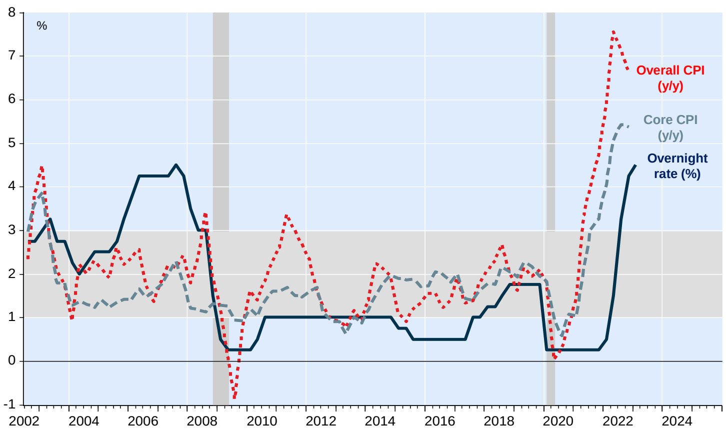
January 25, 2023

Canada's inflation composition argues for caution

By Alexandra Ducharme and Matthieu Arseneau

Inflation has without a doubt been the economic focus of 2022, and with reason. In the months following the onset of the COVID-19 pandemic, it has accelerated all around the world, including in Canada. In the second quarter of 2022, annual inflation as measured by the change in the consumer price index (CPI) peaked at a whopping 7.6% in the country, its highest level since the early 1980s. Since then, the situation has improved, with annual inflation sliding to 6.7% in Q4, a level that remains over twice above the upper half of the Bank's target range (chart).

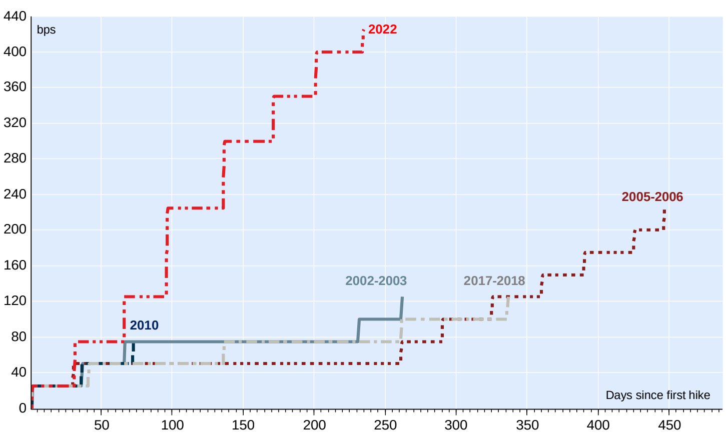
Canada: Is the central bank's job done?
All-items CPI, averages of core inflation measures and policy rate



NBF Economics and Strategy (data from Bloomberg and Refinitiv)

To bring inflation down and prevent expectations from de-anchoring, the central bank has already raised rates by 425 basis points since March, a faster and larger tightening compared to the episodes of the last two decades.

Canada: An extremely aggressive monetary tightening
Change in the Bank of Canada policy rate during tightening cycles



NBF Economics and Strategy (data from Refinitiv)

But the 2022 price jump is largely attributable to global supply disruptions, which complicates matters for central bankers. Indeed, their toolbox (mostly interest rates) allows them to influence demand – and not so much supply – driven inflation. Back in July, the Bank of Canada assessed that global factors such as the war in Ukraine and ongoing supply disruptions have been the biggest drivers of surging inflation, but that domestic price pressures from excess demand were becoming more prominent[1].

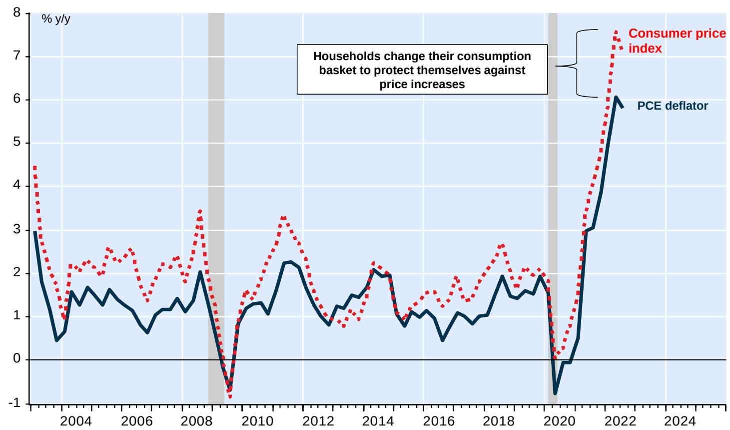
It is widely acknowledged that any change in the policy rate makes its full way in the economy six to eight quarters after it is undertaken. As such, nobody knows yet exactly to what extent the rate hikes announced by the BoC so far will dampen domestic demand – in turn pressuring inflation down. This transmission delay is the key to the current dilemma of the central bank, which, by its own admission, is trying to juggle the risks of overshooting and undershooting monetary tightening. Considering these lags, knowing the current share of inflation that can be imputed to demand can help the central bank to better assess whether its policy rate is at the appropriate level even if headline inflation is not yet on target. This is because the Bank would not respond in the same way to a supply-driven price shock as to a demand-driven one. If it did, it would unnecessarily depress demand, and inflation could fall below target as the supply shocks subside. This decomposition is the objective of this report.

Different price indicators for different needs

The consumer price index (CPI) is the measure of inflation most followed in Canada as it is the index that the Bank of Canada targets according to its official mandate and is used for the calculation of real return bonds payments. The CPI tracks a large number of prices but unfortunately does not provide information on quantities consumed, which is crucial for analyzing the supply and demand forces that drive inflation. To get information on quantities, we need to employ another lesser-known measure of inflation, the personal consumption expenditures (PCE) deflator, that is published quarterly[2]. This measure of inflation recently has peaked at 6.1% in Q2, its highest level since the early 1980s but significantly below the CPI figure of 7.6% (chart). The reason for this gap is that because of its fixed basket nature, the CPI does not consider the fact that consumers adjust their spending when they judge that prices have become too high/too low. The PCE deflator does not have this bias, being fully reactive to the substitution effect since the weights are adjusted with each release. However, it has other shortcomings, such as being provided only on quarterly basis and lacking timeliness.

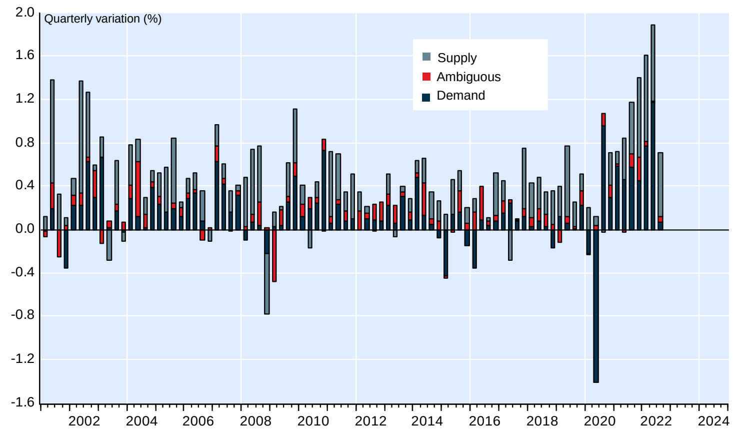
[1] https://www.bankofcanada.ca/2022/07/fad-press-release-2022-07-13/
[2] In the U.S., the PCE deflator is the inflation measure targeted by the Federal reserve and it is published monthly.

Canada: Perspective on different inflation measures
Consumer price index and personal consumption expenditure deflator



NBF Economics and Strategy (data from Statistics Canada)

Canada : Recent inflation momentum largely attributable to supply
Contribution of supply and demand to quarterly PCE deflator

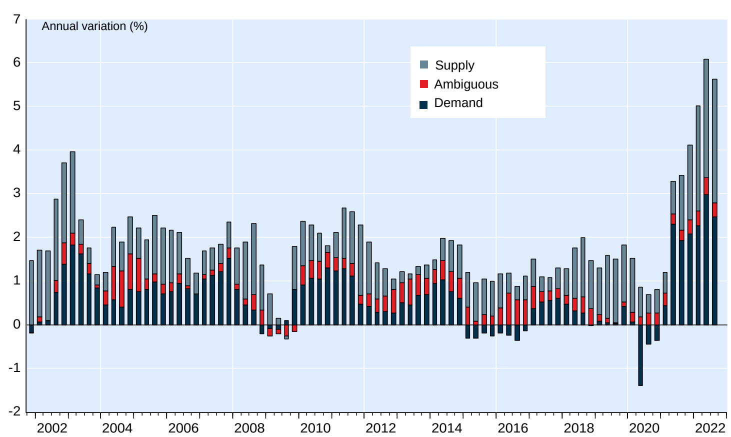


NBF Economics and Strategy (data from Statistics Canada)

Supply vs. demand forces

For the purpose of this report, we take advantage of the information PCE gives us and decompose supply and demand driven inflation using the methodology developed by the Federal reserve of San Francisco described in the appendix. Our results indicate that in the year to Q3 2022, supply-driven inflation was three times larger than usual and accounted for about half of the annual headline figure. About the same share can be attributed to demand, which also stood at a much higher level than normal over the past year, reflecting an economy that is still overheating (chart).

Canada : Both supply and demand weigh on annual inflation
Contribution of supply and demand to annual PCE deflator

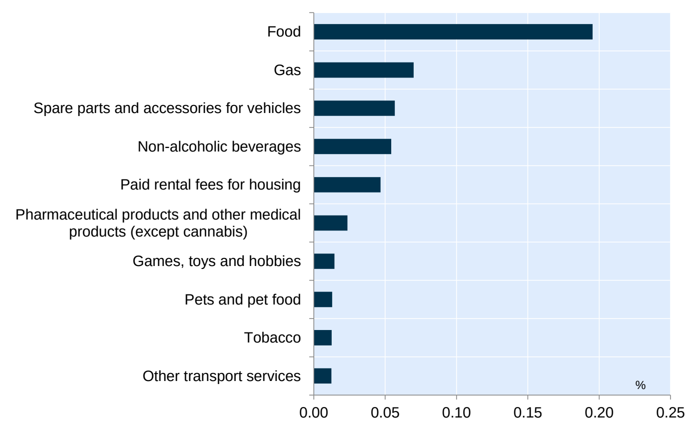


NBF Economics and Strategy (data from Statistics Canada)

Moving on to more recent trends, quarterly change shows that demand-driven inflation appears to have progressively swelled after the start of the pandemic but peaked in the second quarter of 2022. During Q3, the contribution of demand to inflationary pressures was negligeable, a sign that the transmission of monetary policy is underway. Meanwhile, supply pressures have yet to ease as of Q3 (chart), remaining twice as high than usual.

An analysis of the exact categories that have been labeled as supply shocks according to our method depicts an intuitive picture of the current forces behind inflation. Food and gasoline are the top two contributors, which is consistent with the relative inelasticity of these expenditure items and their recent price surges. Motor vehicle parts complete the podium, also not a surprise given the recent supply chain issues in this sector.

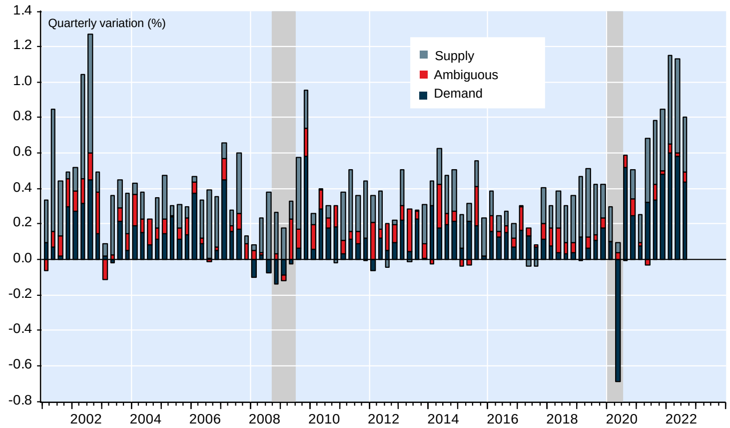
Canada: Top 10 supply contributors to quarterly PCE
2022Q3



NBF Economics and Strategy (data via Statistics Canada)

To get a clearer picture of the nature of the underlying inflationary pressures, key for central bankers, we also took a look at the core PCE deflator, which excludes food and energy. We found that total inflationary pressures were less acute compared to the previous three quarters, not only because of a decline of supply issues but also due to weakening demand pressures.

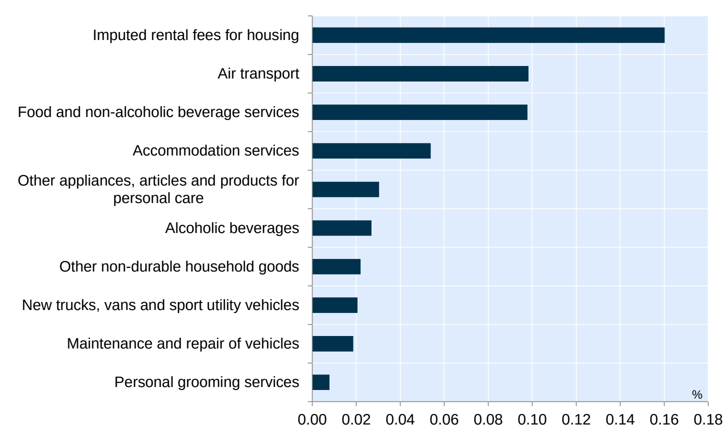
Canada : Demand still weighs on core PCE
Contribution of supply and demand to quarterly core PCE deflator



NBF Economics and Strategy (data from Statistics Canada)

Here again, the categories are very intuitive. Expenses considered to contribute to demand-driven core PCE inflation include imputed rental fees for housing, reflecting the recent housing frenzy. But there are also many discretionary services witnessing revenge spending after 3 years of pandemic, namely air transportation, restaurants, and hotels. As such, we expect the downward trend in the contribution of demand to continue in the coming quarters as households dry out their excess savings in a context of high interest costs.

Canada: Top 10 demand contributors to quarterly core PCE
2022Q3

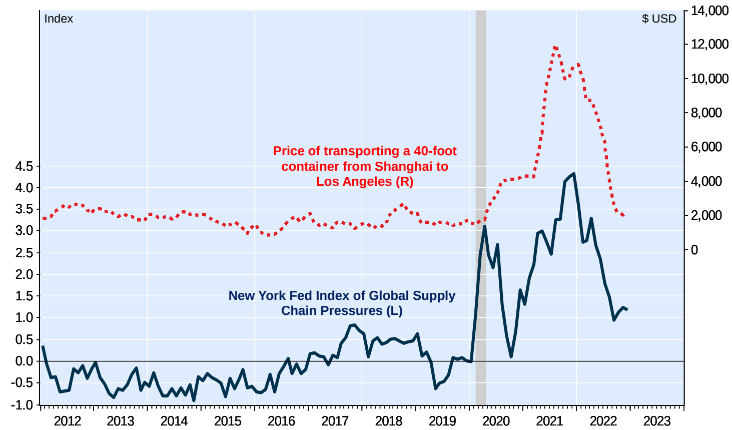


NBF Economics and Strategy (data via Statistics Canada)

Supply chain issues are dissipating

On the supply side, there are plenty of reasons to anticipate that inflationary pressures will ease in the quarters ahead. Lingering health restrictions have caused several difficulties to the global supply chain, but that is not the case anymore. Transportation costs have quickly normalized to pre-pandemic levels and the New York Fed global supply chain pressure index has improved sharply (chart).

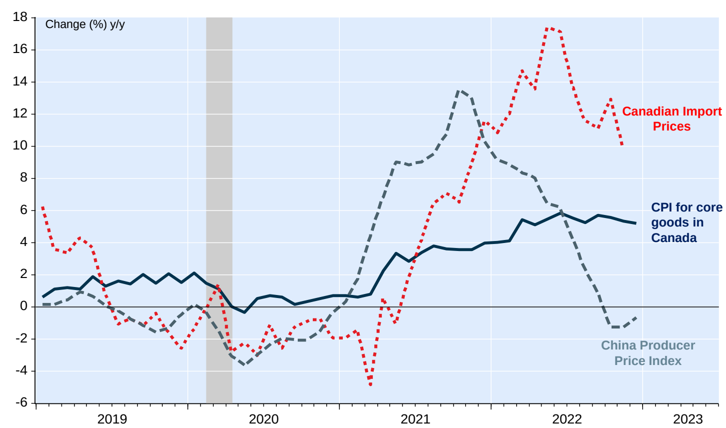
Canada: Moderation in good prices should continue
Merchandise transportation prices and supply chain pressure index



NBF Economics and Strategy (data via Bloomberg)

The evolution of Chinese producer prices will also help to moderate inflation in Canada via imported goods. As of December, the annual producer price index in China was in contraction, a sharp contrast with the 13% annual surge registered at its worst in 2021 (chart).

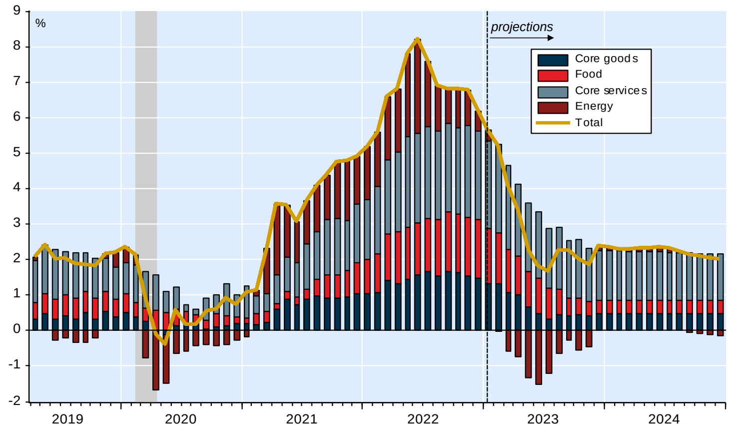
China could help ease pressure on the price of goods
China Producer Price Index, Canadian core goods CPI and Canadian Import Prices



NBF Economics and Strategy (data via Statistics Canada, Fred)

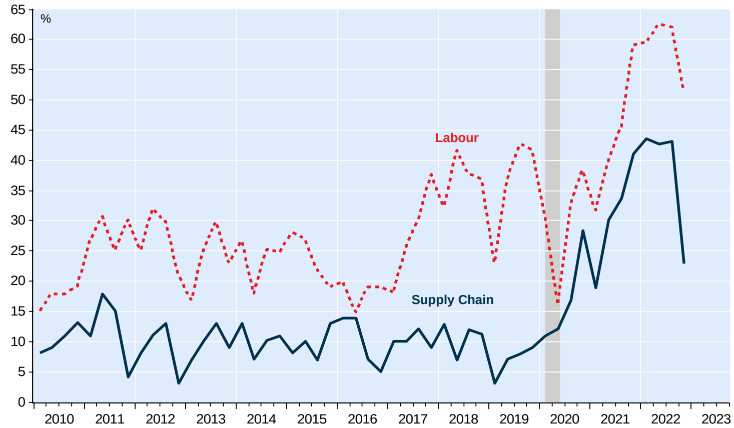
For these reasons, we believe that Canadian inflation will fall back closer to the 2% target much faster than the current consensus of economists (chart). This forecast is based on our belief that inflation in core goods and food prices will fade, while energy prices will remain contained at current lower levels. Meanwhile, services inflation will be slow to normalize, keeping core inflation at the upper end of the central bank's target range.

Canada: Contribution to headline annual inflation
Including projections



NBF Economics and Strategy (data via Statistics Canada, NBF)

Canada: Bottlenecks easing
Companies with supply chain/labour bottlenecks, Business Outlook Survey



NBF Economics and Strategy (data via Bank of Canada)

Conclusion

To address surging inflation, the Bank of Canada has been raising rates since March 2022, for a total of 425 basis points of tightening. But the Bank can only fight inflation by impacting demand. Inflation due to supply-side problems, whether supply chain problems due to lingering COVID-19 restrictions abroad, the invasion of Ukraine, or any other international disruption, is beyond the Bank's reach. Our calculations show that, although demand-driven pressures in underlying inflation remain historically high, there is already improvement on that front. Indeed, the impact of demand moderated in the core PCE deflator in Q3, registering the smallest contribution to inflation in four quarters. Given the significant lags in the transmission of monetary policy to demand, the Bank must be careful not to raise rates into overly restrictive territory. There is a risk of missing the inflation target on the downside if the supply issues vanished completely. Supply driven inflation, still a significant contributor to inflation in Q3, has also moderated according to our results and further improvements are in the cards. As of Q4, only 25% of businesses were reporting supply chain constraints, compared to 43% a quarter before (chart). Following the 25 basis point increase in the policy rate announced in January, the Bank of Canada believes that further tightening of monetary policy will not be necessary if its economic scenario materializes. Based on our results, we also think that a pause in the tightening cycle should be preferred to assess the impact of the already tight monetary policy on the economy.

Appendix: Methodology

Our methodology is drawn from Shapiro (2022)[3] and Chen & Tombe (2022)[4]. We start by retrieving data on detailed consumption expenditure of Canadian households, which is updated on a quarterly basis by Statistics Canada (table 36-10-0124-01). We remove adjusting entries and cannabis-related expenditure items to ensure we have a consistent basket over the full time-series. We also remove expenditure made by Canadians abroad. We use the quantity sold in nominal terms and in 2012 constant prices to calculate a price index by dividing one by the other. We then run a regression for price and quantity levels as in equations 1 and 2.

$$\ln(p_{i,t}) = \sum_{j=1}^{4} \beta_{1j} \ln(q_{i,t-j}) + \sum_{i=1}^{4} \beta_{2j} \ln(p_{i,t-j}) + b_{i,t} + \epsilon_i^j \qquad (1)$$

$$\ln(q_{i,t}) = \sum_{j=1}^{4} \beta_{1j} \ln(q_{i,t-j}) + \sum_{i=1}^{4} \beta_{2j} \ln(p_{i,t-j}) + b_{i,t} + \epsilon_i^j \qquad (2)$$

We run each regression on a 40-quarter (or 10-year) rolling window, the last datapoint being the third quarter of 2022. The intuition from this is that we want to take into account any change in price or quantity that is attributable to a structural shift in underlying economic conditions.

From these regressions, we obtain an expected value for price and quantity for each expenditure category. We compare these expected values to the price and quantity levels effectively realized at time t. This is represented by ϵ_i^j in each equation, i.e., the residual of the equations. Then, we compare the sign of these residuals. If both price and quantity are above (or below) their expected levels, we conclude that this expenditure category is experiencing a demand shock. If the price is above its expected level and the quantity is below (or vice versa), we conclude that there is a supply shock. If the price or quantity is too close to its expected level, we call this category ambiguous. We then sum the contribution of each expenditure item to get three aggregated contribution categories: supply, demand and ambiguous. To compute the annual contribution, we take the four-quarter rolling sum of these aggregations. We also calculate a core price index by excluding the energy and food consumptions items from our contributions.

[3] Shapiro, Adam Hale. (2022). Decomposing Supply and Demand Driven Inflation, *Federal Reserve Bank of San Francisco*, Working Paper 2022-18. https://doi.org/10.24148/wp2022-18
[4] Chen, Yu, & Trevor Tombe. (2022). The Rise (And Fall?) of Inflation in Canada: A Detailed Analysis of Its Post-Pandemic Experience. *University of Calgary.* https://dx.doi.org/10.2139/ssrn.4215492

NATIONAL BANK OF CANADA FINANCIAL MARKETS

Economics and Strategy

Montreal Office
514-879-2529

Stéfane Marion
Chief Economist and Strategist
stefane.marion@nbc.ca

Matthieu Arseneau
Deputy Chief Economist
matthieu.arseneau@nbc.ca

Kyle Dahms
Economist
kyle.dahms@nbc.ca

Daren King, CFA
Economist
daren.king@nbc.ca

Jocelyn Paquet
Economist
jocelyn.paquet@nbc.ca

Alexandra Ducharme
Economist
alexandra.ducharme@nbc.ca

Angelo Katsoras
Geopolitical Analyst
angelo.katsoras@nbc.ca

Toronto Office
416-869-8598

Warren Lovely
Chief Rates and Public Sector Strategist
warren.lovely@nbc.ca

Taylor Schleich
Rates Strategist
taylor.Schleich@nbc.ca

UK Residents

This Report is a marketing document. This Report has not been prepared in accordance with EU legal requirements designed to promote the independence of investment research and it is not subject to any prohibition on dealing ahead of the dissemination of investment research. In respect of the distribution of this Report to UK residents, NBF has approved the contents (including, where necessary, for the purposes of Section 21(1) of the Financial Services and Markets Act 2000). This Report is for information purposes only and does not constitute a personal recommendation, or investment, legal or tax advice. NBF and/or its parent and/or any companies within or affiliates of the National Bank of Canada group and/or any of their directors, officers and employees may have or may have had interests or long or short positions in, and may at any time make purchases and/or sales as principal or agent, or may act or may have acted as market maker in the relevant investments or related investments discussed in this Report, or may act or have acted as investment and/or commercial banker with respect hereto. The value of investments, and the income derived from them, can go down as well as up and you may not get back the amount invested. Past performance is not a guide to future performance. If an investment is denominated in a foreign currency, rates of exchange may have an adverse effect on the value of the investment. Investments which are illiquid may be difficult to sell or realise; it may also be difficult to obtain reliable information about their value or the extent of the risks to which they are exposed. Certain transactions, including those involving futures, swaps, and other derivatives, give rise to substantial risk and are not suitable for all investors. The investments contained in this Report are not available to retail customers and this Report is not for distribution to retail clients (within the meaning of the rules of the Financial Conduct Authority). Persons who are retail clients should not act or rely upon the information in this Report. This Report does not constitute or form part of any offer for sale or subscription of or solicitation of any offer to buy or subscribe for the securities described herein nor shall it or any part of it form the basis of or be relied on in connection with any contract or commitment whatsoever.

This information is only for distribution to Eligible Counterparties and Professional Clients in the United Kingdom within the meaning of the rules of the Financial Conduct Authority. NBF is authorised and regulated by the Financial Conduct Authority and has its registered office at 70 St. Mary Axe, London, EC3A 8BE.

NBF is not authorised by the Prudential Regulation Authority and the Financial Conduct Authority to accept deposits in the United Kingdom.

U.S. Residents

With respect to the distribution of this report in the United States of America, National Bank of Canada Financial Inc. ("NBCFI") which is regulated by the Financial Industry Regulatory Authority (FINRA) and a member of the Securities Investor Protection Corporation (SIPC), an affiliate of NBF, accepts responsibility for its contents, subject to any terms set out above. To make further inquiry related to this report, or to effect any transaction, United States residents should contact their NBCFI registered representative.

This report is not a research report and is intended for Major U.S. Institutional Investors only.

This report is not subject to U.S. independence and disclosure standards applicable to research reports.

HK Residents

With respect to the distribution of this report in Hong Kong by NBC Financial Markets Asia Limited ("NBCFMA")which is licensed by the Securities and Futures Commission ("SFC") to conduct Type 1 (dealing in securities) and Type 3 (leveraged foreign exchange trading) regulated activities, the contents of this report are solely for informational purposes. It has not been approved by, reviewed by, verified by or filed with any regulator in Hong Kong. Nothing herein is a recommendation, advice, offer or solicitation to buy or sell a product or service, nor an official confirmation of any transaction. None of the products issuers, NBCFMA or its affiliates or other persons or entities named herein are obliged to notify you of changes to any information and none of the foregoing assume any loss suffered by you in reliance of such information.

The content of this report may contain information about investment products which are not authorized by SFC for offering to the public in Hong Kong and such information will only be available to, those persons who are Professional Investors (as defined in the Securities and Futures Ordinance of Hong Kong ("SFO")). If you are in any doubt as to your status you should consult a financial adviser or contact us. This material is not meant to be marketing materials and is not intended for public distribution. Please note that neither this material nor the product referred to is authorized for sale by SFC. Please refer to product prospectus for full details.

There may be conflicts of interest relating to NBCFMA or its affiliates' businesses. These activities and interests include potential multiple advisory, transactional and financial and other interests in securities and instruments that may be purchased or sold by NBCFMA or its affiliates, or in other investment vehicles which are managed by NBCFMA or its affiliates that may purchase or sell such securities and instruments.

No other entity within the National Bank of Canada group, including National Bank of Canada and National Bank Financial Inc, is licensed or registered with the SFC. Accordingly, such entities and their employees are not permitted and do not intend to: (i) carry on a business in any regulated activity in Hong Kong; (ii) hold themselves out as carrying on a business in any regulated activity in Hong Kong; or (iii) actively market their services to the Hong Kong public.