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Tell-tale Signals: A Customized Toolkit for Tracking the Economy

Policymakers at Canada's major financial authorities have reliable tools to make informed decisions. A customized set of indexes from the C.D. Howe Institute, including a new leading economic indicator, can further help them monitor and guide monetary policy and financial stability in Canada.

Jeremy Kronick, Steve Ambler
and Mawakina Bafale

About The Authors

Jeremy Kronick
is Associate Vice President and Director of the Centre on Financial and Monetary Policy at the C.D. Howe Institute.

Steve Ambler
is Professor of Economics, Université du Québec à Montréal. He is the David Dodge Chair in Monetary Policy at the C.D. Howe Institute.

Mawakina Bafale
is a Research Officer at the C.D. Howe Institute.

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Daniel Schwanen
Vice President, Research

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Tell-tale Signals: A Customized Toolkit for Tracking the Economy

by Jeremy Kronick, Steve Ambler and Mawakina Bafale

- To make informed decisions, policymakers need reliable and robust economic data, and researchers at the C.D. Howe Institute have created many unique data sets for their analyses and recommendations over the years.
- This *Commentary* brings together some novel data series from previous C.D. Howe Institute studies to provide third parties, including the Bank of Canada, the Office of the Superintendent of Financial Institutions (OSFI) and others, with unique insights. These indicators, or indexes, can be helpful in decisions such as the setting of the Bank's overnight rate target and OSFI's Domestic Stability Buffer (DSB), a capital buffer designed to cover potential losses at Canada's largest banks in periods of financial stress.
- This study also introduces a new leading economic activity index (the first freely available index for Canada), which has shown to be previously effective in anticipating periods of economic stress such as the 2001 dot-com crash and the 2008 Great Financial Crisis. The index has been trending downward since the Bank began its last tightening cycle. This warning is further supported by data that show economic activity is flagging.
- Data suggest that the Bank should be at the end of its tightening cycle. With economic activity typically leading inflation, inflation seems set to continue back to the 2 percent target. The weak macroeconomic context means that an increase in the DSB is likely to be counterproductive, suggesting OSFI keep it steady at 3.5 percent.

Introduction

The C.D. Howe Institute's mission is to raise living standards by fostering economically sound public policies, including in the areas of monetary policy and financial stability. In order to make informed policy recommendations, we need reliable and robust economic data. Researchers at the Institute have created many unique data sets and used them in their analyses and recommendations.

Among recent examples, our novel vulnerability barometer, which takes into account the amount Canadian households have to spend out of their income to service their debt, was able to better anticipate recessions in Canada – including the Great Financial Crisis (GFC) – than similar existing measures (Ambler and Kronick 2020). In another instance, we highlighted the return of the relationship between

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money growth and inflation during the COVID pandemic, and how a focus on monetary aggregates would have shown the lurking inflation danger during 2021, before the Bank started hiking the overnight rate (Ambler and Kronick 2022).

The goal of this paper is twofold: first, to present a series of indexes, or indicators, using data sets developed in past C.D. Howe Institute work; and second, to lay out how these indicators can be helpful to interested third parties, including policymakers like the Bank of Canada and the Office of the Superintendent of Financial Institutions (OSFI), particularly in the setting of the overnight rate target and monitoring financial stability. The latter includes OFSI's setting of the Domestic Stability Buffer, or DSB, designed to cover potential losses at Canada's largest banks in periods of financial stress.[1]

The database not only brings together data series which have been used in previous C.D. Howe Institute studies, but also introduces a novel, publicly available, leading indicator of economic activity.

We discuss how each data series is constructed and how it is used to produce a particular indicator. Then, we show the evolution of these indicators and their most recent values. Finally, we discuss the relevance of recent developments in the financial and economic indicators in this new toolkit for the Bank of Canada's monetary policy stance and OSFI's decision around the DSB. Policymakers should not consider these data sets as a complete toolkit of variables. They are meant to present unique insights that are not necessarily available with other publicly (or for policymakers, privately) available data.

We discuss the following economic and financial indicators:

1) a financial vulnerability indicator, which tracks vulnerabilities across the banking, corporate, housing, and household sectors, and which successfully flagged previous periods of financial stress and recessions;
2) a diffusion index, which measures the extent to which expansions and contractions are widespread across different sectors of the economy, and which previously confirmed the breadth of contractions during the 2008 and 2020 recessions;
3) a money overhang index, which tracks the gap between trend money growth and trend inflation, which flashed a strong warning signal of coming inflation in 2020 and early 2021 and is now signalling a decrease in inflation;
4) a monetary policy stance indicator, which uses different versions of the so-called Taylor rule[2] to estimate the appropriate level for the Bank of Canada's target overnight rate, and which suggests today a rate in line with the Bank's current monetary policy stance;
5) a leading economic indicator, which predicted previous economic downturns, and which has been trending downward since the Bank of Canada began its last tightening cycle; and,
6) a statistical decomposition of Canadian inflation into supply-side and demand-side drivers, and which currently indicates that much of the remaining pressure on inflation is coming from the supply side.

The indicators suggest that the Bank of Canada should be at the end of its tightening cycle. They also suggest that even if financial risks have recently risen, the weak macroeconomic context means that an increase in the DSB, currently set at 3.5 percent of risk-weighted assets, would be counterproductive by restricting credit issued by the big six banks – most likely because of the impact on the cost of lending – and possibly amplifying any economic downturn. (See Key Concept Explainer for more on the DSB.)

1 All these data can be accessed at https://www.cdhowe.org/public-policy-research/toolkit-economic-indicators.

2 See Taylor (1993). The basic idea behind the Taylor Rule is that the central bank's policy rate responds positively to increases in inflation and to increases in the output gap (the difference between output and full-capacity output).

Key Concept Explainer

The Domestic Stability Buffer (DSB) is a capital buffer that the big six Canadian Domestic Systemically Important Banks (D-SIBs) must set aside to cover potential losses during periods of financial stress.

The DSB is part of the Common Equity Tier 1 (CET1) capital requirements for the big banks, alongside the 4.5 percent minimum capital requirements, the 2.5 percent capital conservation buffer, and the 1 percent D-SIB surcharge.

The DSB plays a more countercyclical role than the rest of the capital requirements. It is increased when the economy is growing, and higher vulnerability to losses is mounting. The DSB is lowered during periods of economic stress, freeing up capital for banks to absorb or provision for losses without restricting activity and lending. Without this buffer, there would be greater pressure on D-SIBs to preserve regulatory capital and reduce activity and lending, thereby exacerbating economic downturns. The DSB can also be reduced when the economy is growing but vulnerabilities are falling.

The indicators presented here can be considered as proofs of concept and our hope is that the data will prove useful to policymakers, the Institute's policy councils, and researchers interested in questions relating to Canadian monetary policy, financial stability, and business cycles. As a final note, none of these data get at some of the fundamental structural policies governments need to undertake to address the investment and productivity problems Canada faces. This is beyond the scope of the paper. This work focuses on cyclical policy only.

Vulnerability Barometer

Our first indicator is the Vulnerability Barometer (VB), which tracks vulnerabilities across the banking, corporate, household, and housing sectors.[3]

We first introduced the VB in an earlier paper (Ambler and Kronick 2020). Too often, existing measures of financial conditions use debt-to-GDP and/or debt-to-income ratios that conflate "stock" variables like debt, and "flow" variables like income, and omit debt servicing ratios.[4] Debt-to-GDP variables will often increase in a persistently declining interest rate environment as asset prices rise, but that alone is insufficient to tell you the risk

3 Consistent with the setup in Duprey and Roberts (2017).

4 Aldasoro et al. (2018) at the Bank for International Settlements is another example of work looking at the importance of debt service ratios.

profile of borrowers. What they can tell you is how painful the unwinding of debt positions will be in a downturn. However, it is the increased risk that borrowers may be unable to pay their debt servicing costs that can be a trigger leading to recessions.

Ambler and Kronick (2020) showed that the inclusion of debt servicing was an improvement over other similar measures of financial conditions in terms of tracking financial vulnerabilities. In particular, debt servicing risks spiked in advance of recessions or crisis periods, and avoided the false positives that bedevilled those previous vulnerability measures.

Figure 1 shows the evolution of the barometer from 1990 to the most recent data point, the third quarter of 2023. The methodology involved in its construction (along with the methodologies behind the other indicators) is summarized in the **online Appendix** (www.cdhowe.org) available on the Institute's website. A higher score means increased vulnerability.

The gray bars represent recessions as dated by the C.D. Howe Institute's Business Cycle Council.[5] The yellow bars are non-recessionary periods that represent periods of stress:[6] the Mexican crisis of the mid-1990s, the Asian crisis, Russian debt default, and Long Term Capital Management collapse that all took place in 1997–1998, the sub-prime crisis of 2007, and the 2015 oil price collapse. As is clear, the barometer does a good job of tracking both, and debt servicing has significant value added, especially in helping to anticipate upcoming recessionary periods.[7] It spikes for almost all of the periods of stress (quite often at the beginning of the period), and shows few false positives. Notably, all underlying measures increased in advance of the GFC, consistent with a financial crisis that touched both the financial and real economy at a level not seen since the Great Depression. The spike in the measures occurred contemporaneously with the pandemic recession: this is not surprising given the black swan nature of this event.

As of the fourth quarter of 2023, the chart shows that vulnerability has come down from a previous peak in 2022, which was driven by strong growth in house prices after the Bank dropped the overnight rate to 0.25 percent at the beginning of the pandemic. That said, the VB remains above zero, and we know risks have increased in the last few months due to, among other things, geopolitical crises abroad and the prospect of interest rates staying higher for longer than expected.[8]

Diffusion Index

The diffusion index uses a single number to convey the extent to which expansions and contractions of output are widespread across the economy in a given period. Having robust, methodologically sound data on how diffuse economic activity is

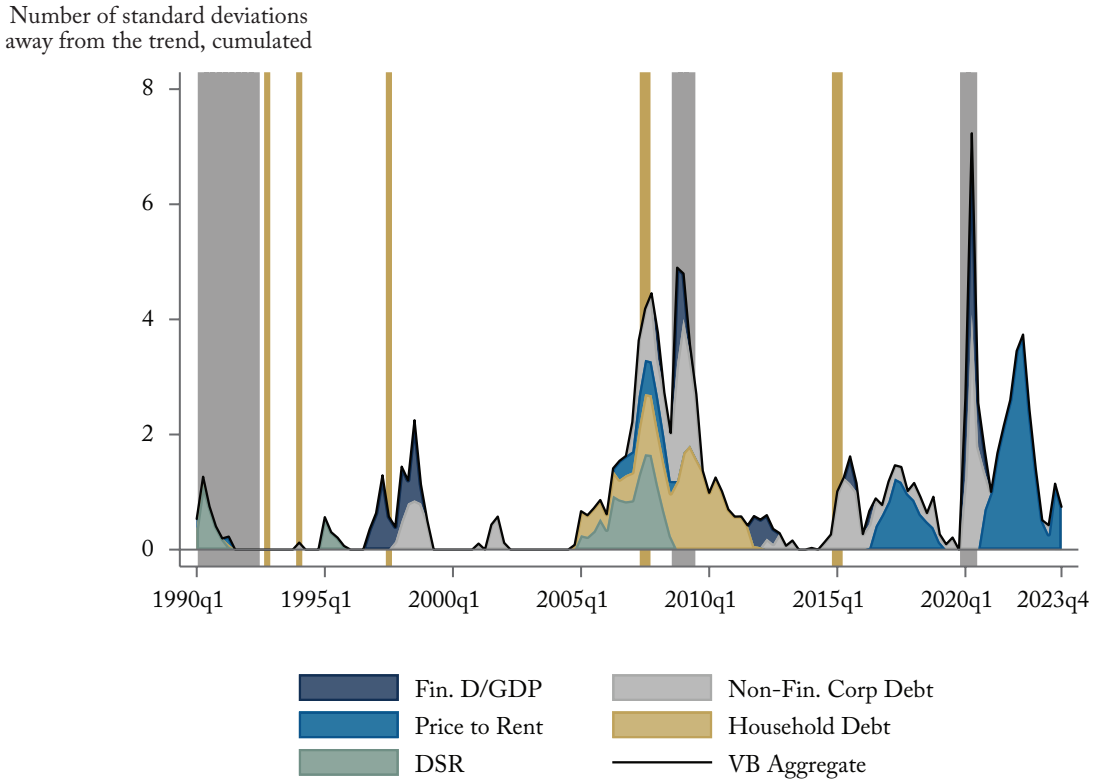
5 https://www.cdhowe.org/council/business-cycle-council

6 We follow the identification of international stress periods in Ambler and Kronick (2020), originally set out in Drehmann and Juselius (2014). We use international periods as we need more than three recessionary periods to create thresholds for our variables. While these international periods of stress did not lead to recessions here in Canada, they all had a negative impact, and the size of that impact was in part based on the levels of the barometer variables. Readers can judge whether the barometer is useful for predicting Canadian financial instability on the basis of the three recession periods alone (as well as the 2015 downturn).

7 Note that in past work, Ambler and Kronick (2020), we extended the VB back to 1980 and showed the debt servicing ratio increasing well in advance of the 1990 recession. We do not include that extended version here because not all data existed during that time.

8 We note peculiarities with corporate debt that the VB might have trouble capturing. One is the fact that there is an additional layer of risk with the exchange rate since some Canadian corporate debt is in US dollars. Second is the recent termination of the Canada Emergency Business Account, which might cause stress that the raw figures wouldn't pick up at present.

Figure 1: Vulnerability Barometer, 1990Q1 – 2023Q4



Note: Fin. D/GDP includes financial sector debt variables as a percentage of GDP (year-over-year growth rate and deviation from trend), Non-Fin. Corp Debt includes non-financial sector corporate debt variables as a percentage of GDP (year-over-year growth rate and deviation from trend), Price to Rent is the deviation from trend of the ratio of house prices to rent, Household Debt includes household debt variables as a percentage of either disposable income or GDP (deviation from trend), and DSR is the debt service ratio deviation from trend. VB Aggregate is the overall vulnerability barometer.

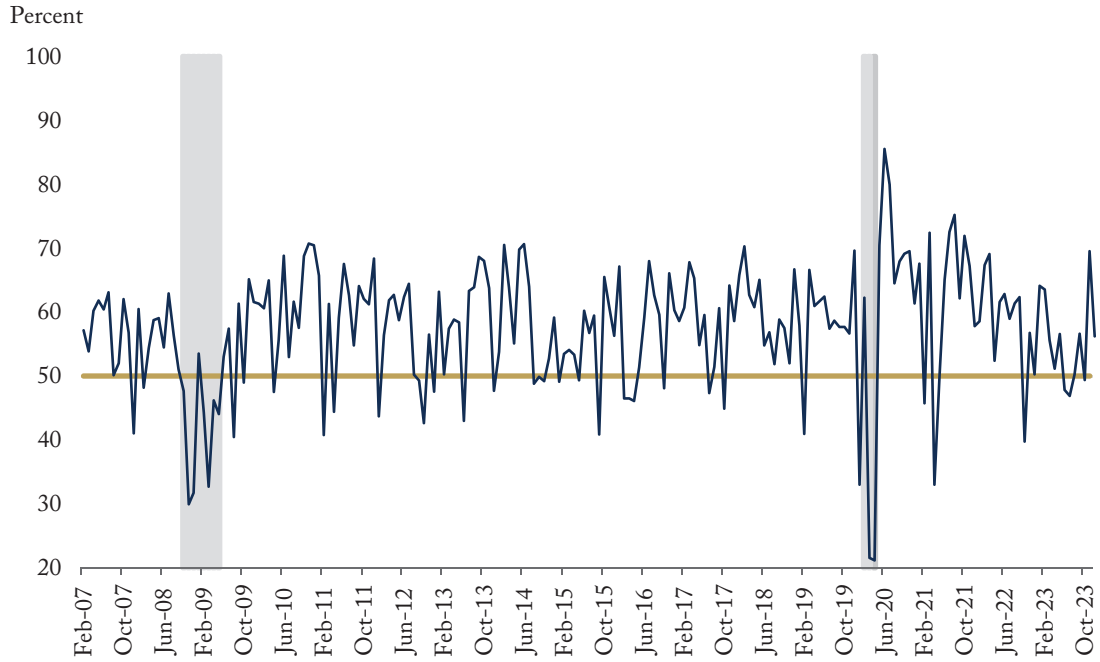
Source: Authors' calculations.

allows for a more complete picture of where we are in a business cycle, relevant for understanding both where inflation is likely headed and the macroeconomic environment in which risks to financial stability are evolving.[9] It is also a necessary component for dating the beginning and end of recessions, adding context to the story being told by the aggregate GDP growth and unemployment figures. Kronick (2016) develops the methodology behind the index in detail, and the online Appendix summarizes it.

The index is calculated monthly using principal-components analysis whereby we remove idiosyncratic shocks, e.g., strikes or bad weather, to

9 See Kronick and Omran (2019) who show the importance of breadth of economic growth for understanding monetary policy transmission.

Figure 2: Diffusion Index, Jan. 2007 – Dec. 2023



Source: Authors' calculations.

focus on the common component of the business cycle that is moving up or down across industries. An overall average of 50 can be interpreted much like an unweighted index with an equal number of expanding and contracting industries in that month. An index above 50 indicates a greater number of industries expanding than contracting, and an index below 50 indicates the opposite.

The C.D. Howe Institute's Business Cycle Council makes use of the diffusion index in making its recession-dating calls. As an example, it was of crucial importance in leading the Council to declare that the downturn in the first two quarters of 2015 was not a recession,[10] as the index remained significantly above 50 even as total GDP decreased, employment flagged, and the unemployment rate increased.

Figure 2 above illustrates the evolution of the diffusion index from January 2007 to December 2023. It shows that the Canadian economy operates mostly in a state where more industries than not are expanding, indicating a healthier economy. Notably, the COVID recession was far deeper than the Great Recession, yet it rebounded to an expansionary state above 50 much more quickly.

The diffusion index dipped below 50 in the months of June and July of 2023, indicating a majority of industries were declining. It has since

10 See C.D. Howe Business Cycle Council (2016).

rebounded, with a big spike in November that was offset by a sharp decline in December. The underlying trend since the Bank started tightening monetary policy has been pretty weak. This is consistent with the overall economy, which fell by 0.1 percent in the third quarter of 2023 before increasing by 0.2 percent in the fourth quarter, driven mostly by exports from a booming US economy. Business investment was especially poor in the fourth quarter. Since economic activity leads inflation, it suggests the latter might decelerate.

Money Overhang Index

The money overhang index tracks the gap between the trend growth rate of broad money (using M2+[11] as the definition of broad money) and trend inflation. A larger gap, if caused by shocks to trend money growth, means that inflation will have to catch up – the reverse being equally true.[12] The implication for the Bank is that if the gap starts to increase during a stable inflationary period, tightening is necessary to keep inflation from rising above target. If the gap is shrinking during a stable inflationary period, monetary loosening is necessary to keep inflation from falling below target.

To create the "trend" variables, we use a Hodrick-Prescott (HP) filter. The HP filter is a data-smoothing technique that separates time series into slowly changing trend components and cyclical components, which fluctuate at higher frequencies. Doing so reveals long-term trends in data by eliminating cyclical components, i.e., rises and falls that are not fixed over time.[13] In this case, we decompose actual money growth and inflation data into a long-run, structural component (trend) and a cyclical or short-run component.

When calculating these trend variables, and the gap that follows, we only use data which policymakers (i.e., the Bank of Canada) have at the time they are making these decisions. In other words, the trend data must be continuously updated as new data become available.

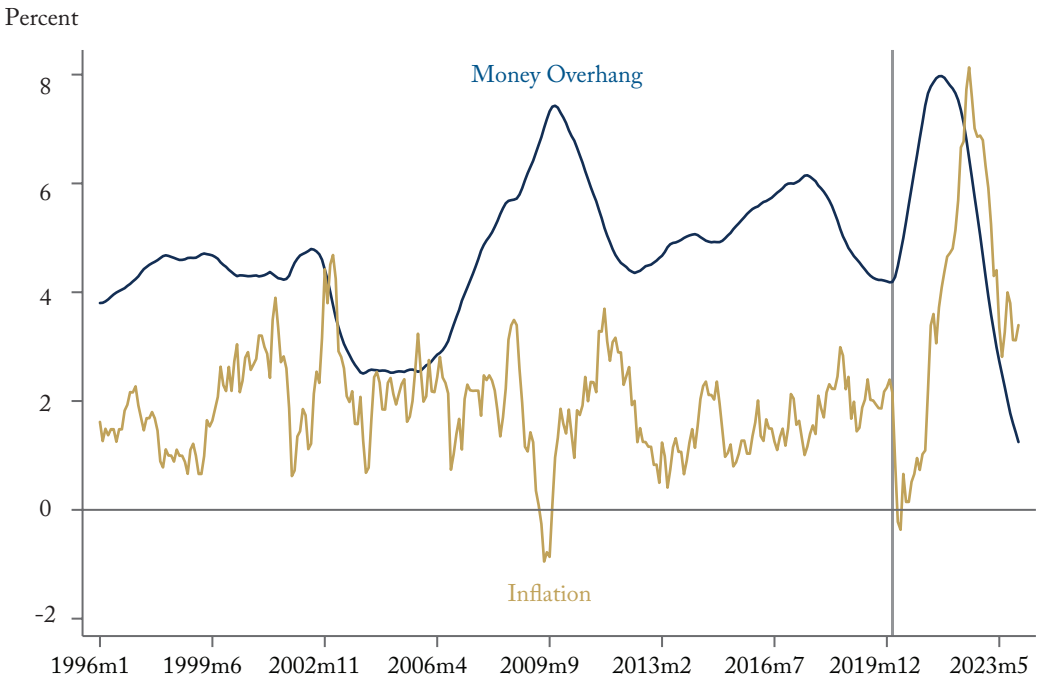
Ambler and Kronick (2022) use the index to show how it would have helped to predict the increase in inflation in Canada starting in early 2021. The month-over-month annualized rate of inflation was already 7.2 percent in January 2021, at a time when headline inflation (year-over-year) was only 1.0 percent and when the Bank of Canada was still worried about getting inflation back up to target. In January, the Bank held its target overnight rate at 0.25 percent, and stated (Bank of Canada 2021): "The Governing Council will hold the policy interest rate at the effective lower bound until economic slack is absorbed so that the 2 percent inflation target is sustainably achieved. In our projection, this does not happen until into 2023." By the beginning of 2023, headline inflation was running at 5.9 percent. As can be seen above

11 From Statistics Canada Table 10-10-0116-01: Sum of M2: "currency outside banks, chartered bank demand and notice deposits, chartered bank personal term deposits" and "deposits at trust and mortgage loan companies, deposits at caisses populaires and credit unions (excluding deposits at these institutions), life insurance company individual annuities, personal deposits at government owned savings institutions and money market mutual funds."

12 The "if caused by shocks to trend money growth," part of that sentence is important. In the GFC, the money overhang index spiked but did not lead to an increase in inflation. This was because the gap increased, not due to an increase in trend money growth but due to a fall in trend inflation. The recent increase was driven by nominal money growth, which front-ran inflation's increase, and the fall of late is due to a combination of increased inflation and falling money growth.

13 Hamilton (2018) and others have criticized the Hodrick-Prescott filter because it can induce spurious regularities in the cyclical component of time series when there actually are none. However, Franke et al. (2023) show that the alternative filter proposed by Hamilton can introduce irregularities when there are none. Furthermore, using artificial time series in which the trend and cyclical components are known by construction, the Hodrick-Prescott filter outperforms Hamilton's alternative in terms of the measured distance between the true and estimated trends.

Figure 3: Money Overhang Index, Jan. 1996 – Dec. 2023



Source: Authors' calculations.

(Figure 3), trend money growth was already on the rise in early 2021. Monetary indicators such as this provided warning signs of a major uptick in inflation to come.[14]

The updated index is shown in Figure 3. Real economic growth means that the demand for money balances grows faster than inflation, so there is generally a positive difference between trend money growth and trend inflation. What we want to see is whether that difference grows or shrinks over time using only the most recent data policymakers have when making monetary policy decisions. The gap shot up as soon as the pandemic began (as signaled by the gray vertical bar).

Since the gap continues to fall and now sits below where it was when the pandemic began, inflation should continue to slow towards the Bank's target.

We repeated the exercise using the median measure of core inflation, and the results were similar, with turning points in core inflation coinciding closely with those of headline inflation. In the most recent episode, trend inflation and trend core inflation peaked at the same time, starting to decrease with the same lag with respect to the money overhang measure. Since core is often touted as a reliable predictor of trends in inflation in the medium term, we think this underscores the usefulness of the money overhang index.

14 The Bank's announcement also underlines its focus on the link between economic slack and inflation (i.e., the Phillips curve). This link has proved to be quite unreliable both in Canada and abroad since the pandemic.

Monetary Policy Stance Indicator

The monetary policy stance indicator estimates an appropriate range for the Bank of Canada's target overnight rate using different versions of the Taylor (1993) monetary policy rule. The Taylor rule, in its simplest form, argues that a central bank's policy rate responds positively to increases in inflation and to increases in the output gap, which is the difference between actual output and the economy's potential output. A Taylor rule rate above the actual overnight rate suggests monetary policy needs to tighten. A Taylor rule rate below suggests it needs to loosen. Using a range helps with criticism over the optimality of any one specific Taylor rule. See the online Appendix for a description of the seven Taylor Rules that can be compared against the actual overnight range (see also Kronick and Ambler (2023b) for more details).

In Figure 4 below, we evaluate monetary policy over time to determine how often the policy rate sat in the range suggested by different Taylor rules, with a particular focus on the COVID-pandemic and the recent inflation surge. We look specifically at two of the seven potential Taylor Rules discussed in the online Appendix. We focus on a narrower range to provide a more useful analysis for the Bank of Canada. The first rule is that of Choudhri and Schembri (2013), who actually estimate the coefficients on the inflation and output gap terms, and also include the US policy interest rate as an explanatory variable. The second rule we include is the inertial rule, which includes the lagged policy rate so that interest rate adjustments are spread over time, which we believe is more realistic. We use two versions of that rule: one using headline inflation and one using core inflation.

Figure 4 below shows the evolution of the Taylor rule indicator between January 1996 and September 2023. The gold band gives the range of values predicted by the three different Taylor rule measures. The target overnight rate remained within the gray band more often than not over the sample period. However, it appears that the Bank should have started raising its policy rate from its effective lower bound of 0.25 percent beginning in July 2021. Inflation was only 1.1 percent in February 2021, but the next month jumped to 2.2 percent, and by July 2021 was 3.7 percent. This suggests that the Bank of Canada, like most central banks, fell behind the curve in fighting inflation. The figure also shows that the policy rate suggested by the indicator, as of June, was in line with the Bank's target overnight rate.

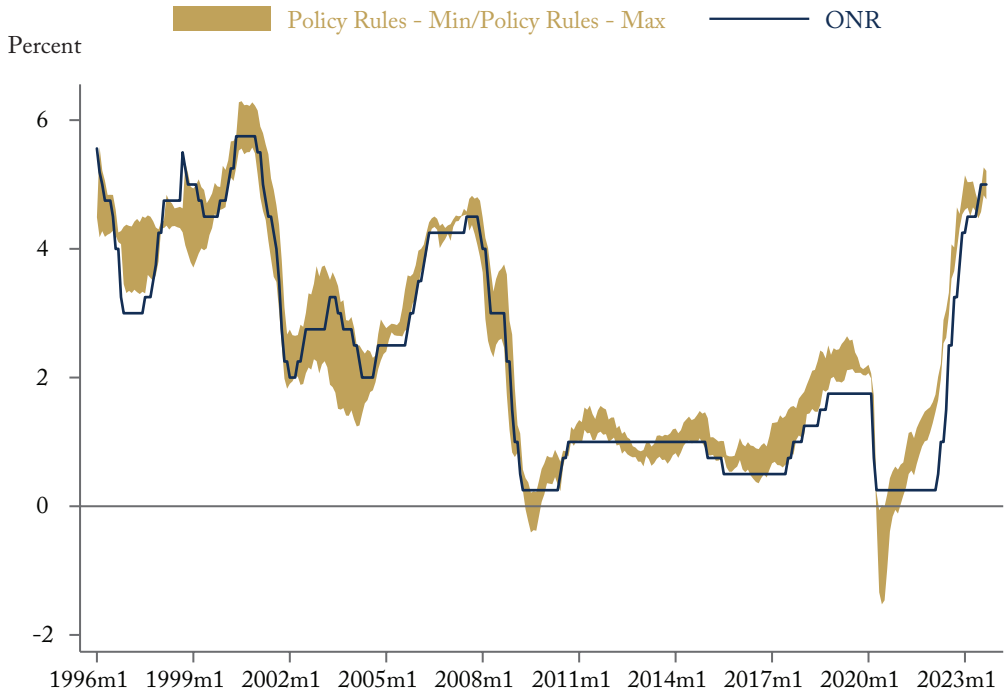
If we replace the output gap with the difference between the unemployment rate and the estimated natural rate of unemployment, we can calculate the monetary policy stance indicator up to and including January 2024. Figure 5 shows the results, again using the Choudhri and Schembri and inertial rules. Once again, it suggests that the Bank should have started raising rates earlier, this time in June 2021, and that the suggested rate was in line with the Bank's target overnight rate beginning in early 2023.[15]

Leading Economic Activity Index

The setting of the overnight rate and the domestic

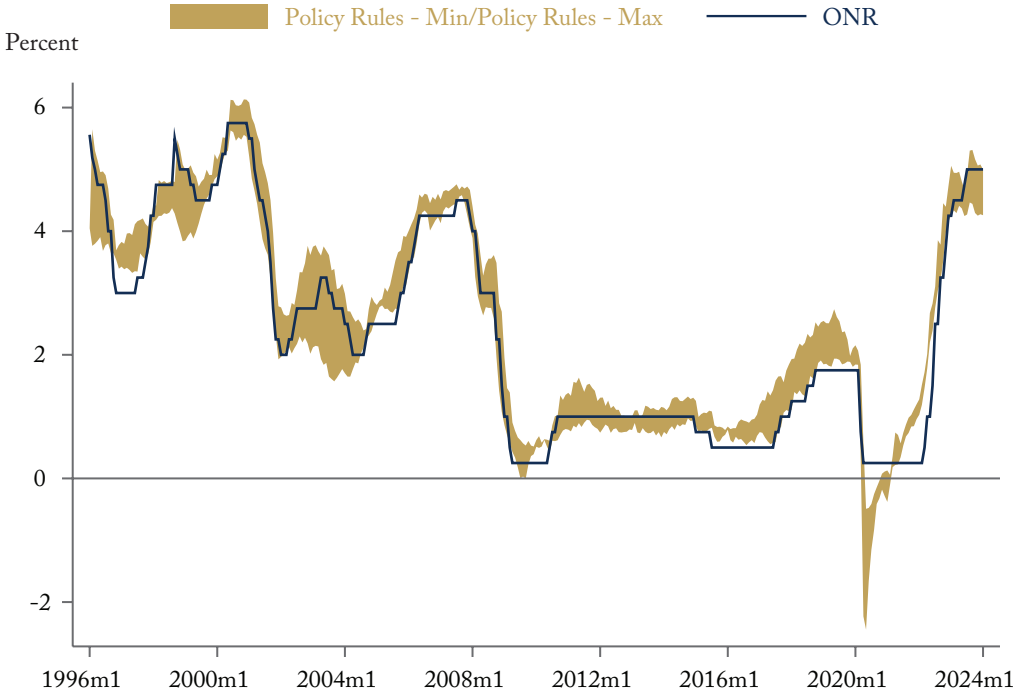
15 The effective lower bound-adjusted (or ELB-adjusted) approach accounts for the inability of the central bank to provide more stimulus to the economy when its policy rate cannot go lower (the Bank of Canada considers 25 basis points to be the effective lower bound). To compensate, the rate should stay at the lower bound beyond the point at which a balanced approach would dictate to start raising it. This approach would have been more sympathetic to the Bank falling behind the curve, suggesting it leave the overnight rate at the lower bound up until March 2022, which, coincidentally, is when the Bank started raising the policy rate. The issue is that that approach suggests a pretty sharp u-turn for the overnight rate once it starts tightening, with a big jump once off the lower bound. That is, obviously, not what the Bank did, nor is it appropriate given the effect it would have had on markets and borrowers.

Figure 4: Taylor Rule Range Indicator – Integrated Output Gap, Jan. 1996 – Sept. 2023



Source: Authors' calculations.

Figure 5: Taylor Rule Range Indicator – Unemployment Rate, Jan. 1996 – Jan. 2024



Source: Authors' calculations.

stability buffer are necessarily forward-looking. As a result, we need additional variables we can confidently describe as leading indicators. There is no publicly available leading economic activity index here in Canada.[16] Such an index would tell policymakers/regulators where the economy is headed, including the possibility of a downturn. Existing research[17] has identified a number of variables that exhibit leading indicator properties in forecasting economic activity. In broad terms, these variables are related to:

- average hours worked;
- employment insurance claims (first-time);
- new orders/estimated value orders/inventories on manufactured goods;
- building permits/housing index;
- the difference (spread) between 10-year and 2-year government bonds;
- money growth;
- business confidence;
- the stock market; and
- energy prices.

As this is a new data series, we provide a detailed description in the online Appendix of how we went from these broad categories to the index itself. For our purposes in this cover note, Figure 6 shows the leading economic activity index from January 1992 to January 2024.

The leading economic activity index does quite well in advance of each period of stress: the 2001 dot-com crash, the 2008 financial crisis and Great Recession, and the 2015 oil price collapse. On average, the LEI level peaks seven months ahead of the peak in the business cycle. The LEI trough, on average, occurs three months ahead of the trough in the business cycle. We leave out comparing the index to the COVID pandemic given the propagation of the virus happened independently of any of the data in the indicator.

The leading economic indicator (with some small ups and downs here and there) has been trending downward since the Bank of Canada started its tightening cycle. Its level is where it the last time inflation was below the 2 percent target in February 2021. We would suggest this is an indication of underlying weakness in the economy.

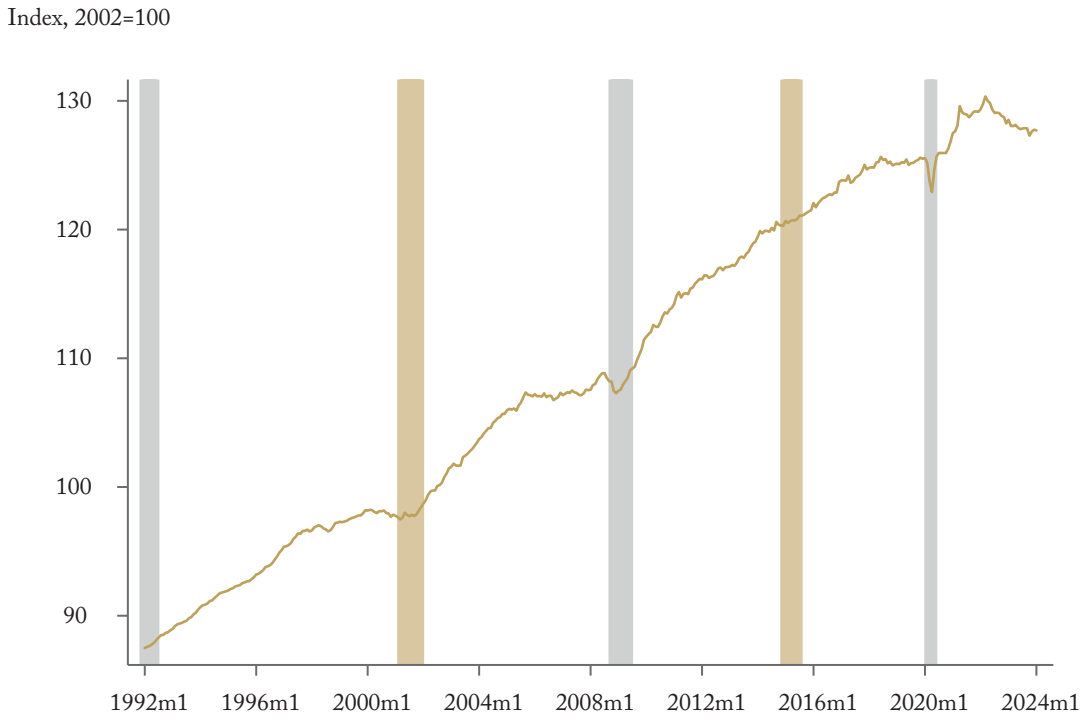
Demand-side/Supply-side Inflation Decomposition

Monetary policy is best suited to deal with demand-side shocks, as the overnight rate directly impacts borrowing and spending. Supply-side shocks are more complicated, as a negative supply shock is both recessionary and inflationary. It doesn't imply the Bank should do nothing in the face of the supply side shocks. It must judge how temporary these shocks will be and whether doing nothing will eventually cause inflation to get baked into wages, which creates a wage-price spiral, eventually de-anchoring inflation expectations. All that said, it is important to understand the degree to which demand and supply factors each influence inflation. With disaggregated data on prices and quantities of household consumption items in hand, and using a new methodology for identifying shocks by imposing sign restrictions, Chen and Tombe (2023, 2023b) evaluate the relative

16 The Conference Board of Canada does have a proprietary composite leading indicator but it is behind a paywall. The OECD has a publicly available leading indicator for Canada, the Composite Leading Indicator, but some of the underlying data are not freely accessible.

17 See, for example, the list of components making up the OECD's Composite Leading Indicator for Canada: https://www.oecd.org/sdd/leading-indicators/CLI-components-and-turning-points.pdf, and the components of the US Conference Board Leading Index: https://www.conference-board.org/topics/us-leading-indicators.

Figure 6: C.D. Howe Institute's Leading Economic Activity Index (2002=100), Jan. 1992 – Jan. 2024



Note: Grey bars represent recessions and gold bars periods of notable financial stress in the Canadian economy.
Source: Authors' calculations.

importance of supply-side and demand-side drivers of Canadian inflation.[18]

As it relates to the current tightening cycle, they conclude that:

> Both supply- and demand-side factors have played a role, with a substantial reduction in demand-driven factors accounting for most of the overall fall in the pace of growth of consumer prices. We find no evidence of the growing influence of labour costs on price increases and, encouragingly, we find modest evidence that higher interest rates have begun to reduce the pace of demand-side price increases among goods that are historically sensitive to monetary policy. Today, a greater portion of the remaining price pressures stem from supply-side factors. It is important to note that monetary policies alone cannot address these supply-side pressures directly; instead, they work primarily by reducing the overall demand for goods, services and economic activities.

Figure 7 (an updated version of Figure 4A from Chen and Tombe 2023b) confirms that much of the remaining price pressures come from the supply side.

18 Their methodology is based on detrended data, so that it is designed to pick up the short-term impact of temporary shocks. It will not pick up changes in long-run trends of either inflation or real growth. Also note that the price and quantity changes used to classify things as demand or supply-driven come from innovations within a vector autoregression, i.e. deviations from a flexible trend. The methodology is described in detail, as well, by Calvert Jump (2018) and Shapiro (2022).

Implications for Canadian Monetary Policy and Financial Stability

We now turn to the question of how the Bank of Canada and OSFI can use the C.D. Howe Institute database to help make decisions with respect to the overnight rate – currently set at 5 percent – and the DSB – currently set at 3.5 percent – respectively. On balance, these data lean more heavily towards explaining the macroeconomy than financial stability and the individual health of bank balance sheets. As a result, they might be perceived as providing more insights for the setting of monetary policy than the DSB. However, setting the DSB requires an analysis of data along two lines: first, the change in risks, and how and when those risks are likely to manifest themselves on bank balance sheets, and second – which is where these data can play an important role – the underlying state of the economy.

Once again, we remind readers that we are not suggesting there are no other variables worth investigating alongside these data; simply that they provide unique insights into the state of the economy that can be used to complement other publicly (or for policymakers, privately) available data.

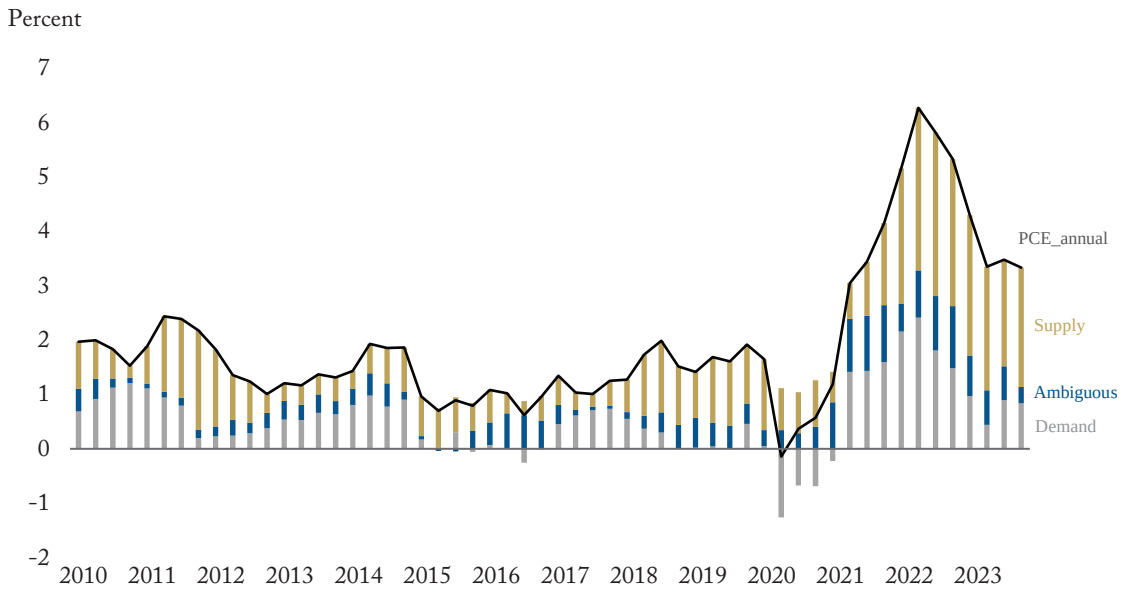
At present, the variables we have introduced in this paper lead to five conclusions regarding the state of the economy.

1) Although the vulnerability barometer has retreated from its 2022 peak, it is still above zero. Furthermore, we know risks have increased since the last available data point, and the diffusion index has been oscillating around 50, with signs that economic activity is weakening. Further tightening of monetary policy could tip the economy into recession: a diffusion index below 50 would be one of the factors leading the Institute's Business Cycle Council to declare an official recession.
2) The money gap index has dropped precipitously since 2022 and is now at a lower level than before the pandemic. The index suggests that inflation will continue its decline after turning up in July and August, and again in December, before falling in January.
3) The overnight rate is now within the range of values suggested by different versions of the Taylor rule.
4) The leading economic activity index is falling, and the drop is commensurate with declines that occurred in the Great Recession and the pandemic recession. In the former case, the leading indicator truly led, starting to decrease before the onset of the recession. In the case of the pandemic recession, its onset was brought about by the forced closure of many firms and entire sectors of the economies, so the leading indicator did not provide early warning (though it was flat in the months leading up to March 2020). The current level of the leading index has fallen back to where it was in February 2021, when inflation was last at or below the 2 percent target.
5) Much of the remaining inflation comes from the supply side where monetary policy has little impact. That doesn't imply the Bank can't or shouldn't tighten further to bring inflation back to target. However, the economic costs of doing so, with inflation stemming from the supply side, are greater. If the central bank were to judge the supply-side shocks as being permanent, or as being sufficiently long so as to de-anchor inflation expectations, then the central bank should tighten monetary policy.

In aggregate, these conclusions suggest the Bank of Canada's tightening cycle should be coming to an end and are possibly indicative of the need to cut. Looking back, the money overhang index predicted the most recent rise in inflation. The leading activity index also predicted well in advance future economic downturns or periods of stress. It is flashing red again. And this is supported by other data such as the diffusion index, which, notwithstanding the brief surge in November (followed by a sharp decline in December), shows economic activity flagging. With economic activity typically leading inflation, inflation seems set to continue back to the 2 percent target – a point confirmed by the gap between trend money growth and trend inflation having returned to where it was pre-pandemic (in fact, having fallen past that level).

From OSFI's perspective, even if risks have risen

Figure 7: Contributions of Supply and Demand to Annual Price Changes in the Personal Consumption Expenditure Index, Canada, 2010:Q1-2023:Q4



Source: Chen and Tombe (2023b) and authors' calculations.

since they last increased the DSB to 3.5 percent, which might suggest a further increase is in order, the macroeconomic context suggests this might be counterproductive as it could restrict credit flow, given the effect on cost of lending, which would amplify any economic downturn.

Conclusion

To summarize, our goal in this paper is to provide a series of unique C.D. Howe Institute indicators, or indexes, that we hope will be of use to interested third parties, including policymakers at the Bank of Canada and regulatory bodies like OSFI, as well as members of the C.D. Howe Institute's Monetary Policy Council and Domestic Stability Buffer Council in their deliberations, industry participants, and academics. We will publish our most up to date data on a monthly basis with free access.

As for the current juncture, our data suggest that the monetary policy tightening cycle should be at an end, and the DSB should be kept steady.

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