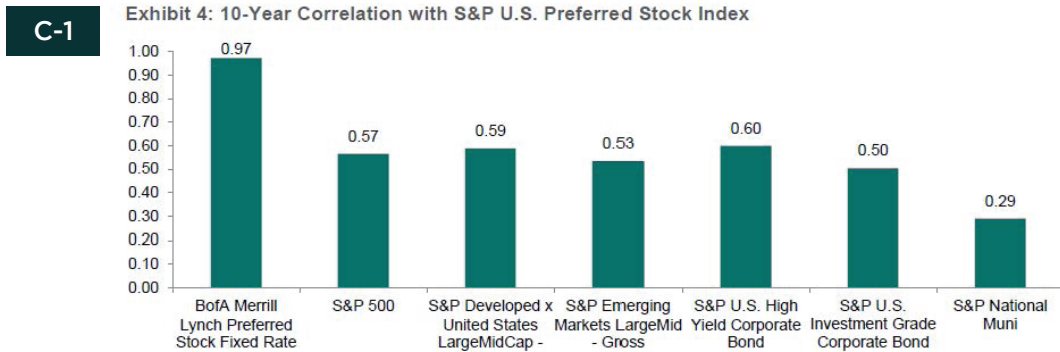


Correlation Analysis and the Canadian Preferred Share Market¹

Correlation analysis with respect to preferred shares is a tricky topic. For example, Phillip Brzenk and Aye Soe of Standard and Poor's wrote in October 2013² *In addition to higher yields, preferred stocks have low correlations with other asset classes such as common stocks and bonds, thus providing potential portfolio-diversification and risk-reduction benefits. Exhibit 4 charts the 10-year correlation of preferred securities, as represented by the S&P U.S. Preferred Stock Index, to other asset classes. It is important to note that preferred securities exhibit higher correlation with high-yield bonds and equities, which are more sensitive to credit, and lower correlation with investment-grade corporate and municipal bonds, which are more sensitive to interest rate risk.*



Source: S&P Dow Jones Indices, FactSet. The S&P U.S. High Yield Corporate Bond Index history begins April 30, 2004; to get 10-year history for this category, monthly returns from Barclays US High Yield Index were used from Sept. 2003 to April 2004. Data from Sept. 30, 2003 to Sept. 30, 2013. Charts are provided for illustrative purposes. Past performance is not a guarantee of future results. Some of the data referenced in this chart reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this paper for more information on the inherent limitations associated with back-tested performance.

On the other hand, Jeff Herold of J. Zechner Associates Inc. wrote in December of 2013³ *Many people, for instance, believe that preferred shares should move in line with bond prices. When the U.S. Federal Reserve started musing this past summer about tapering its bond purchases, the bond market sold off sharply on the expectation that yields were headed up. (Bond prices and yields move in opposite directions.)*

Unfortunately, many articles in the media suggested preferred share prices should follow suit. Some retail investors panicked and sold their preferred shares.

Sadly, history suggests that those sales were ill-advised, because preferred share yields are remarkably uncorrelated to bond yields. We have analyzed yields over the last decade and the correlation between bond and preferred share yields is actually slightly negative. In other words, preferred share yields have a slight tendency to go down when bond yields rise.

The lack of correlation between bonds and preferred yields reflects the absence of any tight linkage between the two markets. Very few investors trade back and forth between preferred shares and bonds, so there is little impetus for preferred share yields to track bond movements.

And most recently, Rob Carrick of the Globe & Mail has written⁴ *Where preferreds do not deliver is in a stock market decline. As the example of the past month shows, you get only a modest buffer against the broader market's losses. Bonds, by contrast, will often rise in price as stocks sink.*

Investors who hold preferred shares have to ask themselves the same question as people who have migrated from bonds to dividend-paying common shares. The question is this: What's my priority – protecting my portfolio by hedging against stock market risk, or generating an attractive flow of income? If you're in preferred shares for the income and can live with sliding share prices, then consider them as a bond substitute or companion. If portfolio buoyancy is your goal, then look to bonds and move your preferred shares over the equity side of your portfolio.

¹ This essay is largely copy-pasted from the appendix to the October, 2009, edition of this newsletter (charts have been updated and the text lightly edited), which in turn borrowed heavily from my blog post of 2008-6-21, *Market Timing*, available on-line at <http://www.prefblog.com/?p=2294> (accessed 2009-10-8). Reduce Reuse and Recycle, that's me!

² Phillip Brzenk and Aye Soe, *Digging Deeper Into The U.S. Preferred Market*, S&P Dow Jones Indices, October, 2013, available on-line at <http://www.spindices.com/documents/research/research-digging-deeper-into-the-us-preferred-market.pdf> (accessed 2014-12-11)

³ Jeff Herold, *Preferred shares offer lush yields for those who do their homework*, Globe & Mail, December 30, 2013, available on-line at <http://www.theglobeandmail.com/globe-investor/investment-ideas/tricks-to-navigating-the-minefield-of-preferred-share-investments/article16133969/> (accessed 2014-12-12)

⁴ Rob Carrick, *Preferred shares will not protect you like bonds will*, Globe & Mail, 2014-12-11, available on-line at <http://www.theglobeandmail.com/globe-investor/inside-the-market/preferred-shares-will-not-protect-you-like-bonds-will/article22048509/> (accessed 2014-12-12)

Correlation Analysis

When performing correlation analysis⁵, we take a set of observations of data with two variables per observation. The data are assumed to be normally distributed and hence we can calculate the standard deviation of each variable over the set of observations. The data in each observation may then be compared in a disciplined manner.

If we find, for instance, that every time the first variable is one standard deviation above its mean, the second variable is also one standard deviation above its mean (and that this 1:1 relationship applies for each observation) then the correlation coefficient of the data is 1.0. The data are highly correlated and the system may be investigated further to determine whether there is an actual relationship.

The relationship may prove to be cause and effect (yelling “ouch” is highly correlated with being hit on the head), or coming from a common cause (two clocks may be highly correlated although not connected, because they are independently measuring the same thing) or the correlation may be spurious (given sufficient manuscripts written by monkeys, a tireless researcher⁶ might find one that is highly correlated with the works of William Shakespeare).

If we examine the past ten years of data, we may tentatively identify the correlations – and hence, a presumed measure of how closely related these investments are – through a covariance matrix, shown as Table C-1.

Table C-1: Covariance Matrix for Yields of Four Different Fixed Income Instruments Ten Years to 2014-12-10

	Five Year Canadas	Long Canadas	Long Corporates	Perpetual-Discount Interest Equivalent
Five Year Canadas	1.00			
Long Canadas	0.91	1.00		
Long Corporates	0.43	0.68	1.00	
Perpetual-Discount Interest Equivalent	-0.06	0.22	0.79	1.00

From the results shown in Table C-1, we might incautiously conclude that:

- Five Year Canadas and Long Term Canadas are highly correlated: there is not much point having both in any given portfolio
- Long Corporates and PerpetualDiscounts are highly correlated
- The correlation between obligations of Canada (both long and short term) and obligations of corporations (both long bonds and PerpetualDiscounts) are less correlated than the constituents of those two groups; i.e., that sovereign vs. credit is a better distinction than long-term vs. short-term.

But we will not repeat Benjamin Graham’s mistake and draw such a conclusion.

Time Varying Correlation

In the first edition of *The Intelligent Investor*, Benjamin Graham argued that a 50-50 split between stocks and bonds was mathematically desirable for a portfolio because the correlation between the two asset classes was negative; but this argument was dropped in the second edition since the correlation had changed.⁷ Dropping the argument may have been premature, however: the Federal Reserve Bank of Kansas City’s Financial Stress Index⁸ uses as one of its indicators the correlation between two-year treasury bonds and the S&P 500 Index, on the grounds that during times of financial stress the correlation become negative, from its normal positive level. Since diversification will be most urgently required in times of stress, an investor could be quite justified in using the negative figure for asset allocation purposes, despite the fact that the correlation will be positive most of the time.

⁵ See Ian Stockwell, *Introduction to Correlation and Regression Analysis*, available on-line at <http://www2.sas.com/proceedings/forum2008/364-2008.pdf>, or almost any introductory statistics text

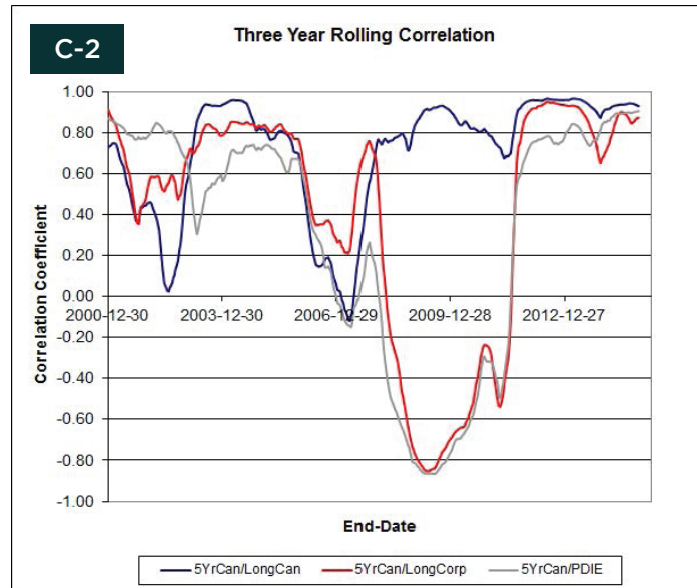
⁶ A Technical Analyst, for example.

⁷ Lingfeng Li, *Macroeconomic Factors and the Correlation of Stock and Bond Returns*, 2002, available via http://papers.ssrn.com/sol3/papers.cfm?abstract_id=363641 (accessed 2009-2-10)

⁸ Craig S. Hakko & William R. Keeton, *Financial Stress: What Is It, How Can It Be Measured, and Why Does It Matter?*, available on-line at http://www.kansascityfed.org/PUBLICAT/ECONREV/pdf/09q2hakko_keeton.pdf (accessed 2009-10-9)

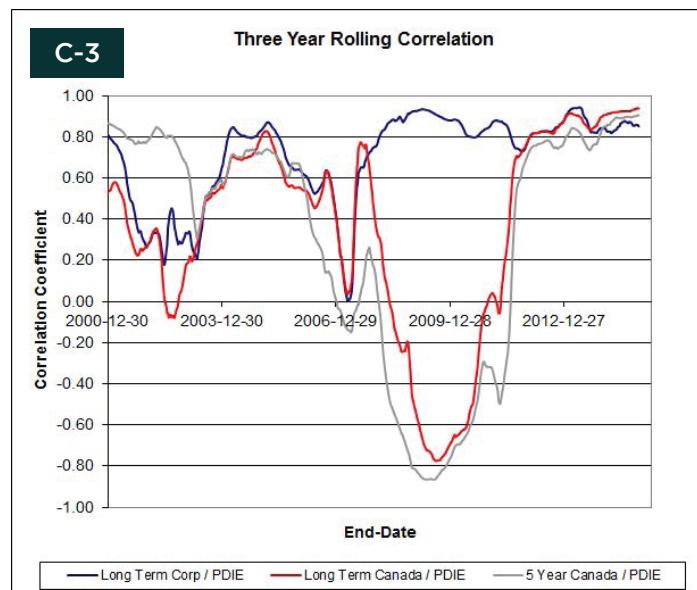
The fact that correlations between asset classes can change over time is a burgeoning field of academic research: Relationships have been sought and sometimes found: there appears to be a relationship between both the absolute and relative volatility of emerging market equity returns and the correlation of these markets with Australian equities⁹; and correlations between the Russian and US equity markets appear to be affected by (1) Country Risk as measured by the spread between the Russian Government Bonds and the U.S. Long-term Treasury Bonds, (2) the change in Russian ruble exchange rate with U.S. dollar, and (3) the change in world energy price.¹⁰

Getting back to the preferred share market, we can examine how the correlations between the five-year Government of Canada Yield and the other instruments chosen to decompose the spreads in Chart 2 look. These data are presented in Chart C-2.



It should be clear from the graph that there are many influences acting upon the four asset classes highlighted in the figure; most notably, we can hypothesize with high confidence that occasional negative correlation between five-year Canadas and the two corporate classes is due to the flight to quality highlighted by the Kansas City Fed in their Fiscal Stress Indicator. Note, however, that this must remain a hypothesis; before we were to dignify the claim with the sobriquet of “theory”, we would need to look at more data.

We may also look at correlations focusing on the bottom line of Table C-1 – the PerpetualDiscount Interest-Equivalent yield, against the other three asset classes. Rolling three year correlations are shown in Chart C-3.



⁹ R. Gupta & A.T.Mollik, *Volatility, Time Varying Correlation and International Portfolio Diversification: An Empirical Study of Australia and Emerging Markets*, available on-line at http://www.eurojournals.com/irjfe_18_02_Gupta.pdf (accessed 2009-10-8)

¹⁰ Thadavillil Jithendranathan, *Time-varying Correlations of U.S and Russian Equity Returns*, available on-line at <http://129.3.20.41/eps/ff/papers/0403/0403006.pdf> (accessed 2009-10-8)

A comparison of Charts 2 and 3 allows us to quantify a number of things that I have simply asserted in the past:

- Overall, the closest relationship (highest correlation) is between Long Corporate bond and PerpetualDiscount preferred yields.
- In addition, while the correlation certainly shows volatility, there is less variation in the correlation between Long Corporates and PerpetualDiscounts than there is for any of the other time-varying correlations considered.

We may conclude that:

- The factors influencing the yields of Long Corporates are very similar in nature and importance to the factors influencing PerpetualDiscounts
- The best yardstick to use as a measure of whether PerpetualDiscounts are “cheap” or “expensive” is the yield of Long Corporate bonds – with the caveat that at times the relationship can break down: in early 2007 the correlation as measured became zero, indicating no relationship between the two variables.

With this in mind, we can look at the Seniority Spread (the difference between the PerpetualDiscount Interest-Equivalent yield and the yield on Long Corporate bonds) in more detail. I will take the opportunity to mention that in financial analysis, the difference between the price or yield of two assets is referred to as the “basis”, while the risk that the basis will change – which will not necessarily involve a change in correlation – is referred to as the “basis risk”.

Implications of Time-Varying Correlations

Correlations between variables that change over time can occur for a number reasons:

- The amplitude of one of several important attributes might change.
- The coefficient of one attribute with variable values might change
- A hitherto unknown factor might emerge.

The first possibility has been highlighted earlier: the correlation of Russian and American equities is believed to be dependent, in part, upon world energy prices.

As an example of the second possibility, we may look at energy prices and the Canadian dollar. Bank of Canada research suggests¹¹ that the sign of the relationship between the Canadian dollar’s real exchange rate against the US dollar and real energy prices changed from negative to positive over time, as the importance of Canada’s energy exports grew; the authors pinpoint the time of the change in sign to the early 1990s.

Finally – and to complete our energy related trifecta – I note some commentary¹² on the accuracy of inflation forecasts: “...although there was concern about the effect of an overheated economy on short-term inflation rates during the 1960s, it would have been essentially impossible at that time to forecast the oil shocks of the 1970s, or the response of the fiscal and monetary authorities to those shocks.”

A more current example is the current Credit Crunch. There is now widespread feeling¹³ that the subprime debacle and subsequent counter-party crisis was simply the method by which central bank policy errors (keeping monetary policy too loose during the pre-2007 expansion) came to light: if it hadn’t been sub-prime, it would have been something else. It is quite hard enough to forecast the effects of a perfectly functioning system; when the system breaks down, it is very difficult to forecast where the chips may fall.

Yet another example is Manulife’s lobbying to get the MCCSR rules changed in the fall of 2008¹⁴, and there we have a quintessentially Canadian solution to economic difficulties: when a systemically important institution runs into trouble, change the rules so it doesn’t look like trouble any more!

Each of the three influences on changing correlations is a reason why market timing cannot work in the long run. The world is simply too complicated to predict, policy responses may be misguided and thereby amplify errors instead of moderating them. Hitherto unknown factors may leap from lowly status as rounding errors into driving forces; financial markets are as difficult to predict as the weather.

All that one can do is diversify and, perhaps, seek to make small excess returns based on exploitation of small anomalies. Anything more is doomed to long-term failure, however lucky one might be on a few market calls.

¹¹ Ramzi Issa, Robert Lafrance and John Murry, Bank of Canada Working Paper 2006-29, *The Turning Black Tide: Energy Prices and the Canadian Dollar*, available on-line at <http://www.bankofcanada.ca/en/res/wp/2006/wp06-29.pdf> (accessed 2009-10-10)

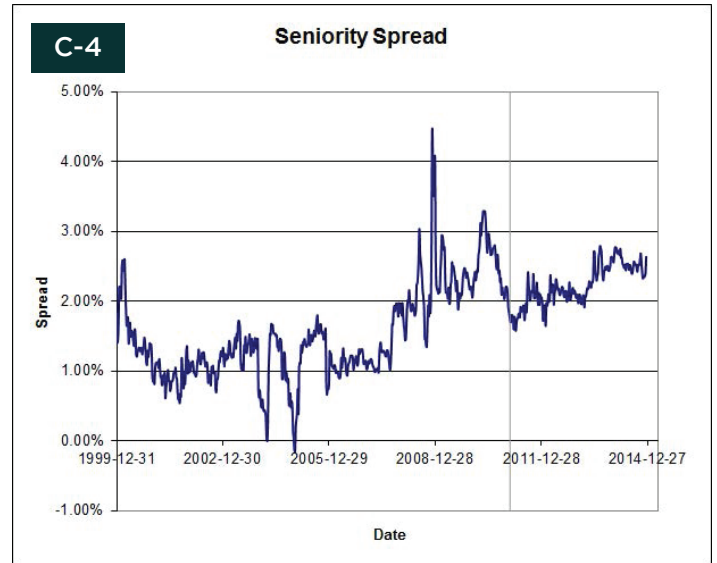
¹² Michelle L. Barnes, Zvi Bodie, Robert K. Triest and J. Christina Wang, Federal Reserve Bank of Boston Public Policy Discussion Paper 09-8, *A TIPS Scorecard: Are TIPS Accomplishing What They Were Supposed to Accomplish? Can They Be Improved?*, available on-line at <http://www.bos.frb.org/economic/ppdp/2009/ppdp0908.pdf> (accessed 2009-10-10)

¹³ E.g., John B. Taylor, *Systemic Risk and the Role of Government*, (speech) available on-line at <http://www.frbatlanta.org/news/CONFEREN/09fmc/taylor.pdf> (accessed 2009-10-10) and Roberto M. Billi, *Was Monetary Policy Optimal During Past Deflation Scares?*, available on-line at <http://www.kansascityfed.org/PUBLICAT/ECONREV/pdf/09q3billi.pdf> (accessed 2009-10-10)

¹⁴ See my notes on PrefBlog at <http://www.prefblog.com/?p=3898>

The Seniority Spread

Historical levels of the Seniority Spread are shown in Chart C-4. It may be seen that, apart from a spike in the early part of the century, this spread was fairly constant in the 100bp–150bp range until exploding in the wake of the Lehman default in 2008. It then reached a plateau in the 200bp range in the period August, 2011 – March 2013, but since then has ascended to a new level in the 250bp range.

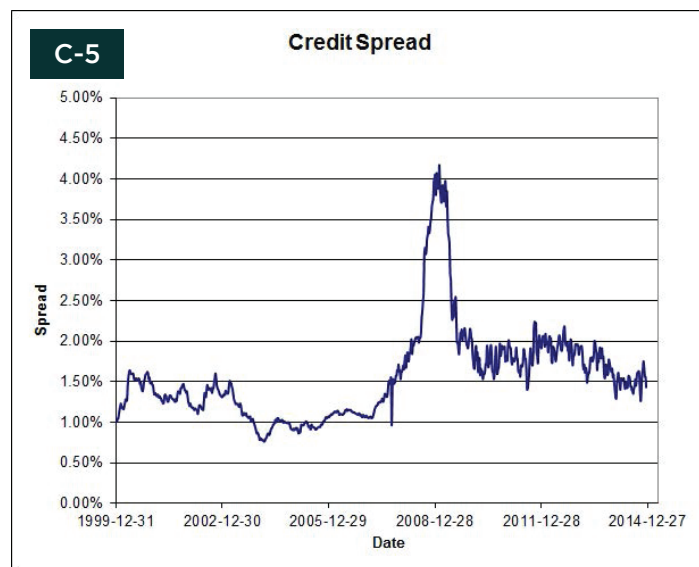


There is no immediately discernable relationship between the spreads shown in Chart C-4 and either the Bank of Canada Financial Stress Index¹⁵ and the Kansas City Fed's Financial Stress Index¹⁶, both of which quantify the stress at the time of the Long Term Capital Management crisis and Russian debt default (August 1998) as being far more severe than that caused by the bursting of the NASDAQ technology bubble in March 2001 – although the Credit Crunch of 2007–09 is clearly dominant in all three data series. Clearly, the relationship of the Seniority Spread to potentially triggering events will be the source of much speculation amongst those who wish to indulge in market timing!

Investors in preferred shares, alarmed by recent declines, may take some comfort in the idea that the Seniority Spread is currently well above historical levels; but it would also be useful to make some assumptions about the default risk of preferred shares relative to that of senior corporate bonds and see how much spread there should be to compensate for default risk.

Note that it is clear that a liquidity premium will be contained in the raw spread; for an institutional investor, bonds are much more liquid than preferred shares since – normally! – a million dollars worth of corporate bonds may be traded in a single telephone call without significantly moving the market; this is, to say the least, far less common in the preferred share market. Additionally, should short term cash be required, corporate bonds may generally be margined on far better terms than will be allowed for preferred shares, which are subject to the margining rules applicable to equities.

In fact the Credit Spread (the spread between long-term Canadas and long-term corporate bonds) has narrowed since the crisis, although (like the Seniority Spread) it remains significantly wider than pre-crisis levels, as illustrated in Chart C-5.



¹⁵ Mark Illing and Ying Liu, Bank of Canada Working Paper 2003-14, *An Index of Financial Stress for Canada*, available on-line at <http://www.bankofcanada.ca/en/res/wp/2003/wp03-14.pdf> (accessed 2009-10-9)

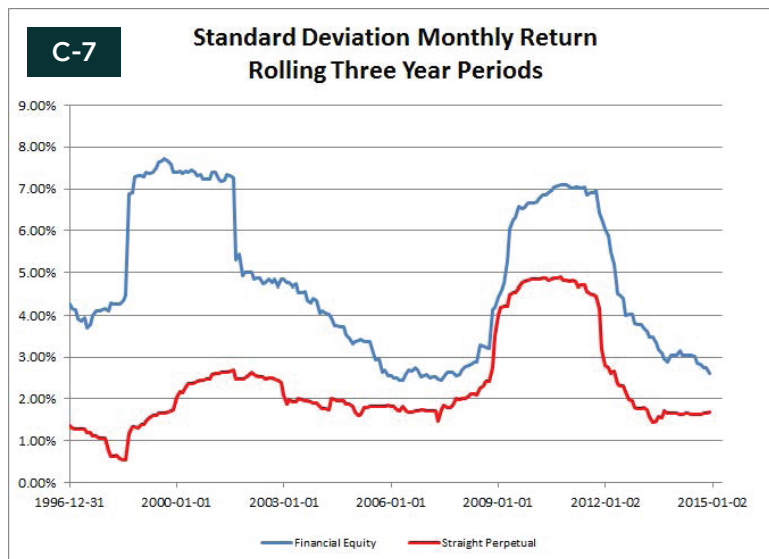
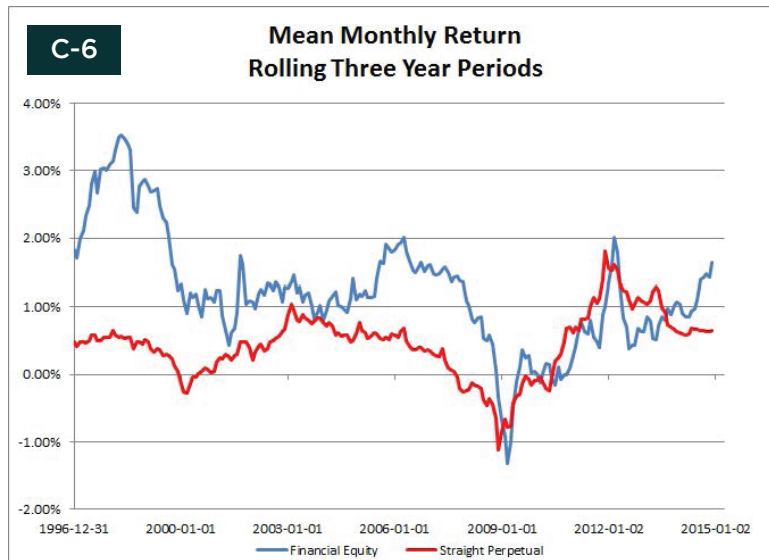
¹⁶ Hakkio & Keeton, *ibid.*

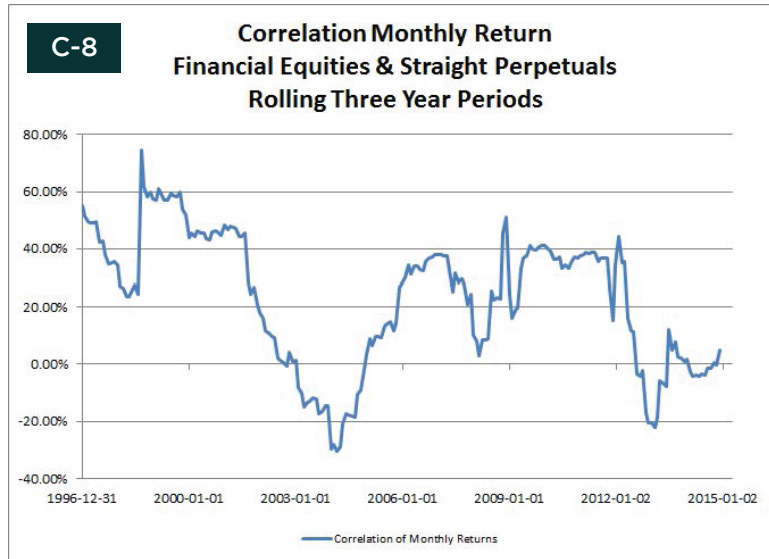
Paradoxically, I suggest that preferred shares are more liquid than corporate bonds for a retail investor, since:

- Retail bond investors are at the mercy of their brokers when transacting; published bid-offer spreads at one discount brokerage are routinely in the 5% range for long corporate bonds.
- When trading preferred shares on the exchange, investors have the option of placing limit orders in an attempt to supply, rather than consume liquidity. This option is not available for retail bond investors
- These differences in liquidity may not be circumvented via holding ETFs rather than individual bonds, since no specialized Canadian Long Term Corporate Bond ETF exists, to the best of my knowledge. Even if they did exist, the MER inherent would effectively serve to widen the Seniority Spread further

Equities

So will preferred shares offer protection against stock market declines? The historical record is illustrated in Charts C-6, C-7 and C-8.





Investment Conclusions

One must always beware of charlatans who present correlation between any two asset classes as a single figure, since the complexity and chaotic nature of financial markets means that these correlations will change over time, often dramatically, as the two classes react in their own ways to changes in the global economic environment.

Presenting a single figure is akin to declaiming that the police average response time to an emergency call is four minutes, without disclosing a difference between night and day, or summer and winter; or that one call in ten takes over ten minutes;¹⁷ while averages are all very well and good they will not necessarily serve you well when required!

Mr. Carrick is overly general in his assertion that *Where preferreds do not deliver is in a stock market decline*. While this is quite correct in times such as the Credit Crisis, when the driving fear was of imminent bankruptcy of corporations due to financial adventures and global depression, it is not necessarily a good prediction if stocks are doing poorly due to deflation and recession fears.

I have used PerpetualDiscounts as the basis for comparisons in this essay because they have a long history and are what I consider the 'purest' form of preferred share. I hope that by the next time I update this essay there will be sufficient data from FixedResets to allow for more extended comparisons.

¹⁷ These figures are made up for illustrative purposes