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Prima: The Bank of Canada's New Projection and Policy– Analysis Model—An Overview

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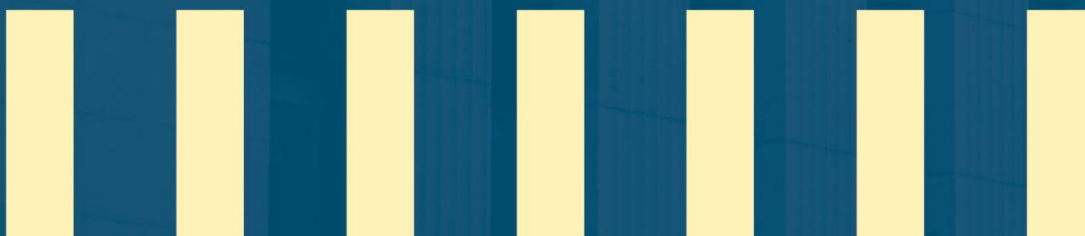
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AT A GLANCE

- Prima is the Bank of Canada's new model for projection and policy analysis.
- It builds on the economic foundations of earlier Bank models, adding detail on how sectoral pressures affect production costs and their pass-through to consumer prices.
- The model uses more comprehensive household and housing channels that strengthen the analysis of monetary policy transmission.
- Its performance has been tested to assess its economic mechanisms, forecasting accuracy and ability to account for selected historical episodes.
- Prima anchors the baseline outlook and supports scenario analysis, complemented by model variants and other tools for assessing inflation risks.

1. Introduction and motivation

The Bank of Canada uses macroeconomic models to help it interpret economic developments, prepare projections and assess monetary policy trade-offs. Prima is the Bank's latest model for this work. It builds on the strengths of the LENS (Gervais and Gosselin 2014) and ToTEM models (Murchison and Rennison 2006; Dorich et al. 2013; Corrigan et al. 2021). The Bank began using Prima in September 2026.

Prima follows the strategy set out in Coletti (2023). It preserves the core economic channels that have long guided the Bank's projection and policy analysis while strengthening the framework in areas where experience and research pointed to a need for more detail.

That need became particularly clear during the post-pandemic surge in inflation. Abrupt changes in demand interacted with production bottlenecks and supply constraints, creating significant cost pressures in some sectors. Those sector-specific pressures spread through production and supply networks, leading to a broad and unusually sharp rise in inflation.

The relevance of these mechanisms extends beyond the pandemic. Trade and energy disruptions, geopolitical developments, climate events and housing constraints can also generate sector-specific cost pressures. Although their effects may be smaller or less persistent than during the pandemic, those pressures can still spread across the economy and materially shape the outlook. Recent Bank of Canada research also emphasizes that supply shocks became unusually prominent during the pandemic and may remain an important source of inflation risk. This reinforces the need for tools that can trace how such shocks affect costs, prices and policy trade-offs (Kryvtsov and Sekkel 2026).

The Bank's previous framework assessed inflation largely through the balance between economy-wide demand and supply. Supply capacity was summarized by estimates of potential output, a smooth measure based on trends in labour input and productivity. Although useful for many purposes, that approach was less suited to situations where supply disruptions, bottlenecks or cost pressures emerged abruptly in specific sectors with broader implications for inflation.

When assessing consumer price index (CPI) inflation, what matters most is how supply, demand and costs evolve in the sectors that produce the goods and services households consume. Prima models

sectoral supply and demand, production, input use, costs and prices while adding more comprehensive household and housing channels for monetary policy transmission.

By linking sectoral developments to CPI outcomes, Prima provides a more systematic way to assess where inflation pressures come from, how they spread and how persistent they may become. It is therefore better suited to analyze not only shocks that begin in specific sectors but also economy-wide shocks that affect sectors differently.

Like all core policy models, Prima will be used, tested and refined over time. Regular projection use will show where its mechanisms are most informative, where variants or complementary tools are needed, and where new data or research should guide future development.

This overview explains why Prima was built, what it adds and how its main mechanisms support projection and policy analysis. A forthcoming technical report will provide the equations, derivations and details of estimation and validation (Alves et al. forthcoming)

2. Overview of Prima

Prima builds on the main insights of earlier workhorse models while introducing several important changes. **Table 1** summarizes these distinguishing features and their contribution to the Bank's projection and policy analysis.

Table 1: Prima's distinguishing features and their analytical purpose

Distinguishing feature	What it allows Prima to do
Production network	Trace how sectoral cost pressures spread through suppliers and producers to consumer prices
Sectoral heterogeneity	Distinguish how shocks affect production and costs across sectors
Variation in cost pass-through	Account for differences in how quickly and strongly firms pass costs on to prices
CPI components and producer prices	Link producer and import prices to the main components of CPI inflation
Household heterogeneity	Capture differences in the timing and strength of household spending responses to monetary and fiscal policy

Integrated housing block	Trace how housing demand, supply and financing affect residential investment, house prices and shelter inflation
Cognitive discounting	Limit the influence of distant expected developments on current spending, financial conditions and the exchange rate
Joint estimation of trends and cycles	Distinguish changes in underlying trends from cyclical pressures as new evidence accumulates

3. Sectoral costs and inflation

Prima traces the path from sectoral supply and demand conditions to CPI inflation by linking production costs, firms' pricing decisions and the transmission of price pressures across the economy.

3.1 Sectoral costs and production networks

Marginal cost captures sectoral supply and demand pressures

Real marginal cost is the cost of producing an additional unit relative to the selling price. It rises when demand puts greater pressure on the cost of labour, capital, energy and intermediate inputs, or when adverse developments in supply make those inputs less productive or more expensive. Because Prima models production, input use, costs and prices together, it uses data to help infer the sectoral supply and demand pressures consistent with observed outcomes.

This sectoral perspective matters because cost pressure can be concentrated in particular industries even when economy-wide measures, such as the output gap, show substantial slack.

Labour is central to Prima's supply side because it is a key input in production and an important source of businesses' costs. Firms combine labour with capital, energy and intermediate inputs to produce output. When demand rises, additional labour becomes more costly, adding to marginal cost pressure. Wages also affect household income and spending, linking production costs to economy-wide demand.

Prima uses an economy-wide nominal wage as a common anchor across sectors. Nominal wages adjust gradually because some agreements reset using expected conditions, while others remain under existing terms or follow past wage growth. Even with a common wage, cost pressures can differ across sectors because labour shares, productivity, selling prices and other input costs vary across industries.

Prima models labour market quantities at an aggregate level. It captures total hours, employment income and an unemployment forecast linked to broader labour market slack, but does not separately model vacancies, job search, separations or worker-firm matching. A labour market variant in development at the time of writing adds these features to study issues such as labour shortages,

vacancy adjustment and monetary policy transmission when employment adjustment is constrained by matching frictions.

The structure of Prima’s production network

Cost pressures do not remain confined to the sectors where they originate. Prima’s production network traces how those pressures spread through suppliers, producers and ultimately to consumer prices (Acemoglu et al. 2012; Cao and Dong 2020).

Prima represents production by using interconnected nodes for non-energy commodities, energy, goods, services and import distribution. Some nodes mainly supply intermediate inputs; others serve households, investment, government or export markets. Their connections show how shocks pass from their source through affected businesses to final demand and consumer prices.

Figure 1 and **Figure 2** provide stylized views of this structure. **Figure 1** places the production network within Prima’s supply side.

Figure 1: Prima’s supply side

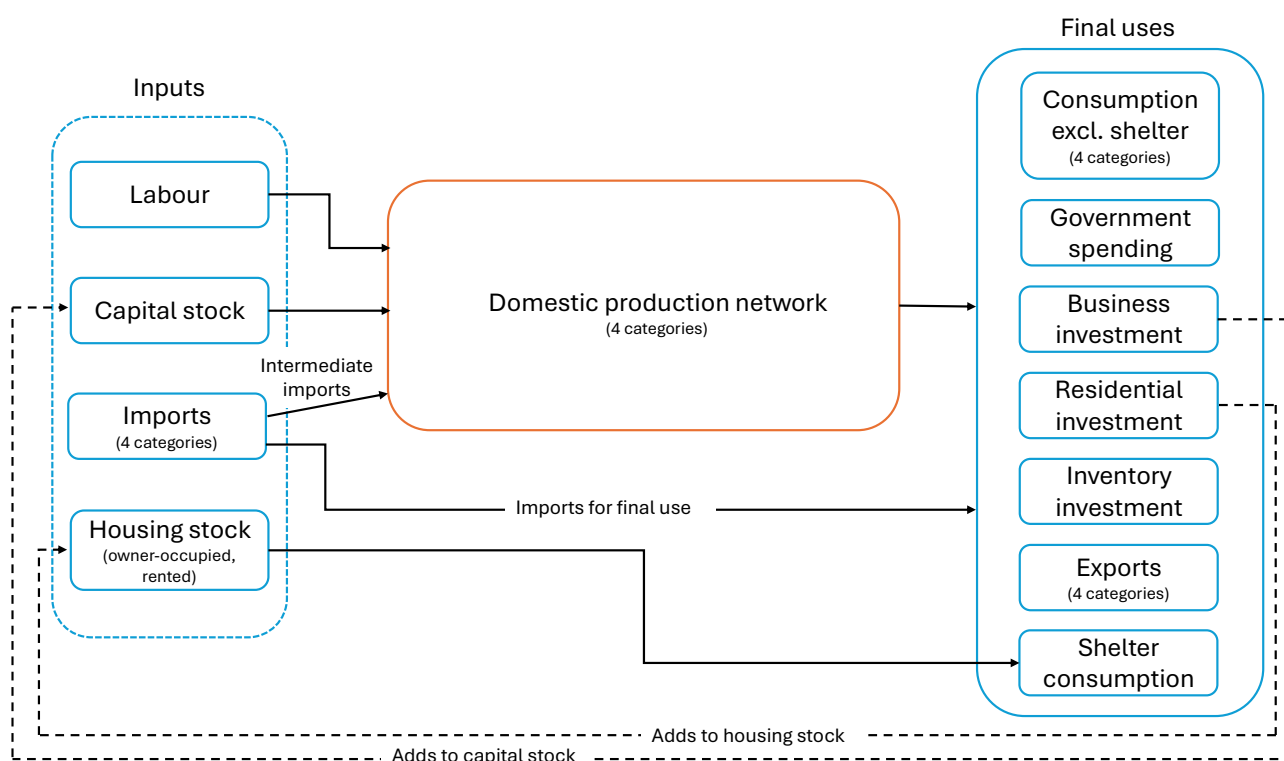
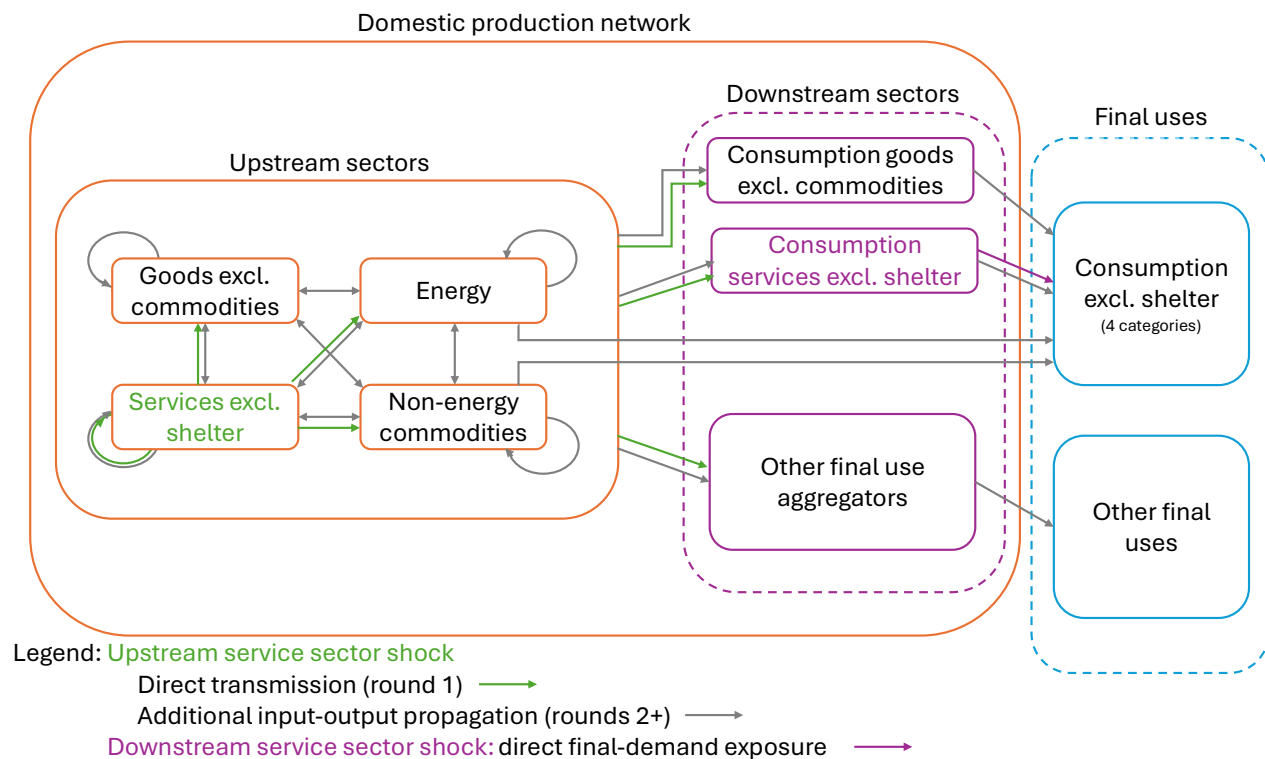


Figure 2 shows how shocks move through the production network. Four upstream sectors produce energy, non-energy commodities, goods and services. They supply one another and downstream sectors, which produce goods and services for final use. A disturbance in a downstream consumption services sector reaches consumers directly and generates little further propagation. A disturbance in an upstream intermediate-services sector instead affects other producers first and continues to spread as successive businesses adjust their costs and prices.

Figure 2: Prima's production network



3.2 How businesses set prices

Firms set prices based on costs, expectations and demand conditions. But only a subset of businesses adjusts their prices in any given period.

In the model, firms that reset prices take expected future conditions into account because they may not be able to adjust prices again for several periods. Other firms leave prices unchanged or link them to recent inflation within their sector. As a result, sectoral inflation reflects a mix of expected inflation, past inflation and changes in marginal cost. In downstream sectors that sell directly to households, strong demand can also lead firms to raise desired markups, adding to price pressures.

Adjustment speeds differ across sectors and CPI components. Some goods prices, such as gasoline, clothing and motor vehicles, tend to adjust relatively quickly, while some services and contract-based prices move more slowly. These differences shape how quickly sectoral disturbances affect CPI inflation and how long their effects last.

A sectoral Phillips curve summarizes this process:

$$\pi_{s,t} = \rho_s \pi_{s,t-1} + \beta_s E_t \pi_{s,t+1} + \kappa_s rmc_{s,t} + \gamma_s^c c_t + \varepsilon_{s,t}. \quad (1)$$

In equation (1), expected inflation ($E_t \pi_{s,t+1}$) summarizes the forward-looking part of firms' pricing decisions once individual prices are aggregated into sectoral inflation. Past inflation ($\pi_{s,t-1}$) captures gradual price adjustment and the role of firms that index their price changes to past inflation. Real marginal cost ($rmc_{s,t}$) summarizes current pressure from wages, capital, intermediate inputs and

productivity. The demand-sensitive term (c_t) captures the effect of household demand on desired markups in selected consumer sectors, while the remaining term ($\varepsilon_{s,t}$) captures other disturbances.

Household demand can affect desired markups

The demand-sensitive term (c_t) in equation (1) applies only in downstream sectors supplying final household consumption, reflecting the mechanism's focus on households' sensitivity to prices. In these sectors, stronger household demand per person raises firms' desired markups because customers may search less for alternatives or be more willing to pay prevailing prices. Weaker demand per person has the opposite effect, lowering desired markups and easing price pressure (Murchison 2025).

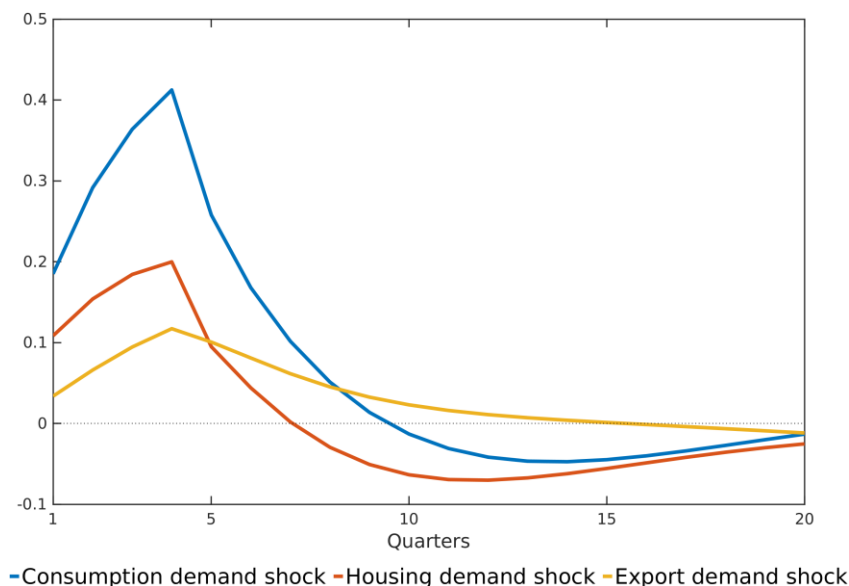
This channel is distinct from marginal cost pressure, which reflects demand relative to available labour, capital and intermediate inputs. A consumption demand shock can therefore raise inflation through both higher marginal cost and higher desired markups.

Chart 1 shows how CPI inflation responds to different demand shocks—consumption, residential investment and exports—where each shock is scaled to generate the same 1% increase in gross domestic product (GDP) on impact. The CPI responses differ because each source of demand raises marginal cost in different parts of the economy and has a different connection to consumer prices.

A consumption shock has the largest effect on CPI inflation. This is because it raises demand in sectors that sell directly to households and puts pressure on the inputs that are relatively important for producing those goods and services. That raises marginal cost in those sectors and, where Prima allows demand-sensitive pricing, can also raise desired markups. A residential-investment shock has a smaller but still sizable effect because it puts pressure on construction-related inputs and costs that feed directly into CPI shelter components. An export shock has the smallest effect on CPI inflation because it does not enter the consumer basket directly. Its CPI effect comes mainly through factor markets and production costs.

Chart 1: Demand composition matters for inflation

CPI inflation response to demand shocks, by shock type (year-over-year, percentage points, deviation from control)

**Inflation expectations**

Costs and consumer demand are not the only influences on current prices. Firms that reset prices also look ahead because the price they choose today may remain in place for several periods. In the model, expected inflation is best understood as a compact way of summarizing the future conditions that firms expect to face when setting prices today, including cost pressures. This can be seen by solving the sectoral Phillips curve in equation (1) forward:

$$\pi_{s,t} = \lambda_s \pi_{s,t-1} + \lambda_s^d \sum_{j=0}^{\infty} d_s^j E_t(\kappa_s r m c_{s,t+j} + \gamma_s^c c_{t+j} + \varepsilon_{s,t+j}). \quad (2)$$

Equation (2) shows that current sectoral inflation depends on past inflation and on discounted expectations of future real marginal costs, demand-sensitive desired markups and other price-setting disturbances. As a result, two shocks with the same initial size can generate different inflation outcomes if firms expect them to persist for different lengths of time.

Chart 2 illustrates why this forward-looking component matters by comparing energy price shocks that have the same initial size but different expected durations. When the increase in energy prices is expected to last longer, firms anticipate higher future costs and adjust prices more markedly today.

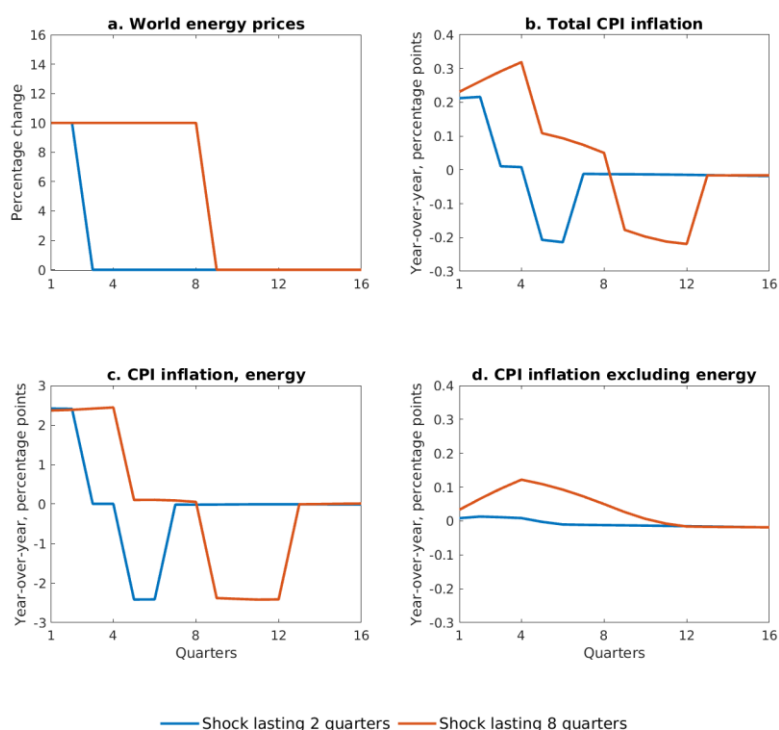
CPI energy inflation mainly reflects the direct path of the energy price itself. It rises when the shock hits, fades as the initial increase drops out of the year-over-year calculation and falls when energy prices return toward their previous path. The more revealing response is in CPI excluding energy. Even though energy prices enter that measure only indirectly, a shock expected to last longer generates a larger increase in non-energy inflation almost immediately.

Forward-looking firms anticipate that energy costs will remain elevated and therefore pass more of those costs through to prices sooner and for longer. The chart shows that persistence matters not only

for how long the original relative price shock lasts, but also for how strongly it spreads beyond the CPI component where it begins.

Chart 2: Expected persistence matters

Energy price shocks and their effects on inflation, deviation from control



This example raises a broader question: how do businesses form the expectations that guide their pricing decisions?

In Prima, firms' inflation expectations are model-consistent. They are aligned with the projected outlook, including the anticipated monetary policy responses to CPI inflation and economic slack. Under this assumption, a sectoral relative price adjustment does not by itself generate permanently higher inflation; inflation returns to target once the adjustment has been made.

A variant of Prima under development at the time of writing allows some agents to base their inflation expectations on the model's projection while others place more weight on recent inflation. In that variant, the share of agents using each approach is endogenous. It changes over time with the relative forecasting accuracy of model-consistent projections and recent-inflation rules, following the heterogeneous-expectations approach in Kostyshyna, Özden and Zhang (2024). This variant is designed to study situations in which recent inflation has a stronger influence on expectations than in Prima. Survey evidence and recent inflation episodes suggest that expectations may become more influenced by recent inflation when inflation is high or persistent. The variant therefore helps assess risks around credibility, inflation persistence and wage-price dynamics.

If expectations place more weight on recent inflation, a large or persistent relative price increase can have broader effects. Businesses and households may come to expect higher inflation to last, making price and wage setting more persistent. Monetary policy may therefore need to respond more pre-emptively to prevent a temporary price shock from becoming embedded in inflation expectations.

3.3 How sectoral prices affect CPI inflation

Prima links sectoral cost and price pressures to CPI inflation and traces how those pressures move through the production network to consumers. Joo et al. (2026) document the sector-based producer price indexes (PPIs) used in Prima.

From producer prices to CPI inflation

To connect these signals to consumer prices, Prima maps producer prices—both domestic and import—into four non-shelter CPI components:

- food purchased from stores
- energy
- goods excluding food and energy
- services excluding shelter

A bridge calibrated from input-output data captures the industries and imports that contribute to each component.

Producer prices are useful in this process, but they are not mechanical one-step predictors of CPI inflation. Their movements can reflect different economic forces, including upstream supply disruptions, stronger demand, temporary cost spikes, changes in margins or measurement noise. A simple CPI–PPI relationship averages across these cases and can therefore provide limited guidance, even though more granular evidence shows economically meaningful pass-through from producer to consumer prices when related product groups and supply-chain links are taken into account (Ahlander, Carlsson and Klein 2023; Wei and Xie 2022; Kostyshyna et al. forthcoming). Prima gives producer price movements more economic content by asking where the shock begins, what type of shock it is, how persistent it is expected to be and whether firms absorb the pressure in their margins or pass it on to consumer prices.

The four non-shelter CPI components listed above are combined using CPI expenditure weights, which differ from production shares and consumption weights in the national accounts. For most non-shelter items, CPI and the national accounts cover broadly similar products, although their coverage, weights and index methods differ.

Shelter requires separate treatment because CPI and the national accounts measure owner-occupied housing differently. The national accounts use imputed rent—the estimated rent on a comparable home—to measure the shelter services homeowners receive. CPI instead measures the costs of owning and occupying a home. CPI shelter inflation can therefore move differently from both other CPI components and the national accounts price of shelter services.

Prima models the main CPI shelter components distinctly. Inflation in paid rents reflects the balance between demand for rental housing and the slow-moving rental stock, with rents adjusting gradually over time. Mortgage interest costs depend on rates on outstanding mortgage debt and the principal

carried forward from past house prices, with changes in market rates passing through gradually as mortgages renew or refinance. Other owned-accommodation costs are linked to residential construction and renovation. Total CPI combines shelter with the four non-shelter components using CPI expenditure weights.

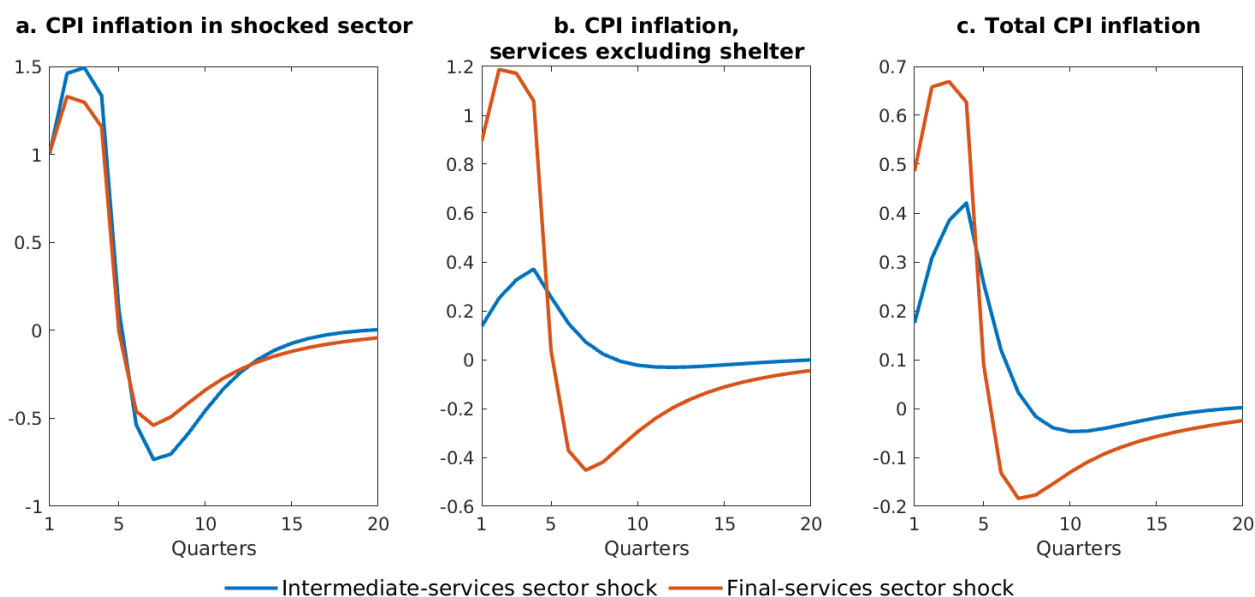
Where a disturbance begins shapes the path of inflation

Chart 3 shows how the location of a sectoral disturbance affects the timing of its effect on CPI inflation. The chart compares two shocks that initially raise sectoral inflation by the same amount: one in an intermediate-services sector that contributes inputs to other businesses, and one in a final-services sector that sells directly to households.

The final-services shock reaches CPI quickly because it affects prices already in the consumer basket. The intermediate-services shock first raises costs for downstream firms. As those firms gradually adjust their own prices, the effect reaches CPI more slowly and can persist for longer. The chart illustrates why upstream producer price pressures can contain information about future CPI inflation, rather than simply moving one-for-one with current consumer prices. This point is consistent with evidence on pipeline pressures and sectoral inflation dynamics (Smets, Tielens and Van Hove 2018).

Chart 3: Upstream shocks reach CPI more gradually

Year-over-year, percentage points, deviation from control



To illustrate the implications that the mechanisms described in this section can have on CPI components, **Chart 4** shows the response to a 100-basis-point increase in the policy interest rate. The purpose of the chart is not to summarize the full monetary policy transmission mechanism, which is discussed later, but to show how a common aggregate disturbance produces different inflation responses across CPI components.

A higher policy interest rate lowers demand and eases price pressures, but the effects reach CPI components at different speeds and through different channels. **Chart 4**, panel a shows the component responses. Inflation in non-shelter components declines after monetary policy tightening, though the timing and size of the declines differ across the food, energy, goods and services categories.

Shelter behaves differently at first (**Chart 4**, panel b). Mortgage interest costs rise as higher rates pass through to outstanding debt, while other owned-accommodation costs ease as housing demand and construction cost pressures weaken. Rent inflation adjusts slowly. Population-related rental demand remains firm, the rental stock adjusts gradually, and rents on existing leases change only over time.

Chart 5 decomposes the component responses by cost channel. Lower labour costs are especially important for services excluding shelter because these sectors are relatively labour intensive. Import prices play a larger role for CPI goods excluding food and energy, and a more moderate role for CPI food. Weaker consumption demand also lowers desired markups in sectors where pricing is especially sensitive to household demand. This adds another channel through which monetary policy reduces price pressure.

Chart 4: CPI components respond differently to monetary policy tightening

Year-over-year, percentage points, deviation from control

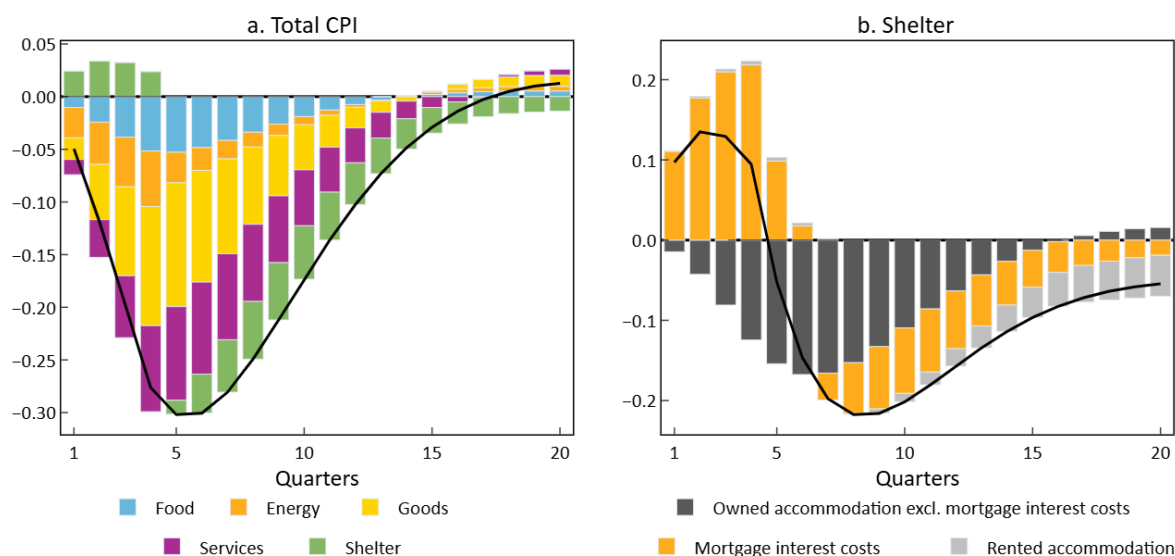
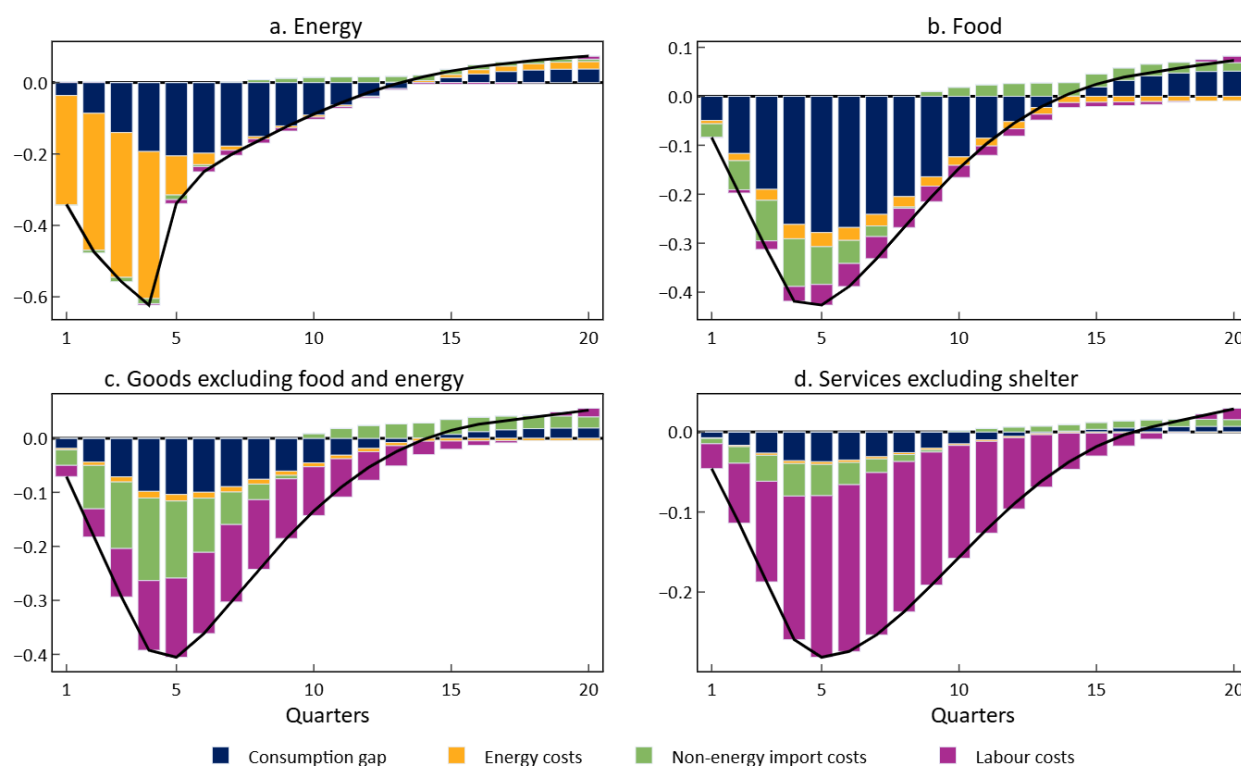


Chart 5: Decomposing the component responses by driver

Year-over-year, percentage points, deviation from control



Together, the examples in this section show how Prima connects sectoral supply and demand conditions to CPI inflation. Marginal costs, production networks, price-setting behaviour and the mapping of producer and import prices to CPI components all shape how shocks pass through to consumer prices. This is why inflation depends on more than the size of a shock. Where the shock begins, how persistent it is expected to be, and how it moves through businesses' costs all affect the path of consumer prices.

4. Aggregate demand and financial adjustment

Prima divides aggregate demand into different blocks:

- household consumption excluding shelter
- shelter services
- residential and business investment
- government spending
- exports
- imports

Several of these blocks build on familiar features of earlier Bank models, while Prima adds more detail on household heterogeneity and housing. The main components of spending respond differently to income, prices, financing conditions and expectations. Trade, net foreign assets, interest rates and the exchange rate help domestic spending and external balances adjust together.

Prima also keeps separate price measures for CPI, consumption in the national accounts and GDP because they are conceptually different and serve different analytical roles.

4.1 Household consumption excluding shelter

Household consumption excluding shelter is Prima's largest expenditure component and a key channel for monetary policy transmission. Households differ in their ability to smooth spending through financial markets, their reliance on current income and their exposure to mortgage debt. These differences shape the strength and timing of monetary policy transmission (Alves et al. 2022; Kaplan, Moll and Violante 2018; Auclert 2019).

Shelter services are discussed separately in section 4.2 because Prima treats housing as a distinct block linking rental and owner-occupied housing demand, residential investment, house prices and shelter inflation.

Prima distinguishes three household groups by their spending behaviour and financial position: lifetime-income households, current-income renters and current-income homeowners. Their spending responds differently to real interest rates, current labour income, government transfers, mortgage payments and borrowing constraints. Roughly one-third of the households in Prima are current-income households, about half of which are homeowners. **Table 2** summarizes the groups and the main factors that affect their spending.

Table 2: Prima's three household types and the main influences on their spending

Household type	Financial position	Factors that affect spending
Lifetime-income	Housing and liquid financial assets	Expected lifetime resources, real returns and recent consumption
Current-income renters	No modelled assets or debt	Current labour income and government transfers
Current-income homeowners	Housing, little liquid wealth and substantial mortgage debt	Current labour income, government transfers, mortgage payments, housing equity and borrowing capacity

Lifetime-income households

Lifetime-income households use financial markets to shift resources over time and receive the profits and financial income generated throughout the economy, including those associated with lending to current-income households and the government. Their consumption depends on expected lifetime resources and real interest rates, while habits make spending adjust gradually. Higher real interest rates encourage them to defer spending.

In Prima, cognitive discounting gives nearer-term income and real interest rates more influence than developments expected further into the future. This makes current consumption less sensitive to distant expectations (Gabaix 2020).

Current-income renters

Current-income renters do not smooth their spending through financial markets in the model. Changes in after-tax labour income or government transfers therefore affect their consumption immediately.

Current-income homeowners

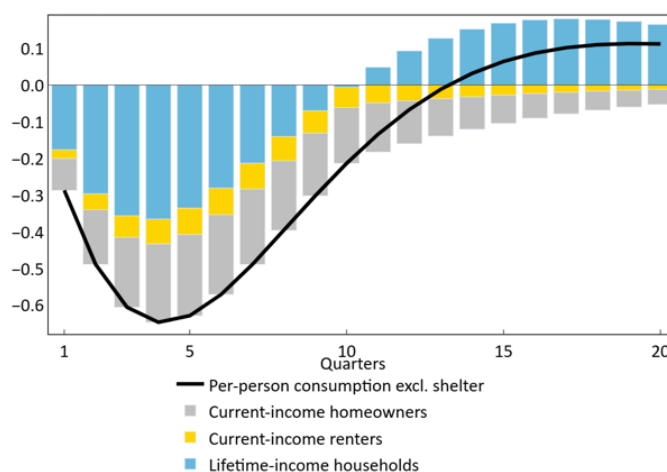
Current-income homeowners have little liquid wealth, so their spending is sensitive to their current labour income and government transfers. They also face borrowing constraints linked to housing equity. Higher interest rates gradually raise mortgage payments as loans renew or refinance, reducing cash available for other spending. Lower house prices also reduce housing equity and borrowing capacity.

An increase in the policy interest rate affects the three household groups through different channels and with different timing. **Chart 6** shows the response of per-person consumption excluding shelter to a 100-basis-point increase in the annualized policy interest rate.

Lifetime-income households reduce spending as higher real interest rates encourage saving and make current consumption less attractive. Current-income renters reduce consumption excluding shelter mainly because labour income falls. For current-income homeowners, consumption excluding shelter falls through several channels: mortgage payments rise as loans renew or refinance, labour income falls, and lower house prices reduce housing equity and borrowing capacity. These differences shape both the timing of each group's response and their contribution to aggregate spending.

Chart 6: Household heterogeneity shapes consumption responses to monetary policy tightening

Per-person consumption excluding shelter (percent deviation from control)



4.2 Housing demand, supply and adjustment

Prima treats shelter separately because housing plays two roles in the economy: it provides a flow of shelter services that households consume, and residential investment adds to the housing stock that provides those services over time. This distinction matters because rents, imputed rents, house prices

and residential investment can move differently when housing demand, financing conditions or population growth change.

Paid rent measures the shelter services consumed by tenants, while imputed rent estimates the value of comparable services that homeowners receive from their own dwellings. Prima models rental and owner-occupied housing separately and links each market to housing demand, supply, investment, prices and the services provided by the housing stock.

Rental housing

In Prima, renters are assumed to demand a stable amount of rental services per person, so aggregate rental demand moves mainly with the renter population. When population-driven rental demand grows faster than the slow-moving rental stock, rents and investment in rental units rise. Construction responds gradually because adjusting investment is costly.

Owner-occupied housing

Owner-occupied dwellings form part of the housing stock, while imputed rent measures the shelter services homeowners receive from their own dwellings. Demand for owner-occupied housing comes from both lifetime-income households and current-income homeowners.

For lifetime-income households, demand depends on the current and expected value of owner-occupied shelter services, future house prices and financing costs. Cognitive discounting in the model limits the influence of distant outcomes.

Current-income homeowners are more constrained. Their housing demand and other spending are affected by current labour income, government transfers, mortgage payments and borrowing limits tied to housing equity.

Residential investment rises gradually when additional housing becomes more valuable relative to construction costs.

House prices balance demand against a housing stock that cannot adjust immediately. Stronger demand initially raises prices because construction plans take time to change. Over longer horizons, the availability of land limits the expansion of the housing stock.

Housing market adjustment

Together, the rental and owner-occupied markets determine how rents, house prices, residential investment and the housing stock adjust when housing demand changes.

Chart 7 illustrates these housing market mechanisms by showing the impact of a permanent 1% increase in population. In the model, the shock adds people without adding a proportional amount of household wealth, housing stock or land. The additional population raises demand for shelter services before supply can respond, adding pressure particularly on rental housing.

Rental housing stock per person falls sharply because the number of renters rises before the rental stock can adjust. Rents increase as demand exceeds available supply. Although rents adjust gradually, the shock is large and persistent enough to generate a visible increase in CPI rent inflation.

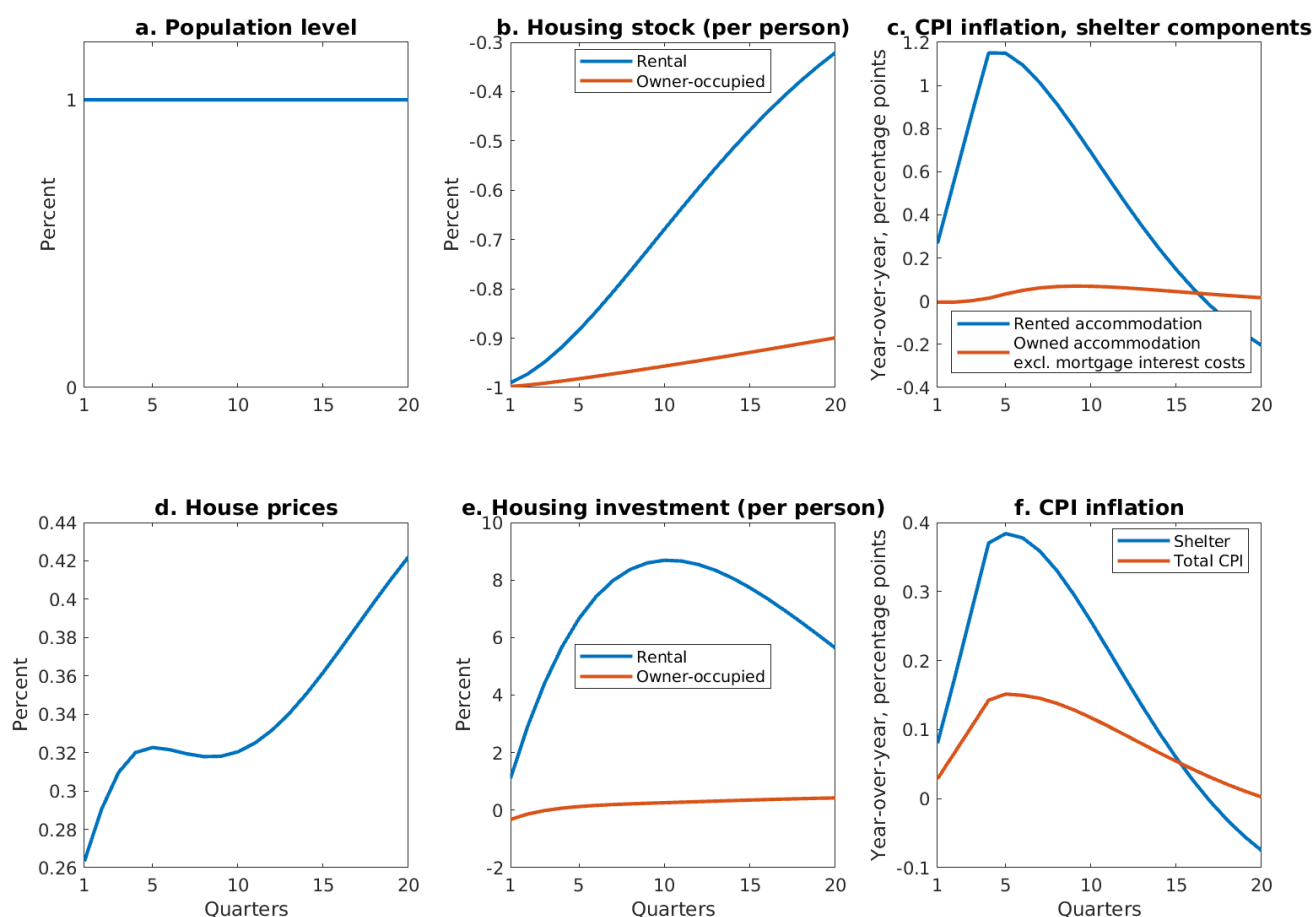
The owner-occupied market also responds because stronger overall demand for housing services pushes up house prices before the housing stock can adjust. Inflation in CPI owned accommodation excluding mortgage interest costs rises much less than house prices because it captures construction and maintenance costs but excludes land values, which account for much of the house price increase.

Higher rents and house prices make additional construction more attractive, so residential investment increases, especially in rental housing where demand pressure is strongest. But construction takes time, so housing stocks expand only gradually.

The slow supply response explains why the shock shows up mainly in shelter inflation: many other sectors can expand output more quickly and limit price pressure. As housing supply expands, pressure on rents and shelter inflation begins to ease.

Chart 7: Population growth raises housing demand before supply can respond

Deviation from control



4.3 Business investment

Prima distinguishes between the demand for capital services and the creation of new productive capital. Businesses that produce goods and services rent capital and use it alongside labour and intermediate inputs to meet demand. Their demand for capital helps determine the rental return that capital can earn.

Capital-producing firms respond to this demand. They transform investment goods into productive assets and compare the expected rental income and future value of additional capital with the cost of acquiring and installing it. Stronger demand for capital raises those expected returns and encourages investment, while higher interest rates and investment goods prices discourage it.

Investment adjusts gradually because changing investment plans is costly. Investment expenditure adds to current GDP and builds the capital stock, while existing capital depreciates over time. These mechanisms make business investment sensitive to both current financing conditions and expected future demand, with adjustment costs spreading its response over time.

4.4 Government spending and fiscal policy

Fiscal policy affects demand through government purchases, transfers and taxes. Government purchases add directly to final demand, while transfers raise household disposable income. Transfers affect current-income households' spending more immediately, whereas lifetime-income households spread the resulting increase in consumption over time.

In Prima, government purchases and real transfers follow persistent, countercyclical rules. They provide support when the economy is weak and labour input is below its sustainable level, then withdraw gradually as conditions improve. Fiscal expenditures are financed through taxes and short- and long-term government debt. Tax instruments include labour-income taxes, consumption taxes and taxes on energy sector profits. Over the longer term, the labour-income tax rate adjusts to keep the government debt-to-GDP ratio anchored.

Fiscal policy therefore supports demand in downturns while the tax rule prevents government debt from drifting away from its long-term path.

4.5 Exports and imports

For projections, rest-of-world variables in Prima are treated as inputs rather than determined inside the model. These include foreign demand, foreign prices, foreign interest rates, world energy and non-energy commodity prices, and foreign producer price indexes for goods exports and services exports. In the Bank's projection work, these inputs come from models maintained by the Bank's International Economic Analysis department and are combined with staff judgment.

Canada exports goods and services and relies on imports for production and final demand. Prima models exports and imports separately to capture the effects of foreign demand, competitiveness, exchange rates and tariffs. Both exports and imports are divided into four groups: non-energy commodities, energy, goods excluding commodities, and services.

Non-energy exports rise with foreign demand and fall when their prices increase relative to those of competing products. That relative price reflects Canadian producer prices, the exchange rate, rest-of-world prices and foreign tariffs.

Energy exports are determined mainly by Canadian supply because producers take world energy prices as given. Output expands until the Canadian-dollar value of energy equals marginal cost, with fixed natural resource inputs limiting the supply response. Energy exports equal production minus domestic

use. At the time of writing, the model does not yet capture pipeline, transportation or other market access constraints; incorporating these constraints is a priority for future work.

Imports enter consumption, investment, government purchases and intermediate production. Buyers shift toward the cheaper source where Canadian and foreign products can substitute for one another.

A currency depreciation raises import prices in Canadian dollars and encourages substitution toward Canadian sources where possible. It also raises the cost of imported intermediate inputs, which spreads through the production network into producer and consumer prices. Canadian tariffs work similarly by raising the purchase price of affected imports (Cacciatore, Hauser and Imura 2026).

Trade adjustment may be gradual because customer relationships, supplier networks, contracts and search costs take time to change. Adding persistence in export market shares or import sourcing shares is an area of future work in the model.

4.6 Open economy and financial market adjustment

Prima links Canada's external position, interest rates and the exchange rate to show how financial markets help the economy adjust to domestic and global developments.

Net foreign assets and external adjustment

Canada's current account records the balance of trade and cross-border investment income. A surplus adds to net foreign assets, while a deficit reduces them.

Prima links Canada's external position to household spending, financing costs and the exchange rate. Higher net borrowing from abroad lowers external wealth and increases the cost of external financing. For lifetime-income households, lower external wealth reduces lifetime resources and strengthens the incentive to save, lowering consumption and helping slow domestic spending.

In Prima, financial markets and the exchange rate reinforce the adjustment. As the external position deteriorates, the country risk premium rises, making Canadian assets less attractive and external financing more costly. The exchange rate also adjusts to support the trade balance. Together, lower external wealth, stronger saving incentives, higher risk premiums and exchange rate adjustment prevent net foreign assets from drifting indefinitely—a standard requirement in small open economy models (Schmitt-Grohé and Uribe 2003).

Short- and long-term interest rates

The policy interest rate anchors short-term risk-free rates. Longer-term rates depend on expected future short-term rates and a term premium. In Prima, cognitive discounting gives rates expected further into the future less influence on current long-term rates. Household and business borrowing rates add borrower-specific risk premiums.

The real exchange rate

For a small open economy such as Canada's, exchange rate movements are an important part of the economy's response to shocks. A flexible exchange rate supports the Bank's inflation-targeting framework by helping relative prices, trade flows and domestic spending adjust as external and domestic conditions change (Schembri 2019).

The real exchange rate measures the price of Canadian goods and services relative to foreign goods and services, adjusted for the nominal exchange rate. A real depreciation makes Canadian output cheaper for foreign buyers and foreign products more expensive for Canadian buyers, supporting exports and reducing imports where substitution is possible.

Exchange rate movements also affect inflation through import prices and imported intermediate inputs. A depreciation increases the Canadian-dollar price of imports, which can pass directly into consumer prices and indirectly into producer costs through the production network (Wei and Xie 2020).

Exchange rate dynamics

In Prima, the nominal exchange rate responds to interest rate differentials, the country risk premium and expected future conditions. Higher Canadian interest rates tend to support the Canadian dollar, while a higher country risk premium tends to weaken it by making Canadian assets less attractive. Cognitive discounting limits the influence of distant expected conditions on the current exchange rate.

The terms of trade are also an important influence on the exchange rate, and world energy and non-energy commodity prices are one source of movement in Canada's terms of trade.

Over time, exchange rate adjustment helps align domestic spending, trade flows and the external position.

5. Monetary policy

Prima traces how changes in the policy interest rate move through the economy. These changes affect household and business spending, housing, trade, financial conditions and the exchange rate, which in turn shape demand, employment, wages, production costs and prices. By adding richer sectoral, household and housing channels to familiar mechanisms from earlier Bank models, Prima provides a more detailed account of the strength and timing of monetary policy transmission. Prima produces a systematic policy response with a Taylor-type rule. In this benchmark rule, the short-term nominal interest rate responds to expected year-over-year CPI inflation four quarters ahead and to the output gap. This allows the model to capture transmission lags, the forward-looking dimension of policy analysis and the role of economic slack. The output gap matters because monetary policy aims to keep inflation close to target while avoiding unnecessary volatility in employment and economic activity.

The policy interest rate adjusts gradually, while the neutral rate of interest and potential output come from staff assessments outside the model:

$$r_t = \max\{r^{ELB}, \rho^R r_{t-1} + (1 - \rho^R)[r^* + \varphi^\pi(E_t \pi_{t+4}^{cpi,yy} - \pi^*) + \varphi^Y(y_t - y_t^*)] + \varepsilon_t^R\}. \quad (3)$$

The effective lower bound constrains how far the policy interest rate can fall. The policy disturbance captures temporary movements not explained by the systematic rule. The estimated coefficients summarize the average historical response to expected inflation and economic slack. The rule is a benchmark for projections and simulations, not a description of every past decision or a prescription for every circumstance.

The size of the policy response generated by the rule depends on how shocks affect expected inflation and the output gap. Supply and demand factors matter because they help determine how persistent and

broad-based the inflation response is likely to be, and how it interacts with expectations and demand. Prima traces these forces through the economy and helps policy-makers assess the path of inflation and the trade-offs involved in returning inflation to target.

Future work on the model will evaluate alternative policy strategies, including optimized Taylor-type rules and Ramsey policy. Optimized Taylor-type rules ask which systematic responses to inflation and economic slack would perform well across a range of disturbances. Ramsey policy asks what interest rate path would best achieve the specified policy objectives in a given situation. These exercises help assess how different strategies perform under alternative economic conditions.

6. Taking the model to the data and assessing performance

Taking Prima to the data requires connecting a structural business-cycle model to the rich information observed in the economy. The model must explain cyclical movements and economic relationships while allowing for slower-moving trends in the data. Prima makes this connection and is assessed before being used for projection and policy analysis.

Prima is disciplined in two complementary ways. Its structural relationships and underlying trends are estimated using calibration and Bayesian methods, drawing on household, business, sectoral and market data. Its performance is then assessed against evidence on economic dynamics, forecasting accuracy and selected historical episodes.

6.1 How Prima is disciplined by the data

Prima follows the approach discussed by Canova (2014), combining the structural model with a flexible statistical bridge to the raw data. The structural model accounts for cyclical movements and the economic links among variables, while the statistical trend components capture slower-moving developments outside the scope of the business-cycle model. Estimating these pieces together allows Prima to:

- use the observed data directly, rather than relying on gaps estimated outside the model or on other data transformations
- distinguish cyclical pressure from evolving underlying trends as evidence accumulates

These trends are not mechanically fixed by separate long-run equations for each variable. Because trends and cycles are estimated jointly, the split between them is disciplined by the model's economics and by smoothness restrictions that prevent trends from absorbing too much short-run variation.¹ Prima can therefore use information across many variables to assess whether a movement is cyclical or reflects a changing underlying trend. Production, spending, costs and prices are interpreted together, so the shocks and cyclical gaps used to explain movements in one variable must also be consistent with their effects on the rest of the model.

¹ These restrictions are implemented by calibrating how variable the trend components can be relative to the model's cyclical gaps and structural shocks. This calibration limits how much of the data the filter can explain by moving trends rather than by identifying cyclical pressure or disturbances. Without this discipline, the filtering process could let trends move too freely and leave unrealistically little for the model's shocks to explain.

A simple example illustrates why distinguishing trends from cycle matters for monetary policy. Goods prices have often risen more slowly than services prices over long periods. Prima can interpret that kind of persistent relative price movement as a slower-moving trend, rather than automatically treating it as cyclical demand or cost pressure. In contrast, a cyclical surge in goods demand or a temporary disruption to goods supply would have more direct implications for near-term total inflation. This distinction is a critical input to policy analysis because cyclical pressure may call for a monetary policy response while a slower-moving relative price trend may not.

The same interpretive process helps initialize each projection. The first two quarters incorporate staff monitoring and are treated in Prima as recent history. The monitored inflation path is supplied to the model rather than forecast by it. Prima interprets that path jointly with the other monitoring data, asking what economic configuration is most consistent with the information. That configuration may include a change in the underlying trend of relative prices across components, as in the goods and services example above, or cyclical demand pressures, sectoral cost pressures, changes in expectations or residual disturbances. The resulting interpretation becomes part of the projection's starting point and shapes the outlook beyond the monitoring quarters.

Prima combines calibration with Bayesian estimation. Calibration is used for directly measurable features and for parameters that the available data identify only weakly, including long-term expenditure and production shares, household balance sheets and input-output links.

Bayesian estimation is used mainly for dynamic relationships governing adjustment speeds, shock persistence and shock size, where the data are more informative. Economically plausible ranges guide the parameter estimates when the historical evidence does not pin them down tightly, while stronger evidence can move estimates away from their starting values.

Prima is estimated using quarterly data on sectoral production and prices, wages, commodity and import prices, producer prices, and expenditure components. The sample runs from the second quarter of 1997 to the first quarter of 2026 and covers periods of low and high inflation, the 2008–09 global financial crisis and the post-pandemic disruption.

6.2 Assessing model performance

The central performance test examines impulse responses—the paths variables follow after a disturbance—and the mechanisms behind them. Prima's responses to a broad range of shocks are assessed against Bank staff analysis, practical rules of thumb and broader literature. The evaluation considers the direction, relative magnitude, timing and persistence of those responses. It also requires the quantitative responses, economic explanations and accounting relationships to remain coherent across linked variables.

Matching observed co-movements is not enough. A statistical model may reproduce the data without explaining why variables move together, while a narrative added afterward need not be consistent with the model that generated the results. In Prima, explanations of co-movements are disciplined by mechanisms embedded in the model itself. This discipline supports coherent projection narratives and risk analysis.

Forecasting provides a complementary test. In an in-sample exercise using historical data, Prima's performance is compared with a simple univariate autoregressive benchmark model. For real GDP growth and CPI inflation, Prima performs about as accurately as the benchmark; differences in performance are not statistically significant.

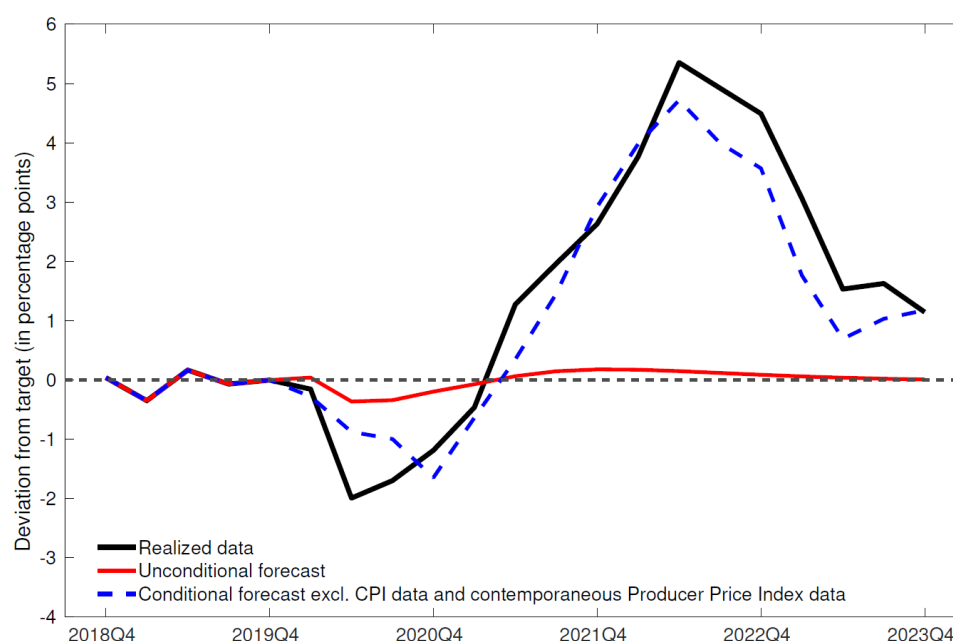
Another historical exercise asks whether Prima can organize the post-pandemic inflation episode through its own mechanisms. In the exercise, the model is given contemporaneous values for much of what actually happened in the economy after the fourth quarter of 2019, including activity, spending, labour market conditions, interest rates, exchange rates, commodity prices and other non-inflation information.

The exercise, however, withholds all CPI information after the fourth quarter of 2019, including total CPI inflation and its components. It also withholds contemporaneous Canadian and foreign producer prices. The exercise is therefore not a real-time forecast: Prima is not asked to predict the pandemic or the recovery before they happened. It is a mechanism test of whether, conditional on many realized non-inflation developments, the model can generate a meaningful CPI inflation response without being shown CPI data, CPI components or same-quarter upstream price signals.

Chart 8 compares actual CPI inflation with two model-implied paths. The unconditional forecast from the fourth quarter of 2019 remains close to the 2% inflation target because the model does not know the pandemic and recovery are coming. The restricted-information path accounts for most of the rise and fall in CPI inflation. This suggests that, conditional on the realized macroeconomic environment, Prima captures important links between global cost pressures, import-related pressures, sectoral developments and consumer prices through its marginal cost, production network and price-setting mechanisms. This result should be interpreted as a mechanism test, not as evidence of real-time forecast performance or full causal identification.

Chart 8: Prima's account of post-pandemic CPI inflation

CPI inflation (year-over-year, percentage points)



6.3 Overall assessment

Together, these tests assess Prima's dynamics, economic explanations, predictive performance and selected mechanisms. No single exercise validates the model as a whole, but the combined evidence supports Prima's use as the Bank's baseline projection model for building projections, explaining economic developments and assessing policy risks.

Future work will continue to strengthen Prima's empirical foundation by using new data and estimation methods to sharpen key relationships and improve projections and policy analysis. That work could include modular estimation of selected blocks and estimation methods that target key model properties, such as selected impulse responses or empirical patterns that matter for projection narratives and policy analysis.

Ongoing work is also exploring data-rich techniques that use larger sets of macroeconomic, sectoral and financial indicators to support projection analysis. The aim is to use more timely information to improve the tracking of selected variables, shocks and short-term dynamics in ways that complement Prima's core model. Related work by Gelfer provides examples of how data-rich dynamic stochastic general equilibrium methods can be used in forecasting applications, including in an open economy setting (Gelfer 2019, 2021).

7. Risk management with Prima

Economic projections are uncertain. A central projection provides a coherent baseline view of how the economy is likely to evolve. Inevitably, there are risks around this baseline outlook. One reason is model

uncertainty: the economy may respond through mechanisms or relationships that are only imperfectly represented in Prima. Another is practical: the regular projection version of Prima is linearized around a reference point, making it less suited to asymmetries, unusually large shocks or constraints that bind only in some conditions.

Risk management therefore starts with two questions: Are the risks around the baseline balanced, and what economic developments could produce those outcomes? Statistical risk tools help answer the first question; scenarios help answer the second. Cateau, Coletti and Portelance (2025) discuss the Bank's evolving risk management approach; Mendes, Murchison and Wilkins (2017) provide broader context on monetary policy under uncertainty.

Prima is the baseline projection model within the broader NextGen modelling system, which also includes model variants, specialty models, risk tools and the digital infrastructure that all support projection and policy analysis.

Assessing risks around the baseline

Statistical risk tools help characterize risks that are difficult to see from the baseline alone. Macro-at-risk methods use economic and financial indicators to estimate the range of possible outcomes for inflation and output. They can show whether risks are tilted above or below the baseline and how that balance changes over time (Surprenant 2025; Adrian, Boyarchenko and Giannone 2019). Scenarios then help explain the economic developments that could produce those outcomes and the policy issues they would raise.

The distributions generated by macro-at-risk tools are therefore a starting point for identifying whether risks around the baseline are asymmetric or whether unusually large upside or downside outcomes deserve attention. Scenario-synthesis methods help translate those distributions into a manageable set of economic scenarios for policy discussion (Adrian et al. 2025). In practice, analysts build these scenarios using shocks in Prima, variants of Prima or other specialty models.

Building scenarios around important risks

Scenarios provide the economic narrative behind important risks. They can test a specific shock, a different interpretation of recent data, an alternative behavioural mechanism, or a constraint that may bind only in some conditions. A scenario's location in a risk distribution shows how unusual its outcome would be for a particular variable and horizon, not how likely the scenario itself is.

Prima strengthens scenario analysis by allowing the main implications of a scenario to be generated within the core projection model. Its structural links determine how alternative assumptions spread through expectations, marginal costs and prices, rather than requiring those effects to be imposed separately.

Prima's structural design also makes it easier to build disciplined variants, because alternative assumptions can be tied to specific economic mechanisms. This makes scenarios easier to interpret and explain than comparable exercises in a reduced-form model. These variants can examine inflation expectations, wage adjustment, labour markets and state-dependent pricing (Harding, Lindé and Trabandt 2023; Blanco et al., forthcoming). Specialty models can add mechanisms, states or

constraints—such as financial vulnerabilities or climate effects—that are outside the regular projection model.

Where possible, analysts compare these tools within a common frame. They align conditioning assumptions, construct economically comparable scenarios and ask the same policy question. Differences can then be traced to the relevant mechanisms or constraints rather than unrelated assumptions.

Using the scenarios for policy

Scenarios let policy-makers compare how different economic developments could affect inflation, activity and the policy interest rate path. The analysis focuses on the mechanisms driving each scenario, the severity and persistence of the resulting outcomes, and the policy response that would be appropriate if those developments occurred.

Comparing scenarios can reveal whether a policy path that works for the baseline projection would produce particularly costly outcomes under a more extreme alternative scenario. It can also expose difficult trade-offs. A stronger policy response may better protect against persistent inflation but deepen weakness in activity if a downside scenario materializes. A more gradual response may limit those costs but fuel inflation in an adverse upside scenario.

The objective is not to determine a policy path that is best in every scenario. Scenario analysis instead:

- helps policy-makers identify policy choices that remain effective across plausible outcomes
- gives greater attention to outcomes with especially serious consequences
- recognizes the developments that would warrant a change in the policy stance as new information arrives

8. Conclusion

Prima gives the Bank a more systematic framework for exploring inflation, economic activity and the transmission of monetary policy. It builds on the aggregate mechanisms of earlier models by adding richer links among sectoral supply and demand, production costs, prices and production networks. Its household and housing blocks also strengthen the analysis of how monetary policy affects spending, borrowing costs and shelter inflation. Together, these features make Prima a stronger platform for explaining the forces shaping the outlook.

Prima provides a disciplined baseline, not a mechanical answer. Bank staff will combine its use with timely information, judgment and complementary tools when assessing the outlook and policy risks. Its value will grow through regular use, as rounds of projections and new policy questions reveal where the core model is most informative, where variants are needed and where further development should focus.

As part of the broader NextGen modelling system, Prima also changes how model-based analysis is produced and used. It has been developed through close collaboration among economists, engineers and scientists. That collaboration combines economic research with modern digital infrastructure, stronger documentation and governance, and emerging AI-assisted tools for model interpretation and

projection analysis. Together, these investments make Prima not only a new projection model, but a foundation for more coherent, transparent and adaptable policy analysis.

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