

**MONTRÉAL EXCHANGE AND MACRO HIVE**

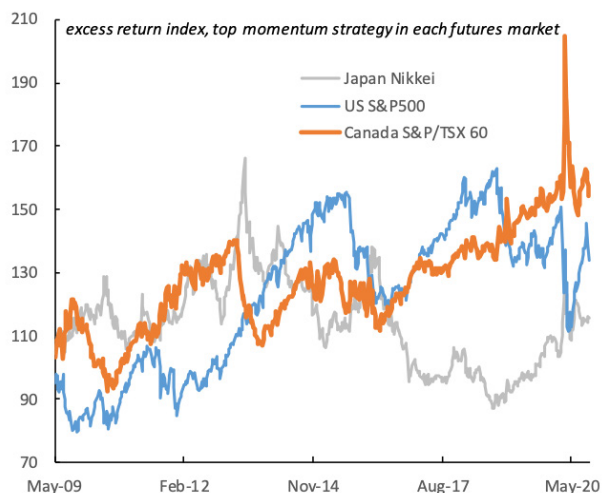
# How Canadian Futures Can Enhance Momentum Strategy Returns

*Bilal Hafeez and Abbas Keshvani, Macro Hive, October 13, 2020*

- Momentum strategies are a core part of any systematic investment approach. The challenge is to keep finding ways to improve returns, especially as core markets have become more crowded with such strategies.
- The good news is that momentum strategies in benchmark Canadian futures, whether the S&P/TSX 60 (SXF), the 10y bond (CGB) or the 5y bond (CGF), have delivered positive returns since the 2008 financial crisis.<sup>1</sup> The Sharpe ratios have averaged around 0.3 to 0.4 but can go as high as 1.5 in periods of high or very low risk aversion.
- Moreover, momentum strategies in the S&P/TSX 60 equity contract have outperformed all the major equity index futures, including the S&P 500 (Chart 1). This is notable because momentum strategies in equity indices have struggled over the past decade.
- On the rates side, while momentum strategies in Canadian rates futures have not outperformed all major markets over the past 10 years, they have outperformed in more recent years.
- Therefore, adding Canadian futures to systematic momentum strategies could provide an important edge for investors.

**CHART 1**

**Momentum Strategy in Canadian Benchmark Equity Futures Outperforms Major Markets**



Source: Macro Hive, TMX, Bloomberg



<sup>1</sup> S&P/TSX 60 Index Standard Futures (SXF) known as “PTA Index”, 10-year Government of Canada Bond Futures (CGB) known as “CNA Comdty” and 5-year Government of Canada Bond Futures (CGF) known as “XQA Comdty” on Bloomberg.

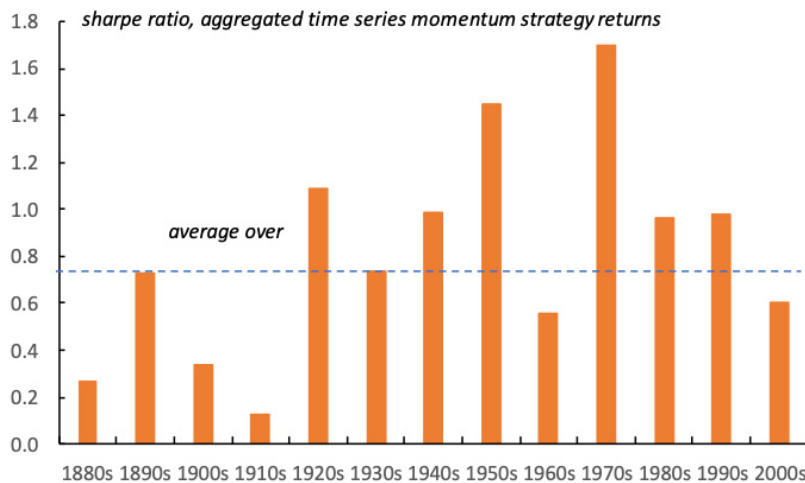
## Some History

Momentum or trend-following strategies are some of the most common types of trading models used by investors. In their simplest form, such strategies involve investors buying into markets when they are going up and selling when they are going down. The popularity of momentum strategies picked up from the late 1970s as more financial futures contracts became available on exchanges around the world. Commodity trading advisors (CTAs) started to employ managed futures strategies, often momentum in nature, in commodities and increasingly in other markets such as FX, rates and equities.

Yet, the idea of trading momentum is not new. It was alluded to several centuries ago by the economist David Ricardo (1772-1823) when he suggested to “cut short your losses, and let your profits run on.” Early on, academics were sceptical of such models because they violated the efficient markets hypothesis, which states that past prices should contain no information beyond current prices. However, with the persistent profitability of momentum strategies over the 1970s and 1980s, academics have since developed theories to justify those returns. These range from behavioural biases such as investor herding to limits to arbitrage, and to the presence of sizeable non-profit-seeking players such as corporate hedgers or central banks.<sup>2</sup>

There is now extensive literature on the profitability of momentum strategies from academics as well as financial institutions. One study that aggregated the strategies across asset classes and tested them over a century found that every decade saw positive returns, whether the decade featured depressions, wars or bouts of inflation (Chart 2).<sup>3</sup> Therefore, the evidence certainly suggests including some form of momentum strategy in a portfolio.

### CHART 2 Momentum Returns Over the Past 100 Years



Source: Macro Hive, AQR



## The Nuts and Bolts of Momentum Strategies

While momentum or trend-following strategies can take many forms, there are broadly two types:

1. **Time series-based:** these are signals based on the history of the target market. For example, if you are trading Canadian 10y bond futures (CGB), you would compare the latest or recent CGB prices to the longer price history to generate a signal.
2. **Cross-sectional based:** these signals are based on comparing the returns of the target market with other markets.<sup>4</sup> For example, in this case, you would compare (say) three-month returns in CGB prices with the three-month returns in U.S. Treasury, Bund, Gilt and JGB futures. Their ranking would then determine the signal.

<sup>2</sup> Hafeez, “Benchmarking Currencies” (2007); Hurst et al., “A Century of Evidence on Trend-Following Investing” (2014).

<sup>3</sup> Hurst et al. (2014).

<sup>4</sup> See Hafeez (2007); Menkoff et al. “Currency Momentum Strategies” (2012).

Given that this paper focuses on a narrower set of rates and equity futures, it makes the most sense to use a time series-based strategy. These are the two most common forms:

- a) **A lookback window:** the percentage change in the futures over a recent period or window – for example, the past month or the past three months. Then, if the return is positive, you buy the futures; if it is negative, you sell.
- b) **Moving averages:** the average of the futures over a recent period – for example, the past month –, which can be compared with current futures prices. If the price is above the average, you buy the futures; otherwise, you sell.

Momentum strategies can also have different holding periods. For example, if you have a one-week holding period, you would generate the signal once a week and hold the position until the following week's signal. We opt to use the lookback window strategy, which both investors and academics commonly use. We look at one-, three- and 12-month lookback windows to capture short-, medium- and long-term trends, respectively. For holding periods, we stick with a one-week period.

For the calculation of investment returns, we focus on Sharpe ratios, where we annualise excess returns and divide by the volatility of returns. This allows us to compare easily across different markets. We also focus on simple, rather than compound, returns to reduce the sensitivity to starting points.

## Example of this strategy at work

Sticking with Canadian 10y bond futures, we can formulate a long-term momentum strategy using a 12-month lookback window. To do this, we first need to create a continuous history of futures prices that adjusts for the jumps or declines in prices on roll days. We do this by proportionally adjusting prices of old and new contracts on roll days.<sup>5</sup>

We then calculate the weekly returns of the futures and subtract the funding cost for the position. For the sake of simplicity, we use short-term interbank or repo rates,<sup>6</sup> though in reality the yields would vary depending on the investor. Posting margin would also impact returns, though for simplicity we exclude that. The resulting return is the weekly excess return of holding the futures contract.

Since we are using a 12-month lookback window, we sum (or more precisely compound) the past 52 weeks of excess returns to determine the "trend." If the number is positive – that is, if CGB prices moved higher relative to cash – then it would generate a "buy" signal. If the number is negative, then it would generate a "sell" signal. We would repeat this exercise every week, generate the signals and then calculate the strategy's returns.

We could add more variations to this strategy. For example, we could incorporate volatility, so our position sizes are larger when volatility is lower. Or we could only generate a signal when the 12-month changes are very large or very small. But for the purpose of minimising datamining, we opt for a simpler approach of keeping position sizes the same and having two signals of buy and sell (not neutral).

# How Do Momentum Strategies in Canadian Futures Perform?

There has been extensive research on momentum strategies for U.S. futures but less on those for Canadian futures. The studies that do include Canadian futures tend to include Canada as part of a much larger cross-market dataset. Nevertheless, these general studies have found that momentum strategies in Canadian 10y bond futures and Canadian S&P/TSX 60 futures do deliver positive returns. Two studies that look at data stretching from the 1980s until 2010 find that the Sharpe ratios of momentum strategies in either Canadian 10y bond futures or equities are between 0.2 and 0.5.<sup>7</sup>

We will look at Canadian futures in more detail. Importantly, we will focus on the post-2008 period, when low rates and QE became dominant and during which quant funds exploiting momentum strategies have grown sharply. The three Canadian futures contracts that we will focus on are the S&P/TSX 60 benchmark equity index and the Canadian 5y and 10y bonds. For all three contracts, we use three lookback windows: one-month, three-month and 12-month.

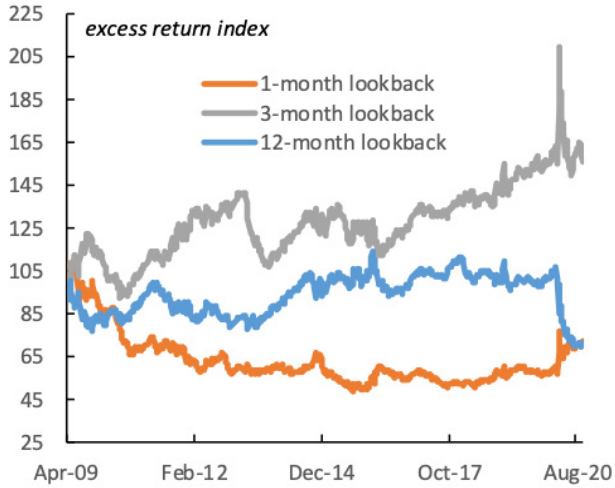
The good news is that at least one of the lookback windows has delivered positive returns over the entire period for each contract. For the S&P/TSX 60 equity futures, the three-month lookback delivers the best return of 5.5% with a Sharpe ratio of 0.4 (Chart 3). The returns have been especially strong since 2016.

5 Masteika et al., "Continuous Futures Data Series for Back Testing and Technical Analysis" (2012).

6 We use the 1m CAD OIS for Canadian futures.

7 Moskowitz et al., "Time Series Momentum" (2011); Baltas et al., "Momentum Strategies in Futures Markets and Trend-Following Funds" (2011).

**CHART 3**  
**Momentum Strategy Returns for S&P/TSX 60 Futures**

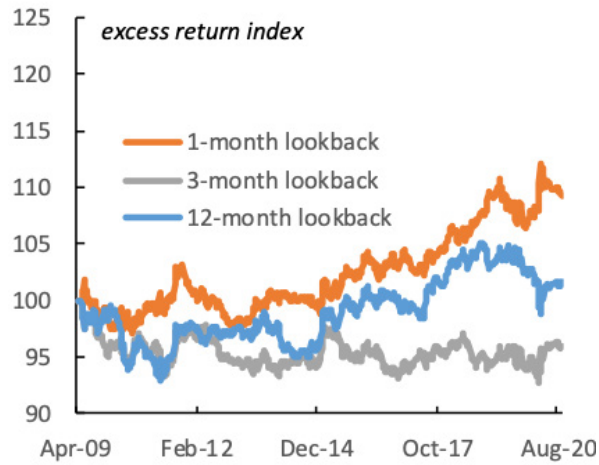


Source: Macro Hive, TMX, Bloomberg



On bond futures, the Canada 5y bond has its best return using the one-month lookback, which delivers an annual return of 1% with a Sharpe ratio of 0.3 (Chart 4). The returns have been steadily rising since 2013. Finally, for the Canada 10y bond futures, the 12-month lookback delivers the best annual return of 1.7% with a Sharpe ratio of 0.3 (Chart 5). Unlike the other contracts, recent years' performance has been more volatile.

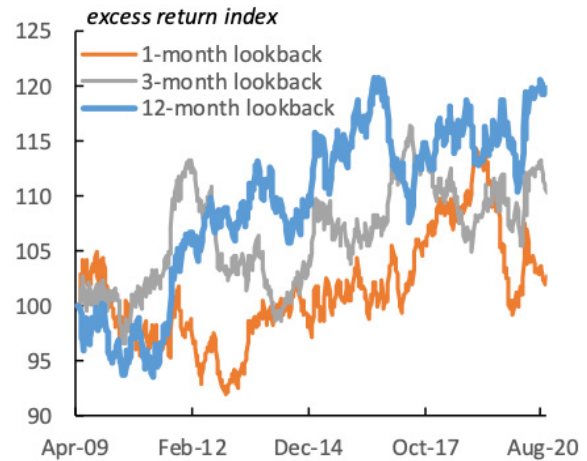
**CHART 4**  
**Momentum Strategy Returns for Canadian 5y Bond Futures**



Source: Macro Hive, TMX, Bloomberg



**CHART 5**  
**Momentum Strategy Returns for Canadian 10y Bond Futures**



Source: Macro Hive, TMX, Bloomberg



# How Do the Strategies Work in Different Macro Regimes?

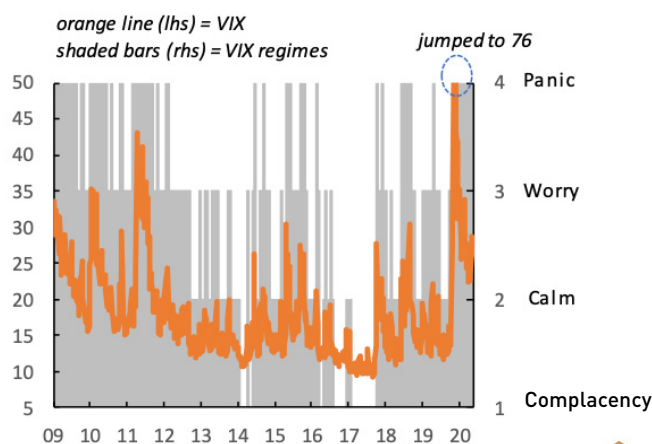
One of the critical questions for any momentum strategy is how it performs in different regimes. We focus on two – investor moods as proxied by VIX and Chinese growth phases.

For VIX, we use percentile analysis to break VIX regimes into four phases of investor moods (Chart 6):

1. **Panic**, when the VIX values are in the 75th percentile or higher.
2. **Worry**, when the VIX values are above average but not in risk aversion (50th to 75th percentile).
3. **Calm**, when the VIX values are below average but not extremely low (25th to 50th percentiles).
4. **Complacent**, when the VIX values are below the 25th percentile.

We would expect both rates and equity markets to behave differently when investors are, for example, panicking compared to being complacent. The question is whether the momentum strategy also behaves differently. Using the best rules for each of the three Canadian futures, we can see how the strategies perform in the four VIX regimes.

## CHART 6 Investor Moods Based on VIX Regimes



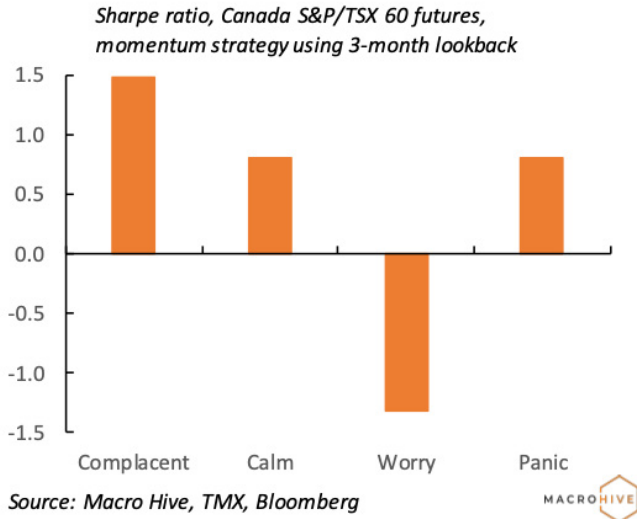
Source: Macro Hive, Bloomberg

We start with equities and the momentum strategy for S&P/TSX 60 futures. The best regime, as we would expect, is the “complacent” phase; that is, when VIX is low. The momentum strategy delivers an impressive Sharpe ratio of 1.5 (Chart 7). The “calm” phase is also positive, with a Sharpe ratio of 0.8. Meanwhile, the “worry” phase shows negative returns. But the “panic” phase, which is the highest VIX regime, delivers positive returns again.

This suggests that the strategy often flips the position to short when VIX is high and therefore delivers positive returns compared to long-only positions. To test the robustness of this finding further, we can examine other lookback windows to see if they still deliver positive returns in the “panic” phase. Unfortunately, they do not, which suggests that the momentum strategy may be less reliable in “panic” phases.

**CHART 7**

**How the Momentum Strategy in S&P/TSX 60 Futures Behaves in Different VIX Regimes**

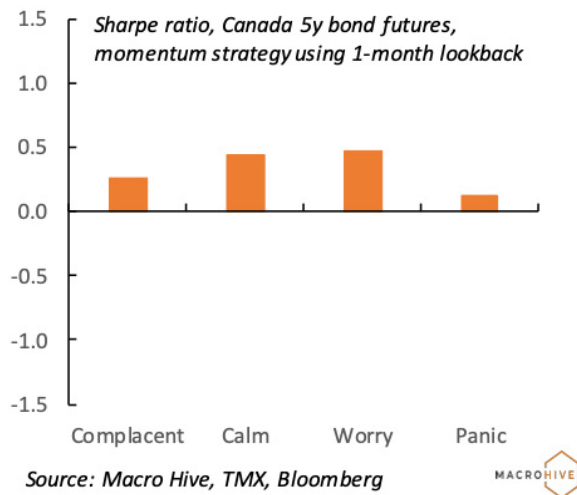


As for bond futures, we find less distinction in the different phases for the Canadian 5y bond. All show positive returns, though the “worry” and “calm” phases show the best returns. The strategy delivers a Sharpe ratio of 0.45 in the “worry” phase (Chart 8). The best environment is when VIX is in the middle of its historic regimes – that is, above or below the average. As for the extremes, the strategy works better in the “complacent” phase than in the “panic” phase.

Finally, the results for Canadian 10y bond futures are almost the mirror image of the S&P/TSX 60 futures returns. The best regime is the “panic” phase, where the strategy delivers an impressive Sharpe ratio of 0.9 (Chart 9). The “worry” phase also has a high Sharpe ratio of 0.7. However, the “calm” phase shows negative returns. The “complacent” phase sees positive but lower returns. This suggests that the 10y bond futures strategy tends to do better when the world is looking scarier. When we use the other lookback windows, we find a similar pattern, where the higher VIX regime tends to work best.

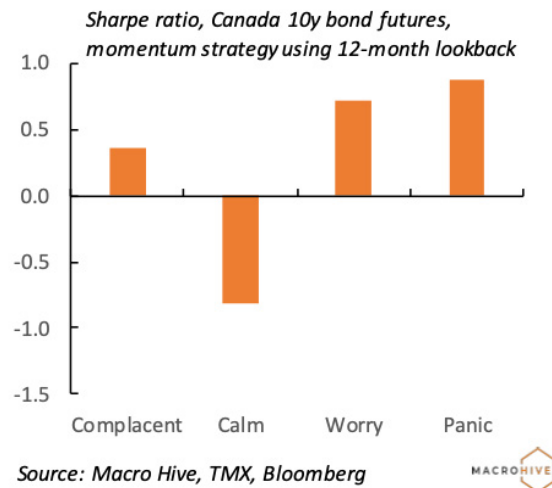
**CHART 8**

**How the Momentum Strategy in CAD 5yr Bond Futures Behaves in Different VIX Regimes**



**CHART 9**

**How the Momentum Strategy in CAD 10yr Bond Futures Behaves in Different VIX Regimes**



For the China growth regimes, we use the Macro Hive China Growth Tracker rather than official Chinese economic data.<sup>8</sup> The Tracker, which comprises various market measures ranging from iron ore prices to Chinese bond yields, tends to show a clearer growth cycle and reflects market sentiment towards China better than most Chinese datasets (Chart 10).

As with VIX, we define four regimes:

1. **Boom** – Chinese growth that is above average and rising.
2. **Slowdown** – Chinese growth is above average but falling.
3. **Recession** – Chinese growth is below average and falling.
4. **Recovery** – Chinese growth is below average but rising.

This should capture the stages of recovery and slowdowns well.

### CHART 10 Macro Hive China Growth Tracker

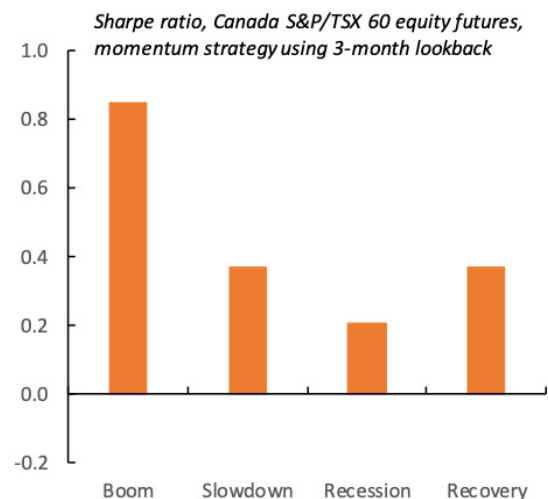


Source: Macro Hive



Starting with the momentum strategy for the S&P/TSX 60 equity futures, unsurprisingly we find the best regime is the boom phase. The Sharpe ratio in that regime is as high as 0.9 (Chart 11). The other phases are lower and show less difference across each. The Sharp ratios range between 0.2 and 0.4.

### CHART 11 How the Momentum Strategy in S&P/TSX 60 Futures Behaves in Different China Regimes



Source: Macro Hive, TMX, Bloomberg



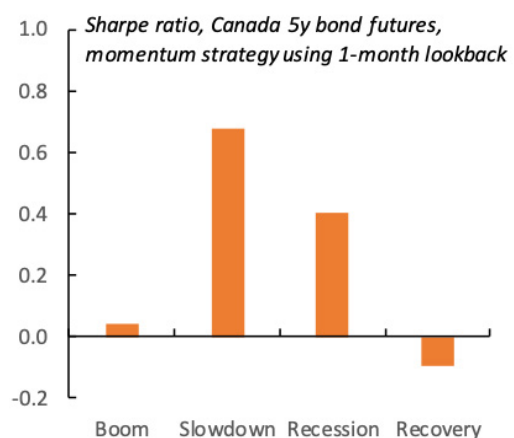
<sup>8</sup> Hafeez, "Using Iron Ore to Track China Growth" (2020).

As for the bond futures, we find that the strategy performs best during the “slowdown” and “recession” phases for the Canadian 5y bond. The Sharpe ratios are 0.8 and 0.4, respectively (Chart 12). During the more upbeat phases of “recovery” and “boom,” the returns are close to flat.

For the Canadian 10y bond futures, we find the best regime by far is when Chinese growth is in recession. In that phase, the Sharpe ratio is close to 1 (Chart 13). The returns are small positive in the slowdown and recovery regimes, but they are negative in the boom phase.

Overall, this analysis suggests that momentum strategies in both Canadian equity and bond futures can deliver Sharpe ratios of over 1 given certain VIX or Chinese growth regimes. This suggests potential to improve returns by varying exposure to the strategies as market regimes shift.

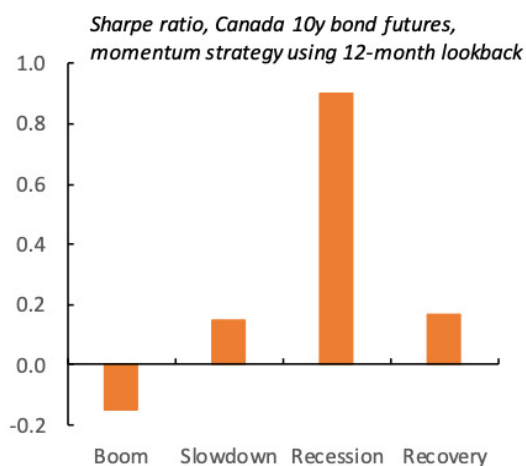
**CHART 12**  
**How the Momentum Strategy in CAD 5y Bond Futures Behave in Different China Regimes**



Source: Macro Hive, TMX, Bloomberg



**CHART 13**  
**How the Momentum Strategy in CAD 10y Bond Futures Behave in Different China Regimes**



Source: Macro Hive, TMX, Bloomberg



## Comparing With Other Markets

We have already shown solid to impressive investment returns from employing momentum strategies in Canadian futures. The next step is to compare the returns with similar strategies in other countries’ futures markets. Therefore, we use the same approach as above to determine which lookback windows deliver the best returns for U.S., German, UK and Japanese equity and rates futures markets. We can then compare these returns with the strategies applied to Canadian futures.

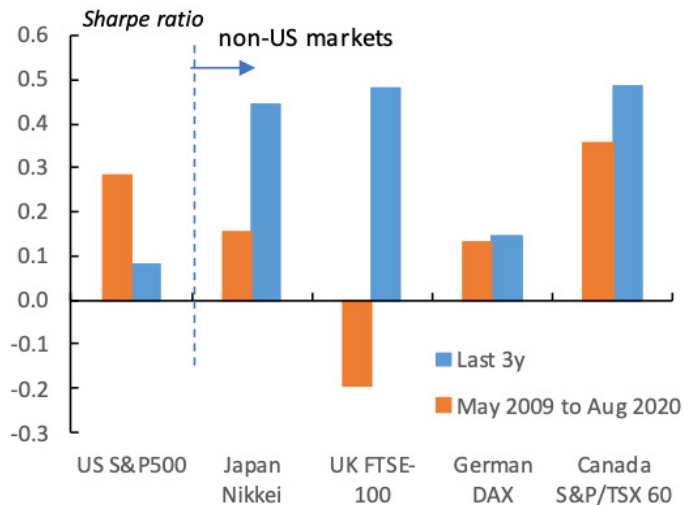
For equities, we find the best window for U.S. S&P futures contracts is 12 months; for German DAX futures, it is three months; while for Japan’s Nikkei and the UK’s FTSE contracts, it is one month. As for investment returns, we find the best Sharpe ratio is for the S&P 500, at 0.3, followed by the Nikkei (0.2), DAX (0.1) and FTSE (-0.2). The returns are therefore not high, and this shows how momentum has worked poorly for equity indices over the past 10 years. The good news is that the Canadian S&P/TSX 60 contract outperforms all of these markets with a Sharpe ratio of around 0.4 (Chart 14).

Looking at more recent performance, we find the S&P/TSX 60 returns improve, and the Sharpe ratio goes up to 0.5. They also improve for the Nikkei and FTSE, but they deteriorate for the S&P 500 and remain unchanged for DAX.



**CHART 14**

**Momentum Strategy Returns Across Equity Index Futures**



Source: Macro Hive, TMX, Bloomberg



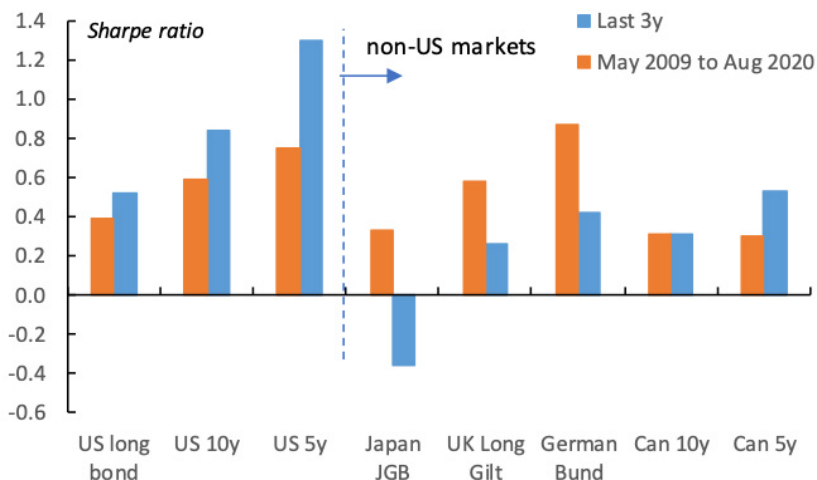
For rates, we find for most of the contracts that the 12-month lookback window works best. The exception is for the U.S. long bond contract, where the three-month window works best. As for the investment returns for the other markets, we find the best Sharpe ratios are for Bunds (0.9) and the U.S. 5yr (0.7), followed by the U.S. 10yr and long Gilt (both 0.6), the U.S. long bond (0.4) and JGBs (+0.3). For comparison, both Canadian rates futures had Sharpe ratios of 0.3.

However, when we look at more recent performance, we find that Canadian futures deliver the best returns after the U.S. contracts (Chart 15). For example, over the past three years, the Sharpe ratio of the Canadian 5y bond futures strategy is 0.5, which is higher than Bunds (0.4), Gilts (0.3) and JGBs (-0.4).

Overall, momentum strategies in Canadian equity futures perform better than in the major equity index futures, while Canadian bond futures have performed relatively well in more recent years, especially when compared with non-U.S. markets.

**CHART 15**

**Momentum Strategy Returns Across Bond Futures**



Source: Macro Hive, TMX, Bloomberg



## Bottom Line

Every investor is on the hunt for an edge. We have found that benchmark Canadian futures, whether in equities or rates, can provide just that. Momentum strategies in the S&P/TSX 60 have delivered better returns than similar strategies in the S&P 500 and other major markets. Meanwhile, strategies in Canadian bond futures have performed well in recent years. Adding a new set of liquid Canadian futures can therefore provide a new frontier of positive returns for investors.



**Bilal Hafeez** is the Founder and CEO of Macro Hive – a leading independent research firm. Prior to Macro Hive, Bilal was Global Head of International Fixed Income Strategy at Nomura, and Head of Multi-Asset Research and Advisor to the CEO at Deutsche Bank. Bilal started his over twenty-year career at J.P. Morgan. Academically, Bilal was an Honorary Visiting Professor of Finance at Cass Business School. He studied Economics at St Johns College, Cambridge.

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