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E-BRIEF

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MONETARY POLICY

Blurred Vision: How Mortgage Interest Costs Impact Inflation

by Steve Ambler and Jeremy Kronick

- Mortgage interest costs can undergo large swings during tightening and/or loosening cycles by the Bank of Canada. Although they have a weight of only around 5 percent in the Canadian Consumer Price Index (CPI), they can significantly affect movements in the latter as a result of these large swings.
- The year-over-year rate of mortgage interest-cost inflation increased rapidly when the Bank of Canada began to raise its overnight rate target in 2022 and peaked at about 31 percent in August 2023, contributing almost one percentage point to measured (headline) inflation.
- Once a swing occurs, its effects tend to linger in the CPI because many mortgages lock in interest rates for up to five years. As a result, year-over-year mortgage interest cost inflation pivots quite slowly, dampening swings in headline inflation and obscuring its turning points.
- While we do not suggest removing mortgage interest costs from the CPI – since they are part of household consumption – we show that stripping them out can give a better indication of where headline inflation is headed in periods when the Bank of Canada's overnight rate goes through large swings. This measure could be one tool among many that the Bank uses in its assessment of the path for future inflation.

Introduction

In this E-Brief, we examine the role of the mortgage interest cost (MIC) component of the consumer price index (CPI) in influencing the overall dynamics of the CPI, particularly in response to large swings in the Bank of Canada's overnight interest rate target.

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As part of generating the CPI, Statistics Canada must consider how to factor in the cost of owning a home. Part of its approach is to create a MIC index that takes into account both house prices themselves as well as mortgage interest rates.[1] The target overnight rate has a direct and almost immediate effect on the latter. A substantial fraction – though not the majority – of all mortgages in Canada are variable-rate, which means that when the Bank of Canada increases or decreases the overnight rate, the MIC changes immediately. There is a lagged effect on fixed-rate mortgages (which are the majority) as they gradually come up for renewal. The impact on mortgage interest costs is then transmitted to the MIC component of the CPI, increasing measured inflation when interest rates increase and decreasing it when they decrease.

The house-price effect typically offsets some of the mortgage interest rate component since interest rate increases tend to dampen house prices and decreases tend to bolster them. However, the house price effect occurs with a lag because the amortization on homes is usually 25 or 30 years, and so the mortgage interest rate component often dominates.

Because the mortgage interest rate component plays an outsized role, the net effect of the MIC is to depress CPI (headline) inflation during and after monetary policy easing cycles, like the one at the beginning of the pandemic, and to boost it when the Bank of Canada is engaged in a tightening cycle (as it was between March 2022 and July 2023) or when the Bank's policy rate remains high after a tightening cycle.

The year-over-year rate of mortgage interest cost inflation was still 10.2 percent in January 2025 (the last number available at the time of writing). This is adding about 0.5 percentage points to headline inflation. Stripping out the MIC component, inflation has been at or below the Bank's 2 percent target since the beginning of 2024 (except for May 2024 when it was 2.1 percent).

While mortgage interest costs are a component of consumers' consumption baskets and should be included in the overall CPI, we argue that stripping them out of headline inflation would give a better idea in some circumstances of where inflation is headed in the medium term, in particular following big swings in the Bank of Canada's policy rate.[2] We base this conclusion on an empirical analysis that looks at several possible measures of inflation and analyzes their predictive capacity for the evolution of headline inflation when the Bank of Canada is engaged in a tightening or an easing cycle.

The Dynamic Effects of Changing Monetary Policy on Mortgage Interest Costs and Inflation

The dynamic impact of a major change in the central bank's policy rate on MIC inflation depends on a number of different factors, including (but not limited to):

- the percentage of mortgages which are variable-rate;
- the rate of renewal of fixed-rate mortgages;

1 For a complete discussion on owned accommodation in the Canadian CPI, see Lehto (2023). Statistics Canada uses a "variant of the user-cost approach, measuring changes in the cost of using a fixed stock of dwellings." Sabourin and Tarkhani (2024) analyze different possible methods for calculating owner accommodation and determine that the current approach remains optimal.

2 Without wide swings in the policy rate, inflation net of MIC does not diverge much from overall inflation.

- the average maturity of fixed-rate mortgages;
- the rate of turnover in the housing market;
- the impact of the policy rate on house prices;
- the average size of new mortgages compared to house prices, and the mix between fixed and variable rates for these new mortgages; and
- the spillover effect of house prices and mortgage rates onto other markets, notably the market for rental accommodation.

We describe for the interested reader how some of these factors interact in online Appendix A. Modelling them all would take a complex general equilibrium model. Our approach in this E-Brief is instead to analyze the out-of-sample forecasting quality of different measures of inflation. These include: the Bank of Canada's two preferred measures of core inflation; a formerly preferred core measure (CPIX), which excludes eight of the most volatile components of the CPI including mortgage interest costs; and a method that strips out MIC inflation alone. We use core inflation measures since they are designed to better get at the underlying inflationary trend (we discuss further below). The goal is to see whether and under what circumstances stripping out MIC inflation can lead to improved forecasts of future inflation compared to core inflation measures.

What Do the Data Say?

Figure 1 below shows the evolution of headline inflation, the Bank of Canada's target overnight rate (its policy rate), MIC inflation, and inflation after stripping out MIC inflation (ex-MIC) since 2019, before the pandemic led to a sharp recession and the rapid reduction of the policy rate from 1.75 percent to its effective lower bound (25 basis points) in March 2020 (see online Appendix B for the data used). The figure includes data up to January 2025.

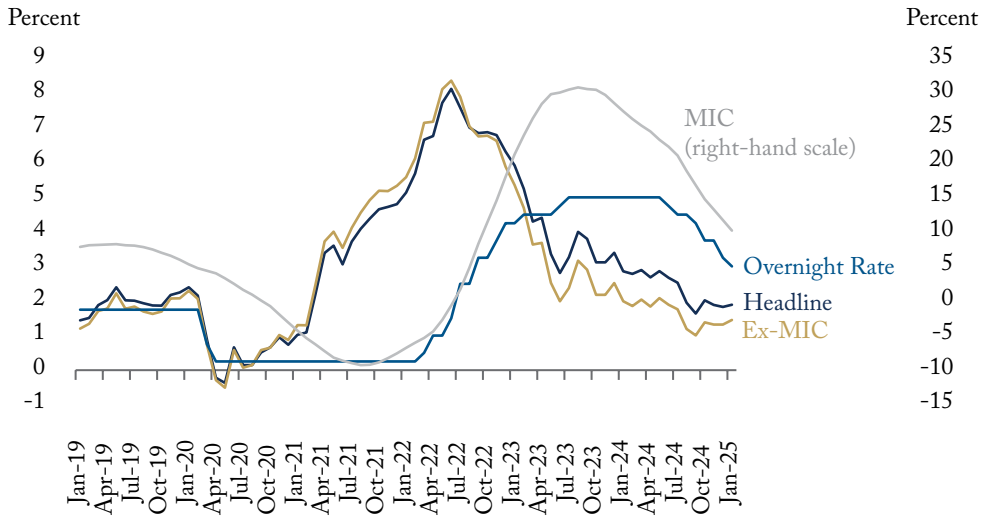
The figure shows that the dynamic relationships among the variables are complicated. MIC inflation which has been rescaled to fit on the graph – see the right-hand scale in Figure 1 – is fairly directly linked to the policy rate. It remained above the rate of headline inflation throughout 2019 and into the start of the pandemic. It began decreasing sharply starting in March 2020 as the policy rate hit its lower bound. It dropped below the rate of headline inflation in September 2020 and turned negative the month after. It remained negative during the entire period when the policy rate was at the lower bound. When the policy rate started rising in March 2022, so did MIC inflation. The latter turned positive in July 2022 when the policy rate was 2.5 percent, overtook headline inflation two months later (8.3 percent vs. 6.9 percent) and continued rising rapidly along with the policy rate. MIC inflation peaked at 30.9 percent in August 2023, one month after the policy rate hit its peak of 5.0 percent.

While MIC inflation has fallen off its peak, it has remained persistently high since then and still stood at 10.2 percent in January 2025 (the latest available data point at the time of writing), despite headline inflation decreasing from its peak of 8.1 percent in June 2022 (with MIC inflation equal to -0.6 percent) to 1.9 percent in January 2025.

Clearly, MIC inflation held down CPI inflation from September 2020 until inflation peaked in the middle of 2022.[3] Stripping out the MIC component from headline inflation, we can calculate by how much – between April 2021 and May 2022, the difference between headline inflation and ex-MIC inflation was at least 34 basis points.

3 Macklem (2024) discusses some of the reasons why the Bank of Canada was late to react to the spike in inflation in 2021–2022 but does not mention the depressing effects of MIC inflation on headline inflation.

Figure 1: Headline, MIC and ex-MIC Inflation with the Overnight Rate



Sources: Bank of Canada, Statistics Canada and authors' calculations.

Both headline inflation and ex-MIC inflation moved above the Bank of Canada's target range of 1–3 percent around the 2 percent target in April 2021, but the jump in inflation without the MIC component was more notable – to a little over 3.7 percent versus 3.4 percent. And when the Bank finally lifted the policy rate off its lower bound in March 2022, when headline inflation was already 6.7 percent, it was almost 7.2 percent without MIC inflation.

Inflation ex-MIC provided an even stronger indicator of the need for a hike in the policy rate before the Bank started its tightening cycle. Today, we see the mirror effect on the other side of the inflation hill. CPI inflation ex-MIC dropped temporarily below the inflation target (2 percent) in June 2023 before the policy rate peaked, increased again to 3.2 percent in August 2023 but has been below or barely above target since the beginning of 2024, suggesting that the easing cycle was perhaps late to get going (it started in June 2024) and behind where it needs to be today. This conclusion is supported by the last few months' worth of inflation data that has CPI inflation ex-MIC at or below 1.5 percent.

When is CPI Inflation ex-MIC a Useful Tool to Help Forecast Future Headline Inflation?

As we have just shown, it is important to understand what the data tell us inflation is without MIC because while the overnight rate and headline inflation typically move in opposite directions, the MIC component of inflation goes in the same direction as the overnight rate. This positive co-movement makes it difficult to assess the true impact of monetary policy. While not part of our recommendations, we note that since 2017 Sweden's central

bank has "explicitly targeted the consumer price index excluding the impact of mortgage interest costs, so that the conduct of monetary policy does not directly affect the measure of targeted inflation" (Arseneau and Ducharme 2024).

Nevertheless, what matters for the Bank is where inflation is headed six to eight quarters ahead, so the follow-up question is whether there is anything to be learned about future inflation by looking at inflation ex-MIC.

The Bank of Canada's inflation target of 2 percent is with respect to total (or headline) inflation, measured by the year-over-year change in the CPI. However, because the goods and services making up the total CPI are often subject to transitory changes, the Bank also analyzes different "core" measures that get at the underlying inflationary trend. What this implies is that there are two components of total inflation: the core portion or underlying trend, driven by demand pressures against the economy's potential, and the non-core portion, which is driven by temporary/transitory shocks or relative price changes.

The Bank has experimented with different "core" measures over the years, from CPI excluding food and energy to CPIX, which excludes eight of the most volatile components of the CPI including mortgage interest costs (and adjusts the remaining components for the effect of changes in indirect taxes) and then, more recently, to CPI-Trim and CPI-Median. The CPI-Trim excludes CPI components whose rates of change in a given month are in the tails of the distribution of price changes, while the CPI-Median corresponds to the price change of the CPI basket weights at the 50th percentile of the distribution of price changes in a given month.

The Bank's preferred core measures today are these last two, CPI-Trim and CPI-Median. However, both of these measures include mortgage interest costs in their calculation, the subject of our concern. And while CPIX does exclude mortgage interest costs, it excludes others as well, so we cannot isolate the impact of mortgage interest costs. Therefore, in this E-Brief, we also look at a measure of the CPI excluding only the MIC.[4] We aren't looking to replace CPI-Trim and CPI-Median with our measure. We are looking to understand whether there are episodes where such a measure might provide useful signals as to the challenge more standard core measures might have in anticipating future inflation.

To do that, we first see whether CPI ex-MIC has some of the statistical properties that make CPI-Trim, Median and CPIX good measures of the underlying trend of inflation. We then perform tests to see how it does in predicting future headline inflation compared to the other core measures.[5]

Statistical Properties of CPI ex-MIC

For how well CPI ex-MIC does as a measure of the underlying trend of inflation, we first ask whether it tracks total inflation over the long run, i.e., is it unbiased? One would expect any measure of the underlying trend to track actual inflation pretty closely over a longer period. Using our two-component definition of inflation above, we can think of total inflation as the sum of some version of core inflation and a residual representing temporary shocks.[6]

4 Our measure is CPI ex-MIC, using headline inflation. Future research could look to generate CPI-Trim and Median without the mortgage interest cost component. The complexity of generating this measure is beyond the scope of this E-Brief. We also note that there will be months when the MIC will fall in the tails of CPI-Trim and be removed in any case.

5 We follow the methodology in papers by Laflèche and Armour (2006), McCracken and Ngan (2023) and Khan et al. (2015).

6 This can be written as $\pi_t = \pi_t^C + e_t$

An unbiased measure of the underlying trend in inflation would mean that the value of the shocks is zero *on average*. We test this property by looking at the average differences between year-over-year total inflation and inflation ex-MIC from January 1992 to October 2024. We find that the average of the shocks in absolute terms is less than one-tenth of a percentage point for CPI ex-MIC, as it is for both CPI-Trim and CPI-Median, with CPIX right at one-tenth (see Table 1, which starts in January 1993 for Trim, Median, and CPIX due to data availability). This is sufficiently close to zero to label each measure as unbiased.

Next, we evaluate volatility. One would expect measures of inflation's underlying trend to be less volatile than total inflation – indeed, by construction, some of the measures are designed to do just that. We measure volatility by the standard deviation of respective year-over-year inflation rates, comparing these measures to total inflation as in Khan et al. 2015. We note that CPI ex-MIC is only available on a non-seasonally adjusted basis, so we compare it to non-seasonally adjusted total CPI. Seasonally adjusted CPI-Trim, CPI-Median, and CPIX are available, so we compare them to seasonally adjusted total CPI. Concerns on the comparisons being between non-seasonally adjusted and seasonally adjusted are moot as we are looking at year-over-year measures.

There is not much improvement in volatility from the exclusion of the MIC, whereas there is a notable decline with CPI-Trim, CPI-Median, and CPIX, as expected (See Tables 2 and 3).

The last statistical property one would test for a measure of inflation's underlying trend would be persistence. As discussed, we want to remove transitory shocks from inflation, meaning our measure would then have a high degree of persistence.[7] By definition,

Table 1: Measures of Bias

	Observations	Mean (percentage points)
CPI ex-MIC	394	-0.06
CPI-Trim	382	0.09
CPI-Median	382	0.05
CPIX	382	0.10

Table 2: Volatility: CPI ex-MIC

	Observations	Standard Deviation (percentage points)
CPI (non-seasonally adjusted)	394	1.304
CPI ex-MIC	394	1.301

Table 3: Volatility: CPI-Trim/CPI-Median/CPIX

	Observations	Standard Deviation (percentage points)
CPI (seasonally adjusted)	382	1.321
CPI-Trim	394	0.847
CPI-Median	394	0.756
CPIX	394	0.874

7 Khan et al. (2015) measure persistence by regressing quarter-on-quarter core inflation measures on five lags of themselves and then adding up the coefficients.

because the MIC is a procyclical policy-driven component of inflation, it is highly persistent and, arithmetically, removing it will lower its persistence. However, here, we are arguing that measures of inflation that include a component with *too* much persistence can also distort inflation's true underlying trend.

The fact that CPI ex-MIC is unbiased and removes an overly persistent component, but does not improve volatility, reinforces our point above that this measure is not meant to replace the Bank's preferred core measures but does have interesting enough statistical properties to see how it does as a tool to help anticipate the path of future headline inflation, which we turn to next. In other words, are there any episodes we can identify in which CPI ex-MIC's ability to help predict future total inflation improves over other core measures? If there are, then we would argue that policy-driven, overly persistent components of CPI can be problematic under certain circumstances.[8]

Results: CPI ex-MIC as Predictor of Future Inflation

We examine different approaches to assessing the effectiveness of these measures in forecasting future inflation and what we can glean about specific episodes.

First, from Lafleche and Armour (2006):

> If core inflation represents the underlying trend of inflation, it should contain more information about the future trend of inflation than total inflation itself. Moreover, it is expected that divergences between total inflation and core inflation will be temporary, i.e., total inflation may diverge from core inflation in the short run but comes back to it in the long run. (Page 26.)

What this means is that, for example, if total CPI inflation is below core inflation, and the former is then hit with a temporary shock, over the horizon of interest, e.g., 12 months, it is expected to reverse. If it fully reverses, we can think of this result as matching our unbiased predictor of total inflation story above.[9]

8 We acknowledge the Rowe and Yetman (2002) argument that if the central bank is successful as an inflation targeter, it is taking all variables into consideration when setting the policy rate and, therefore, no variables other than the target itself should help predict future inflation. This would be true at the horizon for the central bank's policy to lead inflation to converge to its target. The Bank of Canada considers this horizon to be six-to-eight quarters. As a result, if core inflation is a good predictor of future inflation at this horizon or beyond, then the former is not being optimally incorporated into the central bank's policy decisions with respect to hitting its announced target. This would apply both to CPI-Trim, CPI-Median and CPIX, as well as our CPI ex-MIC. However, we note that we ran a regression of inflation deviations from target today on inflation deviations from the ex-MIC measure 18 months ago and find weak correlation. This is indicative of some possibility of the MIC helping to mislead the Bank of Canada as to the direction of future inflation.

9 We estimate the following two equations for $h = 12$:

$$(\pi_{t+h} - \pi_t) = \alpha + \beta(\pi_t^{Core} - \pi_t) + e_t, \text{ and}$$

$$(\pi_{t+h}^{Core} - \pi_t^{Core}) = \gamma + \theta(\pi_t - \pi_t^{Core}) + v_t.$$

Using these equations, we expect $\beta > 0$ and $\theta = 0$. If, in the first equation, $\alpha = 0$ and $\beta = 1$ then we can rewrite it as $\pi_{t+h} = \pi_t^{Core} + e_t$, which is the equation in footnote 6 above. We expect $\theta = 0$ because any deviation in headline inflation from core inflation should not have any impact on core inflation in the future.

Using our regression analysis (see online Appendix C), we find mixed results for this theory across our four measures: CPI-Median, CPI-Trim, CPIX, and CPI ex-MIC (see Tables C1 and C2 in online Appendix C). CPI-Median, as well as the two measures that strip out MIC, CPIX and CPI ex-MIC, do well as a predictors of headline inflation 12 months out. The same is not true for CPI-Trim.[10]

We also run a series of multivariate regressions with the dependent variable deviations of total inflation a certain number of months ahead from inflation today. We analyze each of one to 18 months ahead. The independent variables are the deviation of one of our core measures of inflation from headline inflation today, the deviation of headline inflation from its 2 percent target today, and the deviation of our ex-MIC measure from headline inflation today. This lets us see whether there is any indication that the latter plays an independently significant role as a predictor of headline inflation at different time periods in the future. We find that for each core measure – CPI-Trim, CPI-Median and CPIX – the ex-MIC measure is quite significant at each time interval with a hump-shaped magnitude for the coefficient over time.[11] This suggests there is information in MIC inflation that is relevant for forecasting future headline inflation.

We next turn to the methodology proposed in McCracken and Ngan (2023) to see if we can drill down further on when CPI ex-MIC might have the most value in helping anticipate where headline inflation is headed.

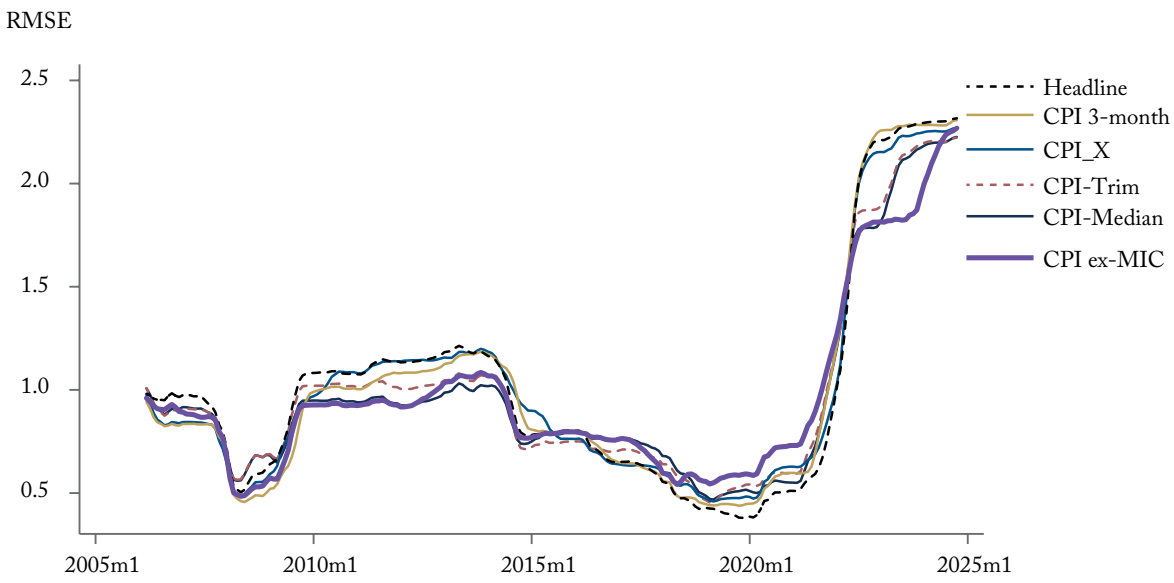
In this approach, we regress headline inflation 12 months out on today's core inflation measures using data from January 1992 or January 1993 to October 2024. We fix the regression sample so we roll forward both the front and back-end dates, keeping a sample size of 100 throughout. From here, following McCracken and Ngan (2023), we then "evaluate the accuracy of the forecast by averaging the squared forecast error over a five-year (60-month) period and taking its square root. This root-mean-squared error [hyphens added] (RMSE), like Euclidean distance, is a common measure of closeness – or in the current context, accuracy. The higher the RMSE, the less accurate the forecast."

Because the regression requires us to use 100 data points and then average the forecast errors over a five-year period, our first date plotted is March 2006. We plot, from March 2006, the rolling five-year windows of the RMSE in percent for our measures of interest, CPI-Median, CPI-Trim, CPIX, and CPI ex-MIC to which we add a three-month annualized total inflation measure, as well as headline inflation itself (Figure 2).

10 In other words, we find that $\alpha = 0$ and $\beta = 1$ for CPI-Median, CPIX, and CPI ex-MIC, but not for CPI-Trim. We note that in the case of CPI ex-MIC, we have a low R^2. The fact that we cannot reject the $\beta = 1$ hypothesis in this instance might then be due to the high volatility we saw earlier and the low R^2. We note also that the null hypothesis of $\theta = 0$ cannot be rejected (a good thing) for CPI-Median, CPIX, or CPI ex-MIC, but it can for CPI-Trim. At 18 months, we find more mixed results. The coefficient on ex-MIC loses its significance, though it is close to one and the joint hypothesis of it being one and the constant being zero cannot be rejected. For the core measures, their coefficients are all significant and close to one, but the joint null hypothesis can be rejected, weakly in the case of CPIX. The $\theta = 0$ hypothesis can be rejected now for CPI-Median and CI-Trim, but not for CPIX or CPI ex-MIC.

11 The regression is $\pi_{t+h} - \pi_t = \alpha_h (\pi_t^{TARG} - \pi_t) + \beta_{1h} (\pi_t^{Core} - \pi_t) + \beta_{2h} (\pi_t^{exMIC} - \pi_t) + e_t$, where $\pi_t^{TARG} = 2$ and π_t^{Core} is CPI-Trim, CPI-Median or CPIX. Results available upon request.

Figure 2: Root-Mean-Squared Error* – Different Measures of Inflation



* Root-mean-squared error measures the average difference of the actual data points from the predicted values, and the difference is squared to avoid the cancellation of positive and negative values, when they are summed up.

Source: Authors' calculations.

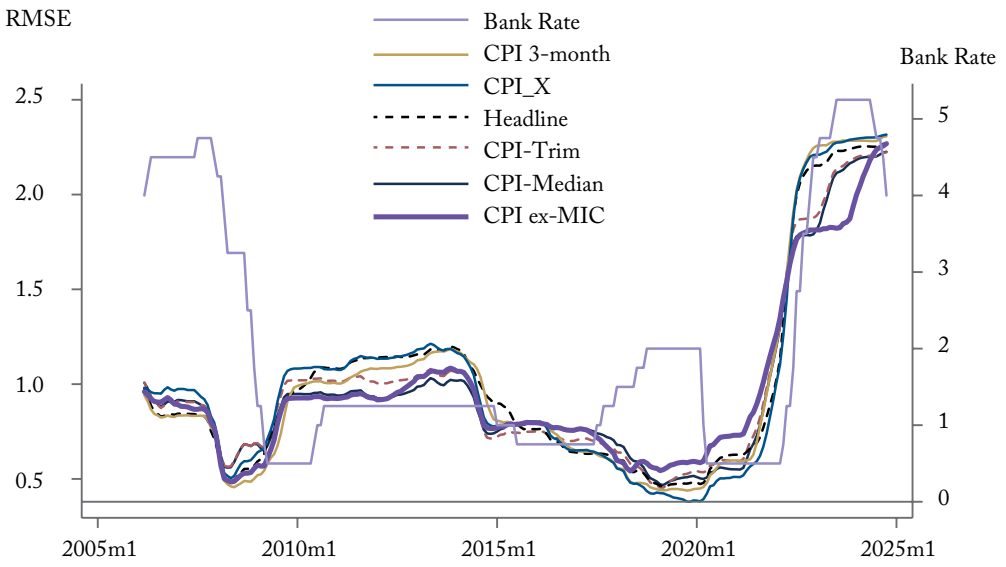
Figure 2 shows a divergence across the forecast errors of different measures.[12] In the current (post-COVID) period, up until the last few months, CPI ex-MIC (the thicker line) is clearly the best predictor of future headline inflation as measured by having the lowest RMSE. More generally, and acknowledging the short time span we are able to analyze, the pattern seems to be that the exclusion of the MIC does best after a major tightening or easing cycle by the central bank, most notably when the Global Financial Crisis hit in 2007 and in the most recent surge in the policy rate. We can see this role for tightening/easing even more clearly when we add the Bank Rate to the graph (Figure 3). We note that in both Figures 2 and 3, the results are largely the same when we extend our analysis out to 18 months, though CPIX does even better than CPI ex-MIC post-COVID. Given CPIX's removal of mortgage interest costs, this result is consistent with this E-Brief's general thesis.

Combining the evidence that CPI ex-MIC can help anticipate where inflation is headed, with the result that it has the lowest RMSE among other measures during periods of significant tightening and easing, suggests it can be a valuable tool under certain circumstances.[13]

12 We perform pair-wise Wilcoxon sign rank tests to determine whether there are significant differences among the RMSEs of the different measures. The vast majority of pairs were significantly different from each other. Among the four that were not included: CPIX and headline inflation, ex-MIC and Median, Trim and three-month inflation, and ex-MIC and three-month inflation.

13 In online Appendix D, we provide further analysis – using Khan et al. (2015) – reinforcing this finding that CPI ex-MIC is likely best used as a predictor of where inflation is headed only in certain periods.

Figure 3: Root-Mean-Squared Error* – Different Measures of Inflation



* Root-mean-squared error measures the average difference of the actual data points from the predicted values, and the difference is squared to avoid the cancellation of positive and negative values, when they are summed up.

Source: Authors' calculations.

Conclusions

We do not suggest that the mortgage interest cost component be stripped out of the CPI. It constitutes part of a household's consumption basket, so it should be counted.

Nevertheless, our results show that measuring inflation after stripping out mortgage interest costs can be a tool to help anticipate the future evolution of inflation in specific circumstances – in particular during and after major monetary policy tightening and easing cycles.

Inflation ex-MIC could also prove to be a useful tool for the Bank of Canada to communicate about the evolution of inflation. It could note that changes in its policy rate are directly linked to MIC inflation, that tightening and easing cycles can lead to deviations of MIC inflation from overall inflation, which can be substantial and quite persistent, and looking at inflation without mortgage interest costs can be a good indicator of where overall inflation is headed. Inflation ex-MIC can also be a good indicator of the stance of monetary policy during a tightening cycle like the one which started in March 2022 and also tell the central bank when it can afford to start loosening the reins of its monetary policy.

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