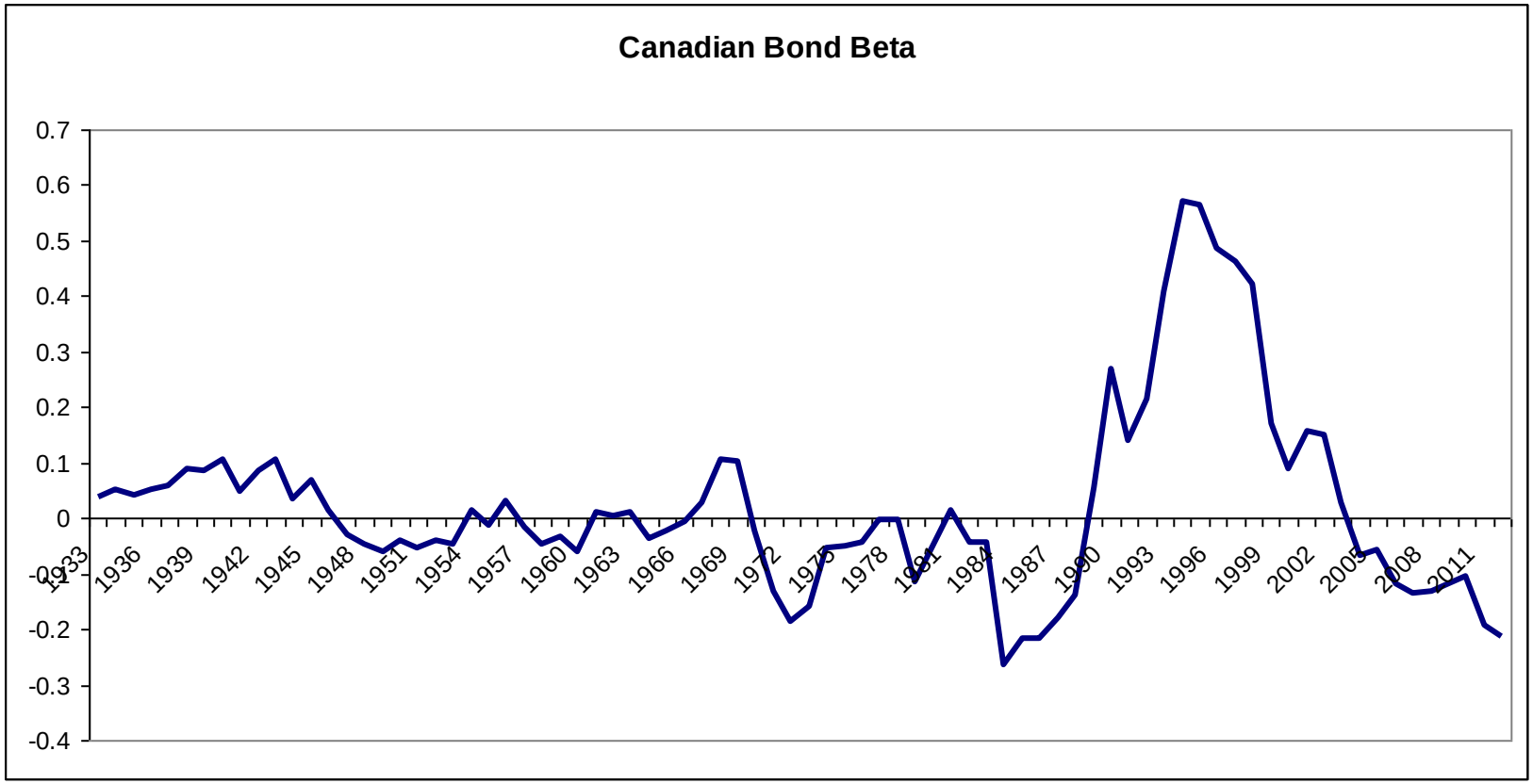
2011
Canadas
CPI
T Bills


RELATIVE UNCERTAINTY
Equities versus Bonds
7
6
5
4
3
2
1
0
1933
1938
1943
1948
1953
1958
1963
1968
1973
1978
1983
1988
1993
1998
2003
2008

SCHEDULE 5


Canadian Bond Beta
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
1933
1936
1939
1942
1945
1948
1951
1954
1957
1960
1963
1966
1969
1972
1975
1978
1981
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011

SCHEDULE 6

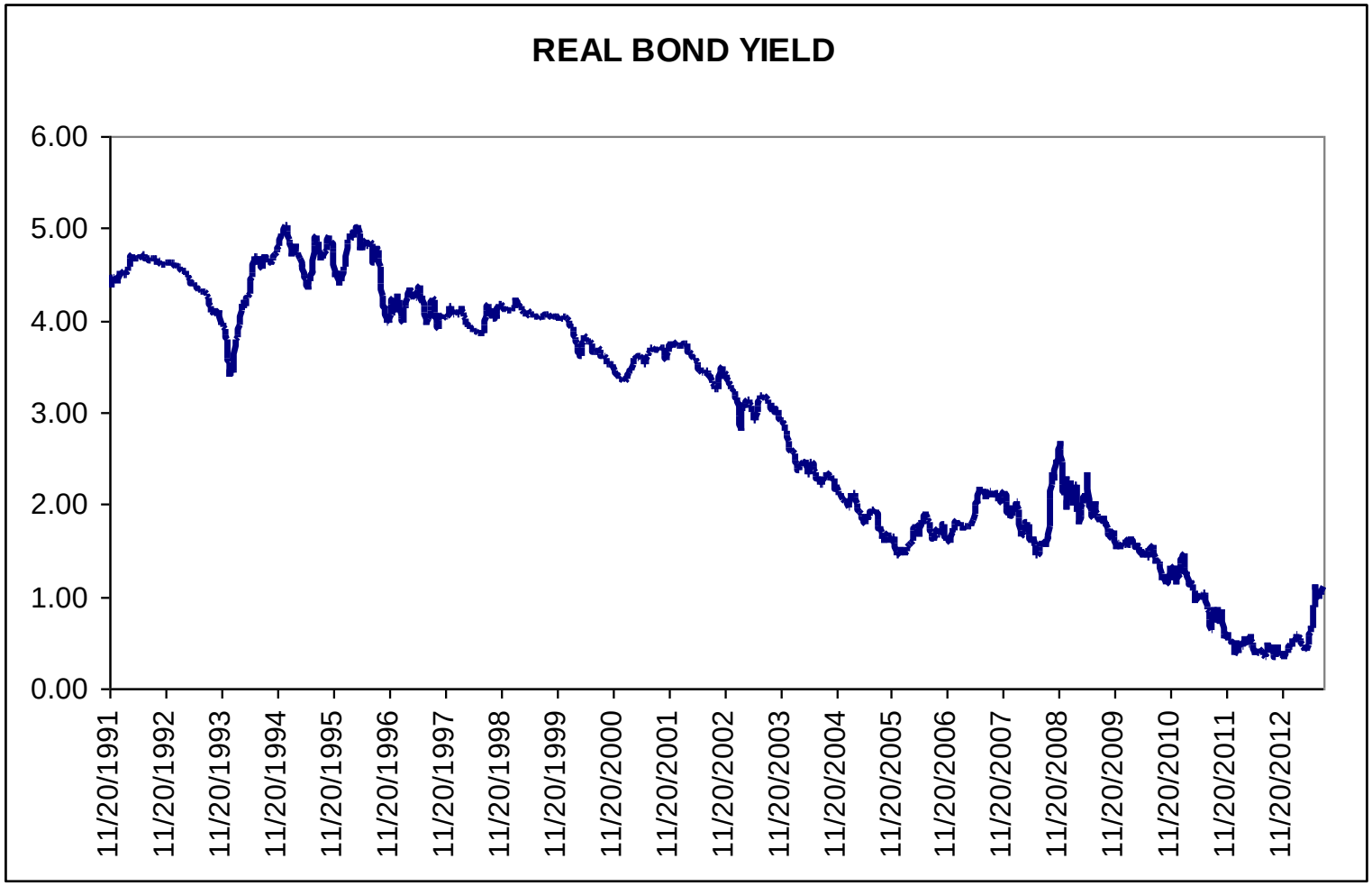
FACTORS INFLUENCING THE REAL CANADA YIELD

Dependent variable: Long Canada yield minus the average CPI inflation rate for the past, current and forward year.

Independent variables:

	Coefficient	T-Statistic
Constant:	0.928	
Risk: standard deviation of return on long bond index for prior ten years.	0.27	5.11
Deficit: aggregate government lending as a % of GDP.	-0.24	-6.88
Dum1: dummy variable for years 1940-51	-4.96	-10.58
Dum2: dummy variable for years 1972-80	-3.42	- 7.37

Adjusted R^2 of the regression 80.87%
Data 1936-2012 (2012 not a complete year)

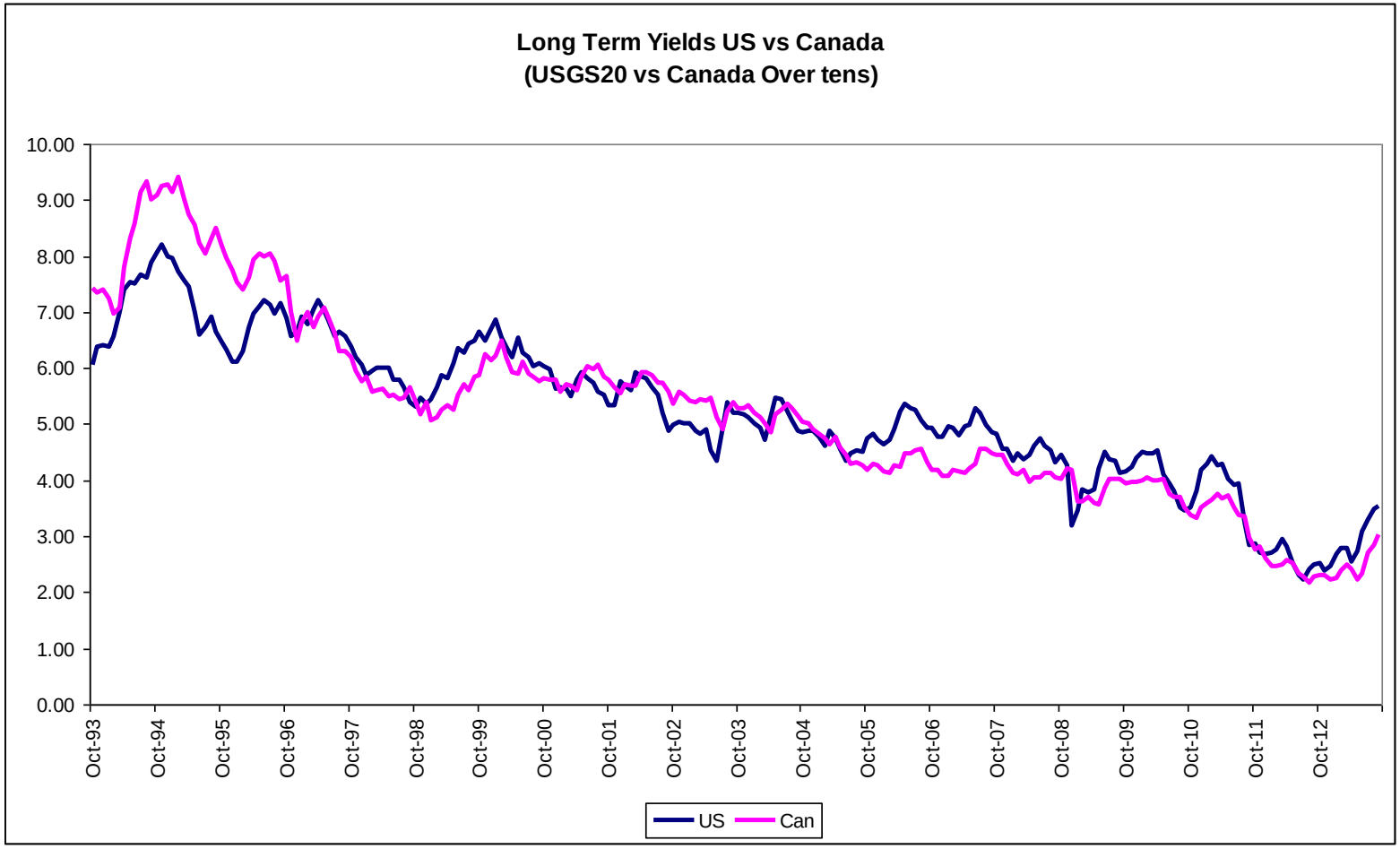

REAL BOND YIELD
6.00
5.00
4.00
3.00
2.00
1.00
0.00
11/20/1991
11/20/1992
11/20/1993
11/20/1994
11/20/1995
11/20/1996
11/20/1997
11/20/1998
11/20/1999
11/20/2000
11/20/2001
11/20/2002
11/20/2003
11/20/2004
11/20/2005
11/20/2006
11/20/2007
11/20/2008
11/20/2009
11/20/2010
11/20/2011
11/20/2012

SCHEDULE 8

Annual Rate of Return Estimates 1926-2012

	U.S.			**CANADA**		
	S&P Equities	Long US Treasury	Excess Return	TSE Equities	Long Canadas	Excess Return
AM	11.81	5.99	5.82	11.18	6.65	4.53
GM	9.84	5.61	4.23	9.52	6.30	3.22
OLS	10.98	5.28	5.70	10.35	5.98	4.37
Volatility[1]	20.18	9.26		18.77	8.89	

SCHEDULE 9


Long Term Yields US vs Canada
(USGS20 vs Canada Over tens)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Oct-93
Oct-94
Oct-95
Oct-96
Oct-97
Oct-98
Oct-99
Oct-00
Oct-01
Oct-02
Oct-03
Oct-04
Oct-05
Oct-06
Oct-07
Oct-08
Oct-09
Oct-10
Oct-11
Oct-12
US
Can