Blurred Vision: How Mortgage Interest Costs Impact Inflation

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Appendix A

Consider the impact on inflation when the central bank is late to react to an increase in inflation.[1] With a constant policy rate, interest costs on variable-rate mortgages will remain static, as will interest costs on those fixed-rate mortgages which are not up for renewal. The impact on the interest rates at which fixed-rate mortgages are renewed will depend on the expected path of the policy rate. With a commitment by the central bank to keep the policy rate at a low level (which the Bank of Canada made in July 2020), these rates will remain low or only rise by a small amount. The overall impact on mortgage interest costs will also depend on the rate at which fixed-rate mortgages come up for renewal.

Now consider what happens when the central bank implements restrictive monetary policy to get above-target inflation under control. Initially, the central bank raises its policy rate, with its rate expected to increase and then remain high until inflation is brought under control, which increases expected interest rates along the yield curve.

The increased policy rate has an immediate impact on variable-rate mortgages. Interest costs on these mortgages increase at a much higher rate than overall inflation (as part of the catch-up). Once again, the impact on the interest rates at which fixed-rate mortgages are renewed will depend on the expected path of the policy rate over the life of the renewed mortgages. There will also be an impact on the housing market: house prices may be negatively affected, which will reduce the average size of new mortgages and reduce interest costs at a given rate of interest.

Imagine an extreme case in which all mortgages are variable-rate. Mortgage interest costs would move up in almost lock-step with the policy rate. A doubling of the policy rate over the span of one year would mean about a 100-percent increase in mortgage interest costs.[2] If MIC inflation is measured year-over-year, this rate would move up gradually as months with higher MIC inflation are added and months from before the beginning of the rate increase are dropped. By the end of the year, measured MIC inflation would be 100 percent. If the policy rate then remained constant, MIC inflation would then level off as months with lower MIC inflation are added and months from the beginning of the rate increase are dropped.

It is clear that this would have a leveling effect in the long run. In the extreme case considered in the previous paragraph (a doubling of the policy rate), MIC inflation (year-over-year) would move from zero to 100 percent during the one-year tightening cycle. Mortgage interest costs would then stay constant. The measured year-over-year rate of mortgage interest cost inflation would decrease from 100 percent and eventually settle down to the overall rate of inflation as long as relative prices (such as house prices) remain constant in the long run.

1 An economic shock leading to a change in the inflation rate, and the Bank of Canada's reaction to it, would also affect the size of the risk premium for mortgage rates over the policy interest rate. This would have a second-order effect on the relationship between the policy rate and mortgage interest costs, but does not change the basic story.

2 This neglects the small number of mortgages up for renewal, new mortgages resulting from home purchases, the risk premium for mortgage rates over the central bank's policy rate and the impact on house prices and the size of new mortgages.

With a mixture of variable-rate and fixed-rate mortgages, the effect on MIC inflation would take longer to peak, and the maximum MIC inflation rate would be much lower than 100 percent. In fact, during the recent tightening cycle in Canada, the peak MIC inflation rate was much lower – though still well above inflation itself – and the peak occurred one month after the policy rate peaked at 5 percent.[3]

Now, consider what happens when the tightening cycle reduces inflation ex-MIC before MIC inflation has peaked. MIC inflation will keep overall inflation elevated. MIC inflation will gradually decrease due to base-year effects but remain elevated for some time. In Canada, it has only decreased from 30.9 percent to 10.2 percent in the 18 months from August 2023 to January 2025.

Modeling all of these dynamic interactions would take a fairly granular dynamic general equilibrium model. We do not undertake this in the context of this E-Brief: for an example, see Garriga, Kydland and Šustek (2017).[4] As discussed in the text, we instead analyze the out-of-sample forecasting quality of different measures of inflation, including the Bank of Canada's preferred measures of core inflation, a former preferred measure in CPIX, and a measure of inflation where we strip out MIC inflation.

3 One month is not as long as one might expect, and this is due to the interaction of some or all of the other factors listed in the text in "The Dynamic Effects of Changing Monetary Policy on Mortgage interest costs and Inflation" section.

4 Carraciolo, Kronick and Robson (2024) and Orlando (2024) discuss the impact of MIC inflation informally, as we do in this E-Brief.

Appendix B

Table B1: Headline Inflation, Inflation ex-MIC, MIC, Overnight Rate (percent)				
Date	Headline Inflation	Inflation ex-MIC	MIC Inflation	Overnight Rate
Jan-2019	1.44	1.20	7.82	1.75
Feb-19	1.51	1.34	8.06	1.75
Mar-19	1.88	1.71	8.11	1.75
Apr-19	2.03	1.78	8.16	1.75
May-19	2.40	2.22	8.21	1.75
Jun-19	2.02	1.78	8.06	1.75
Jul-19	2.01	1.84	8.01	1.75
Aug-19	1.94	1.69	7.78	1.75
Sep-19	1.87	1.63	7.46	1.75
Oct-19	1.86	1.70	6.96	1.75
Nov-19	2.17	2.08	6.56	1.75
Dec-19	2.25	2.08	5.98	1.75
Jan-20	2.40	2.30	5.31	1.75
Feb-20	2.16	2.06	4.74	1.75
Mar-20	0.89	0.73	4.36	0.75
Apr-20	-0.22	-0.29	3.99	0.25
May-20	-0.37	-0.51	3.28	0.25
Jun-20	0.66	0.58	2.49	0.25
Jul-20	0.15	0.07	1.62	0.25
Aug-20	0.15	0.14	0.93	0.25
Sep-20	0.51	0.58	0.08	0.25
Oct-20	0.66	0.65	-0.76	0.25
Nov-20	0.95	1.02	-1.94	0.25
Dec-20	0.73	0.87	-3.11	0.25
Jan-21	1.02	1.30	-4.29	0.25
Feb-21	1.09	1.30	-5.36	0.25
Mar-21	2.20	2.47	-6.27	0.25
Apr-21	3.39	3.73	-7.26	0.25

Table B1: Continued

Date	Headline Inflation	Inflation ex-MIC	MIC Inflation	Overnight Rate
May-21	3.60	4.01	-8.18	0.25
Jun-21	3.06	3.54	-8.62	0.25
Jul-21	3.72	4.12	-8.98	0.25
Aug-21	4.09	4.56	-9.26	0.25
Sep-21	4.38	4.92	-9.22	0.25
Oct-21	4.65	5.19	-8.86	0.25
Nov-21	4.72	5.18	-8.25	0.25
Dec-21	4.80	5.33	-7.56	0.25
Jan-22	5.14	5.58	-6.76	0.25
Feb-22	5.69	6.12	-6.02	0.25
Mar-22	6.66	7.15	-5.35	0.5
Apr-22	6.77	7.18	-4.41	1
May-22	7.73	8.12	-2.73	1
Jun-22	8.13	8.37	-0.64	1.5
Jul-22	7.59	7.91	1.66	2.5
Aug-22	7.01	7.05	4.82	2.5
Sep-22	6.86	6.76	8.29	3.25
Oct-22	6.88	6.78	11.40	3.25
Nov-22	6.80	6.63	14.53	3.75
Dec-22	6.32	5.88	17.95	4.25
Jan-23	5.92	5.35	21.19	4.25
Feb-23	5.25	4.69	23.94	4.5
Mar-23	4.30	3.64	26.39	4.5
Apr-23	4.41	3.68	28.50	4.5
May-23	3.36	2.53	29.91	4.5
Jun-23	2.81	2.00	30.14	4.75
Jul-23	3.27	2.38	30.55	5
Aug-23	4.00	3.17	30.88	5
Sep-23	3.80	2.91	30.64	5
Oct-23	3.12	2.18	30.54	5
Nov-23	3.12	2.18	29.79	5
Dec-23	3.40	2.52	28.61	5
Jan-24	2.86	1.99	27.43	5
Feb-24	2.78	1.86	26.31	5

Table B1: Continued

Date	Headline Inflation	Inflation ex-MIC	MIC Inflation	Overnight Rate
Mar-24	2.90	2.04	25.35	5
Apr-24	2.69	1.84	24.52	5
May-24	2.87	2.08	23.31	5
Jun-24	2.67	1.89	22.31	4.75
Jul-24	2.53	1.76	21.04	4.5
Aug-24	1.95	1.19	18.80	4.5
Sep-24	1.64	1.00	16.73	4.25
Oct-24	2.02	1.38	14.72	3.75
Nov-24	1.89	1.32	13.24	3.75
Dec-24	1.83	1.32	11.71	3.25
Jan-25	1.90	1.45	10.18	3

Notes: Headline: year-over-year CPI inflation; ex-MIC: headline inflation net of MIC inflation; MIC: mortgage interest cost inflation (year-over-year); Overnight Rate: Bank of Canada's overnight rate target.

Source: Bank of Canada, Statistics Canada.

Appendix C

We estimate the following equation:

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

where "Core" is one of CPI-Median, CPI-Trim, CPIX, or CPI ex-MIC.

We present the results for this regression and the joint test that $\alpha = 0$ and $\beta = 1$, which then reduces this equation to our unbiased predictor described in the text (Tables C1 and C2).

Only with CPI-Trim can we reject the null hypothesis that $\alpha = 0$ and $\beta = 1$.[5]

Table C1: Lafleche and Armour Results (standard errors corrected for serial correlation)

	(1) Inf (SA)	(2) Inf (SA)	(3) Inf (NSA)	(4) Inf (SA)
Beta_Med	1.159*** (10.14)			
Beta_Trim		1.301*** (11.52)		
Beta_MIC			1.231*** (2.92)	
Beta_CPIX				1.109*** (9.60)
Constant	0.0908 (0.96)	0.157* (1.67)	-0.074 (-0.65)	0.117 (1.18)
Observations	370	370	382	370
Adjusted R^2	0.377	0.388	0.034	0.305

t statistics in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Authors' calculations.

Table C2: Lafleche and Armour Joint Test

	(1)	(2)	(3)	(4)
	Joint_Med	Joint_Trim	Joint_MIC	Joint_CPIX
p_value	0.154	0.005	0.733	0.237

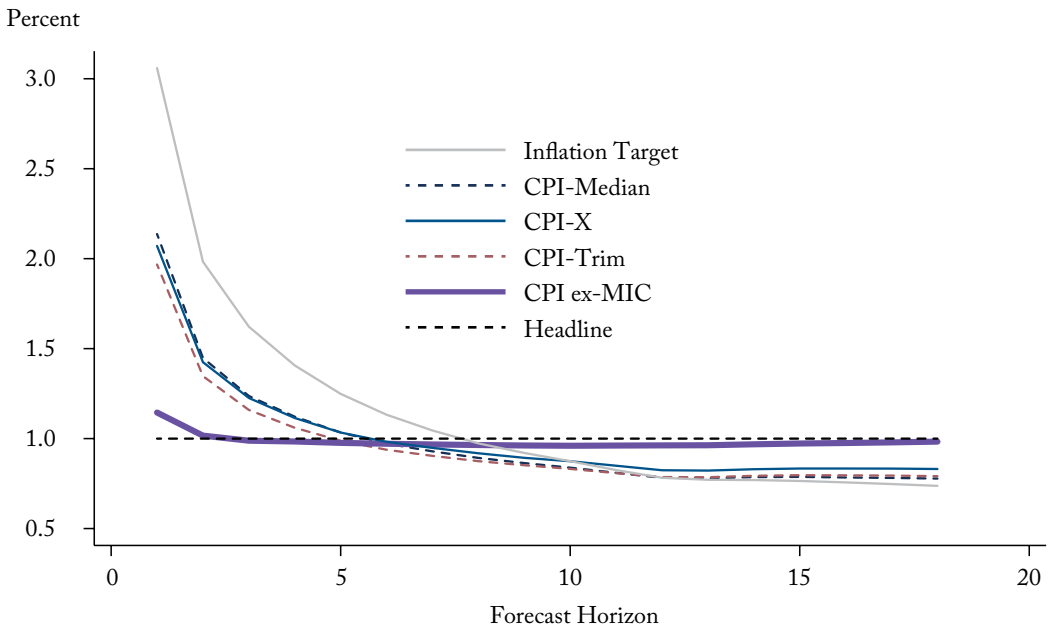
Source: Authors' calculations.

5 We also estimate $(\pi_{t+h}^{Core} - \pi_t^{Core}) = \gamma + \theta(\pi_t - \pi_t^{Core}) + v_t$, with the null hypothesis that $\theta = 0$. We cannot reject the null for CPI-Median, CPI ex-MIC, and CPIX, but can (albeit weakly) for CPI-Trim.

Appendix D

Another approach (Khan et al. 2015) in testing whether CPI ex-MIC can be a valuable tool in anticipating where future headline inflation is headed also involves calculating root-mean-squared errors, using a simplified formula with the raw data instead of a regression analysis.[6]

Figure D1: Root-Mean-Squared Errors – Different Inflation Measures and Target



Source: Authors' calculations.

Over the January 1993 – October 2024 period, we then plot the root-mean-squared errors for each core measure relative to the root-mean-squared errors from forecasting inflation using only its own lags. Values below one mean that the core measure does better than inflation itself (worse for values greater than one).

6

$$RMSE_i = \sqrt{\frac{\sum_{t=1}^{N}\left(\pi_{i,t}^{k} - \pi_{CPI,t+k}^{k}\right)^2}{N}},$$

where π_{it}^{k} is a core inflation measure i used to forecast headline inflation k months ahead.

The results indicate that inflation itself (the horizontal line) does best in predicting future inflation one and two months ahead. CPI ex-MIC does the best three-to-six months ahead. The Bank's preferred core measures do better six-to-12 months ahead. Then, the target itself does best – just better than CPI-Trim and Median – out to the horizon of 18 months.[7]

These results are somewhat at odds with the 12-month regression results we saw with the RMSEs in Figures 2 and 3 in the main text, which indicated CPI ex-MIC did best at that horizon under specific circumstances. However, there are a number of differences between the two calculations. Most notably, here it is a simple statistical property between the core measures/CPI ex-MIC and headline inflation, whereas Figures 2 and 3 were derived from forecasts based on more complex regressions. Moreover, the latter regressions were based on a rolling window so we can analyze which core/CPI ex-MIC measure did best over time. Here, we take an average of the whole sample. Nevertheless, these results reinforce the idea that ex-MIC inflation is mostly useful during specific episodes.

Interestingly, these results differ from the original Khan et al. study in that they found the target to always be a better predictor, lending credence to the Rowe and Yetman (2002) argument. That paper was published in 2015, meaning the data we have across the last decade, including this most recent period, changes the results and adds power to our argument that this ex-MIC measure is valuable in certain instances and that the COVID period is one of those times.[8] In other words, CPI ex-MIC is a tool in the toolbox.

7 This is compatible with Rowe and Yetman (2002). Note that we run the same pair-wise Wilcoxon sign rank tests as we did in Figures 2 and 3, and here we find more of a mixed bag in terms of significant differences. Still enough to make the results of interest but less comprehensive than in those figures in the main text.

8 Note, that as a check we stopped our RMSE calculation at the end of the 2015 as well and were able to replicate Khan et al.'s results.