

Research

The pros and cons of daily and monthly index rebalancing

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Executive summary

Is it better for a bond index to be able to change every day, or only every month? This paper discusses the pros and cons of each approach, using examples taken from the FTSE Canada Universe Bond Index, which rebalances daily, and a specially created equivalent series that uses the same methodology, except that it rebalances monthly.

As will be discussed, there are circumstances where one frequency or the other presents itself as a more “natural” choice. These circumstances are determined by the environments and objectives of asset owners, managers and other stakeholders, and range so widely that it could never be said that one choice is in all cases superior.

Introduction

Bond indexes periodically adjust their constituents to bring themselves back in line with the market or sector they are following. This process of “rebalancing” is often done monthly, particularly among indexes tracking a large number of securities across multiple markets. This presents less of a moving target for fund managers, who would otherwise be pressured into regularly adjusting their tracking portfolios; with all the costs and overheads that this entails. The FTSE World Government Bond Index (WGBI) and WorldBIG Index are examples of indexes which rebalance their constituents and their par outstanding amounts at each month-end. The former currently contains over 1,000 bonds from 22 of the world’s major sovereign bond markets, while the latter has more than 12,000 sovereign, corporate and securitized bonds denominated in 14 currencies.

In contrast, an asset-owner or a fund manager invested in a single local market may prefer an index that more closely reflects the prevailing market; so that the bonds in the index, and their outstanding amounts, are updated daily. This is the approach followed by FTSE with both their Actuaries UK Gilt indexes and their Canada Fixed Income indexes. At the beginning of August 2019, the FTSE Canada Federal Non-Agency Bond Index within this series consisted of 38 bonds. At the close of the first business day of the new month a bond maturing on August 1, 2020 dropped out of the index. Three business days later a new two-year bond, issued that day by the Bank of Canada, entered the index. The number of bonds in this daily index, therefore, remained the same as it would for a monthly-rebalanced index, but the two indexes would differ in two of those bonds. The monthly index would not catch up for another 29 days, during which time it would reflect a portfolio significantly out of line with the market it was designed to mirror. As the Bank of Canada often issues bonds on the first of the month, or shortly afterwards, this phenomenon is a common one.¹

In this paper, we compare the current methodology of the FTSE Canada Universe Bond Index to a monthly rebalanced version, maintaining the same criteria and constituent data, from January 1, 2004 to December 31, 2019. In line with the daily index, which would admit a newly issued bond at the close of the day of issue, the monthly index would include bonds issued on the last business

The FTSE Canada Fixed Income Index rebalances daily. We created a monthly-rebalancing version to help illustrate the pros and cons of using each frequency.

¹ Actually, there are some monthly indexes that would exclude the shorter bond at the month-end, to avoid the index ever containing a bond with a maturity below one year. Although this would reduce the discrepancy in this instance, it would have the opposite effect if the market included a high number of bonds maturing towards the end of the month.

day of the preceding month. But the constituents of the monthly index, and their par amounts, would not change between month-end rebalancings. Any cashflows would be accumulated and reinvested at the month-end, unlike the construction of the daily index where realized coupon and redemption income is reinvested daily.

The FTSE Canada Universe includes domestic bonds issued by Canadian corporations and Canadian federal, provincial and municipal governments. We begin by investigating the impact of rebalancing frequency on Government of Canada bonds issued by the Bank of Canada before considering the larger corporate bond sector, thereby encompassing the entire investment grade credit spectrum.

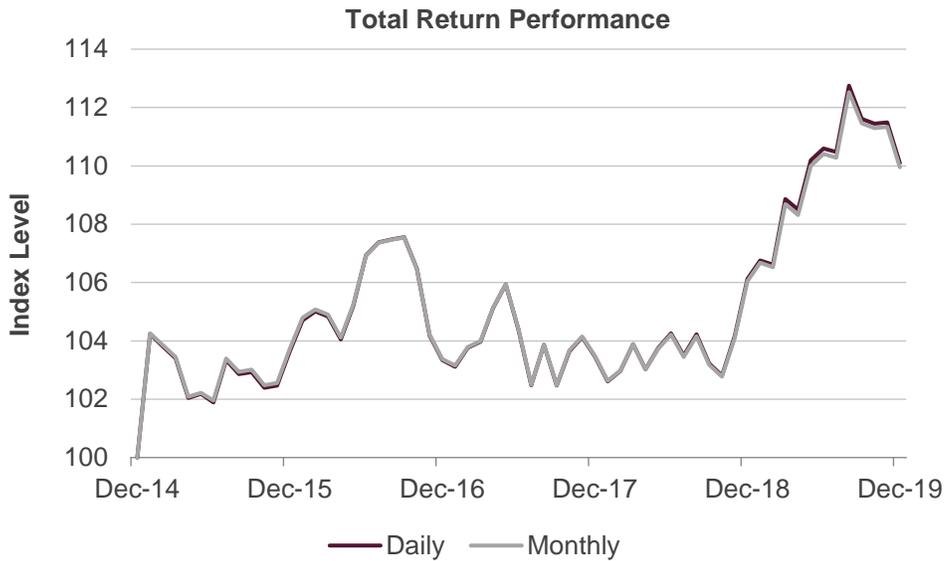
Testing the impact of daily and monthly rebalancing on government bond indexes

Historical performances of the daily and monthly-rebalancing federal non-agency government bond sub-indexes to the end of 2019 can be seen in the charts and table below. Average returns and information ratios are, as one might expect, similar between the two indexes. But the persistently lower duration of the monthly index, over a period where rates have been mainly falling, explains the steady divergence in index levels in favor of the daily index. Over the most recent two years this amounted to eight basis points each year (see Chart 1).

Chart 1: Historical risks and returns

Annualized performance figures

	Last 15 years		Last 10 years		Last 5 years		Last 2 years	
	Monthly	Daily	Monthly	Daily	Monthly	Daily	Monthly	Daily
Average return, %	3.87	4.05	3.25	3.27	1.99	2.02	3.13	3.21
Average duration, yrs	6.54	6.62	6.45	6.53	6.72	6.82	6.56	6.65
Standard deviation, %	3.73	3.75	3.52	3.56	3.81	3.84	3.41	3.47
Information Ratio	1.04	1.08	0.92	0.92	0.52	0.52	0.92	0.93
Tracking Error, %	0.09		0.08		0.07		0.08	



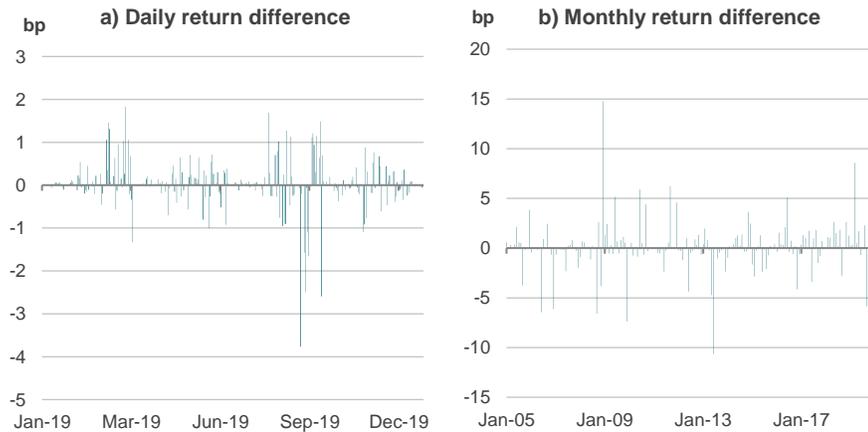
The daily-rebalancing index has regularly outperformed the monthly version in recent years, due to a persistent edge in duration. The time series chart shows five years' worth of history to the end of 2019.

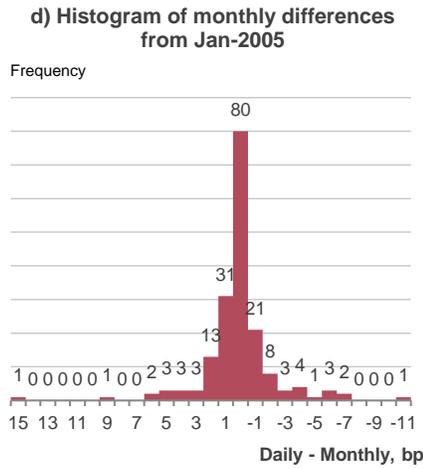
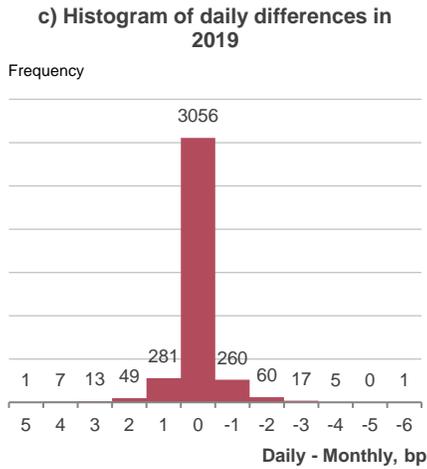
Source: FTSE Russell as of December 31, 2019. Index levels rebased to 100 at December 31, 2014. Past performance is no guarantee of future results. Please see the end for important legal disclosures.

Over the same period the annualized tracking error between the two indexes has been about eight basis points, based on monthly returns. However, the bar chart of daily return differences, in Chart 2a, shows that the distribution of differences has long tails. Half the business days in September 2019 show a return difference between the two indexes of greater than a basis point, for example.

The chart of monthly return differences over the past 15 years, shown in Chart 2b, and the histograms of daily and monthly return differences over the same period, in Charts 2c and 2d, also show long tails. These reflect historical moves that were substantial departures from the average.

Chart 2: Daily and monthly return difference distributions





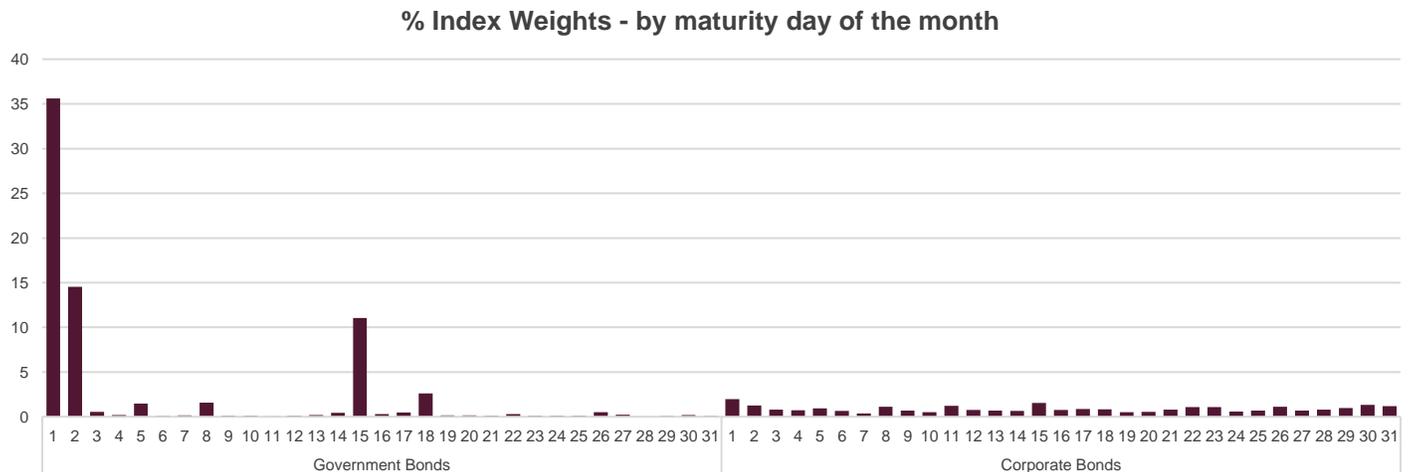
Differences in return between the daily and monthly-rebalancing indexes are usually small, but the distributions have long tails, showing that larger differences are not uncommon.

Source: FTSE Russell as of December 31, 2019. Past performance is no guarantee of future results. Please see the end for important legal disclosures.

Over time the performance differences are not large. But consider the situation at the start of September 2019. Once again, a short bond dropped out of the index at the end of the first day thanks to its maturity falling below one year. By continuing to include the shorter bond the duration of the monthly index was held down. This bond had a weight in the daily index of almost 4.7% and solely as a result of its exclusion, the duration of the daily index rose by more than 0.3 years. In contrast, the duration of the monthly index remained largely unchanged. If a long bond had been issued early in the month the divergence could have been even greater. At such times, a sharp movement in yields could cause an appreciable difference in performance. The Bank of Canada and other government and provincial institutions often issue bonds that mature near the beginning of the month. This can be seen in Chart 3, which shows--as of the end of 2019--the weight of bonds in the FTSE Canada Universe Bond Index maturing on each day of the month. Close to half of current government bonds, by weight, will mature in the first two days of a month. The corporate bond market, in contrast, shows a much more uniform distribution of maturity day.

Almost half the value of outstanding bonds issued by federal, provincial and municipal governments will mature on the first or second of a month.

Chart 3: Weights of bonds maturing on each day of the month



Source: FTSE Russell as of December 31, 2019.

Chart 4 shows that the daily index has often had a longer duration than the monthly index. The duration of the monthly index will be further pulled down by the holding of any coupons as cash until they are reinvested at the end of the month. The resulting effect on performance of the duration difference has already been noted. Should rates start to rise the longer duration could count against the daily index. Assuming a normal, upward-sloping yield curve, however, this effect would be offset to some extent by a greater carry.

Chart 4: Recent modified duration histories of both indexes



Source: FTSE Russell.

Accessing the primary market

A more subtle effect of rebalancing choice should also be considered. It is often cheaper to purchase bonds at issue, rather than later in the secondary market. In the federal government market, the margins are small, nevertheless central banks want their auctions to be successful, so bonds are often keenly priced. Missing out on the primary market could therefore prove expensive, when it comes time to catch up. Of course, a fund manager benchmarked against a monthly index still has the option of buying bonds on their issue date; but that incurs tracking error against their benchmark, which seems scant reward for their forward thinking. For a global manager with a 1,000-bond benchmark, this tracking error would be negligible, but this is not the case for a manager benchmarked against a 39-bond index.

An example of a quarterly issuance calendar published by the Bank of Canada is shown in Table 1. In most months, one or two completely new bonds are issued. Bonds will, of course, retire from the index at a similar rate.

Table 1: Bank of Canada quarterly bond issuance calendar

Auction type	Term type	Auction date	Delivered
Bonds - Nominal	2 Year	2020.01.08	2020.01.10
Bonds - Nominal	10 Year	2020.01.15	2020.01.17
Bonds - Nominal	2 Year	2020.01.23	2020.01.27
Bonds - Nominal	5 Year	2020.01.30	2020.02.03
Bonds - Nominal	3 Year	2020.02.06	2020.02.10
Bonds - Nominal	2 Year	2020.02.12	2020.02.14
Bonds - Nominal	5 Year	2020.02.19	2020.02.21
Bonds - Nominal	3 Year	2020.02.26	2020.02.28
Bonds - Nominal	2 Year	2020.03.11	2020.03.13
Repurchase - Switch	30 Year	2020.03.25	2020.03.27

Source: Bank of Canada, December 2019.

The Bank also conducts market operations, by buying and selling outstanding bonds, for their own economic purposes, although unlike several of their peers the Bank of Canada has not yet followed a program of Quantitative Easing (QE). Following such an index would not place an undue administrative burden on most asset managers working to keep their tracking portfolios up-to-date.

Smaller tracking errors with corporate bonds

We have so far considered the government bond market. What about corporate bonds? As of late 2019, there were just shy of 1,000 corporate bonds in the FTSE Canada Universe Corporate Bond Index. The corresponding charts and tables to those shown above for government bonds are presented below. The much larger number of bonds acts as a smoothing factor, and the historical tracking errors between the daily and monthly indexes are much smaller. However, the persistent edge in average duration of the daily index evident in government bonds remains, albeit to a smaller extent, and once again produces higher returns.

Table 2: Comparing daily and monthly corporate bond indexes

Annualized performance figures, Corporate Bonds

	Last 15 years		Last 10 years		Last 5 years		Last 2 years	
	Monthly	Daily	Monthly	Daily	Monthly	Daily	Monthly	Daily
Average return, %	5.09	5.17	4.86	4.93	3.75	3.82	4.49	4.55
Average duration, yrs	5.70	5.75	5.92	5.97	6.19	6.23	6.30	6.34
Standard deviation, %	3.06	3.08	2.91	2.94	3.07	3.09	2.63	2.65
Information Ratio	1.67	1.68	1.67	1.68	1.22	1.23	1.71	1.72
Tracking Error, %	0.04		0.04		0.03		0.03	

Source: FTSE Russell as of December 31, 2019. Past performance is no guarantee of future results. Please see the end for important legal disclosures.

With the secondary market in corporate bonds being markedly less liquid than that in government bonds, the attractions of the primary market are correspondingly greater. In addition to potentially needing to pay a higher price in the secondary market, the bid-offer spread will typically widen. This spread can be regarded as both a cause and effect of liquidity. In illiquid markets, a trader quotes a wider spread so as to maintain a level of insurance against the market moving too far away from their prices before they know to adjust them. The larger population of bonds means the tracking error arising from this early-purchase approach is small, even with a monthly index.²

Hedging matters: currency and duration

An aspect of monthly indexes, that may make for simpler operations, concerns the hedging out of foreign currency risk. Most hedged indexes eliminate almost all currency risk by using one-month forward contracts, and the value of foreign currency exposure to be hedged is estimated by assuming that the value of the index grows at some prescribed rate. Hedging a daily index in the same way would not always be so effective. New issuance and bond retirements would mean an index hedged in this way would be under or over-hedged most of the time, and therefore subject to an undue degree of currency risk and return. The forward-forward market does exist, whereby a contract starting at a given date can be purchased, and using a combination of such contracts could eliminate much of the risk. Central bank operations, whereby bonds are tapped or repurchased, would still have to be known in advance though for this to be acceptably effective. However, fund managers benchmarked against a daily index will often be investing in their local markets, where currency risk is not a concern.

² In a recent study of the US investment grade corporate bond market Flanagan, Kedia and Zhou have estimated sizeable benefits of between 27 and 265 basis points of return through purchasing bonds in the grey market versus purchasing them in the secondary market 1, 30 and 90 days later. See "Secondary Market Liquidity and Primary Market Allocations in Corporate Bonds"; Flanagan, Kedia, Zhou, September 2019.

Other investors may be interested solely in credit exposure and wish to hedge out duration risk. This can typically involve a complicated process of using government bonds and futures to minimize deviations from a number of key rate durations. To undertake this process when benchmarked against a daily index could well incur a greater overhead than most investors would tolerate.

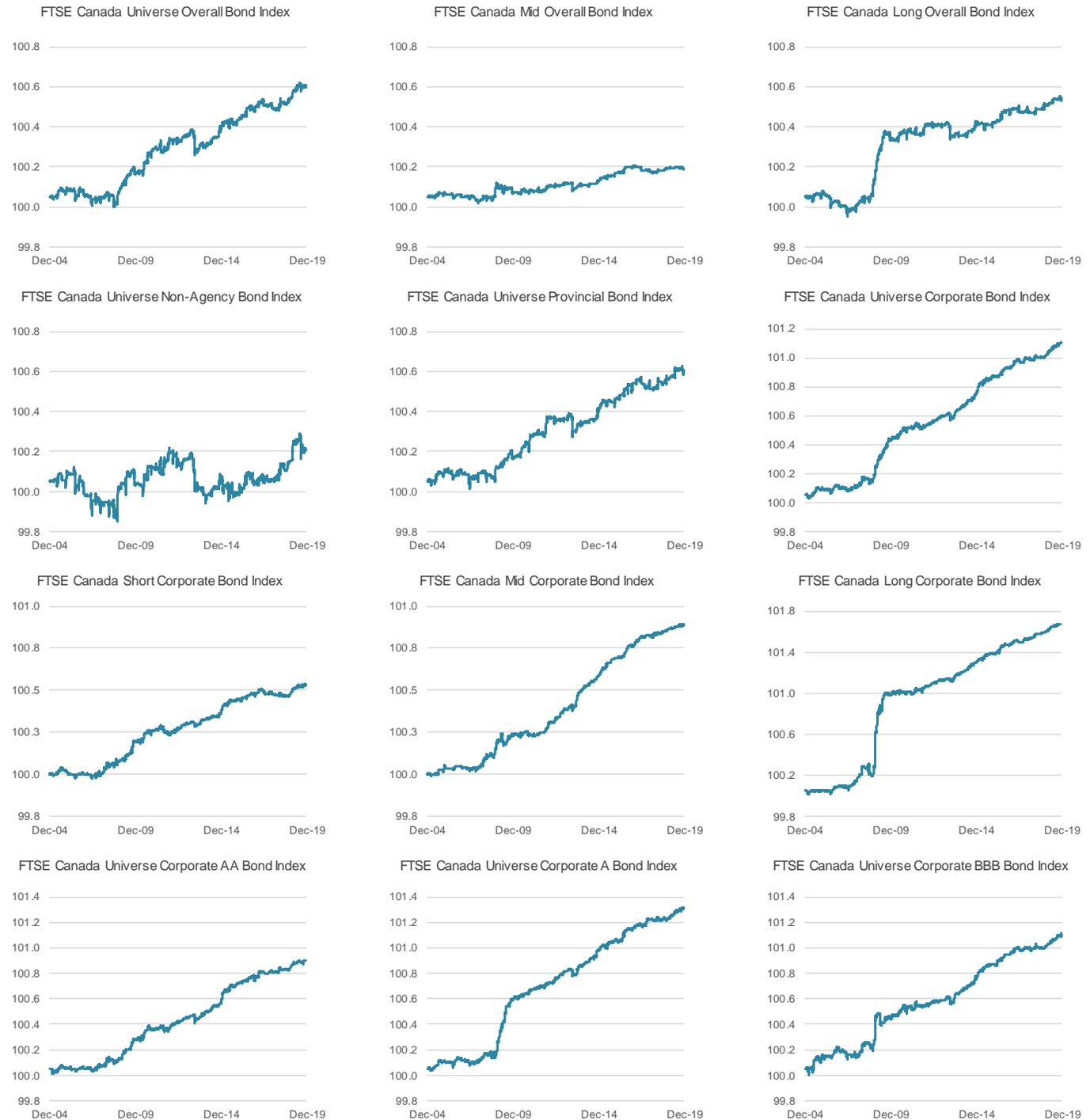
Conclusions

1. It would be too simplistic to conclude that it is better to have indexes rebalancing daily rather than monthly, or indeed vice versa. There are arguments for and against both approaches. The choice will ultimately depend on the circumstances, and objectives, confronting asset owners and fund managers.
2. The tracking error of a monthly index, arising from duration effects through a short bond leaving the index early in the month, will be more pronounced during a period of declining yields (see Appendix).
3. The tracking errors on our monthly FTSE Canadian Universe Corporate Bond Index have been smaller than on our monthly Federal Non-Agency Government Bond Index, due to the much larger population of corporate bonds. However, the ability to access the primary market, particularly for corporate bonds, may be helpful in reducing tracking error further, given evidence of lower liquidity in the secondary market.
4. For investors hedging out currency risk, daily index re-balancing is less helpful, since this is typically achieved using a one-month forward contract. Similar considerations apply to hedging out duration risks for a credit investor, which also make being benchmarked against a daily index more onerous.
5. The sample period for our analysis is the last 15 years, which covers both a higher-yield regime in the lead up to the 2008 crash, and the declining yields during the regime of low nominal GDP growth since then. It also captures substantial shifts in the shape of the yield curve over that period.
6. However, the Bank of Canada did not pursue QE asset purchases during the sample period, so it would be unwise to jump to conclusions regarding the impact of such a program on indexes with different rebalancing frequencies.

Appendix

Relative historical performance of the daily-rebalancing FTSE Canada Universe Bond Index, and the equivalent monthly-rebalancing series across a selection maturity (Short, Mid, Long), issuer classification (Government and Corporate) and rating categories.

Cumulative performance of Daily-rebalanced index relative to the Monthly-rebalanced version



Source: FTSE Russell as of December 31, 2019. Past performance is no guarantee of future results. Please see the end for important legal disclosures.

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