

# Monetary Policy Trade-offs Under Imperfect Central Bank Information\*

Tommy Iao

Ekaterina Shabalina

Reserve Bank of Australia

Reserve Bank of Australia

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## Abstract

Central banks typically aim to respond to demand shocks while looking through supply-driven inflation, yet the distinction between these shocks is imperfectly observed. This paper measures the extent of central bank’s misidentification of demand and supply shocks and quantifies the welfare costs of this shock-type uncertainty across the wealth distribution. First, we recover the central bank’s perceived demand-supply decomposition of inflation from forecast revisions and compare it with a benchmark decomposition constructed from disaggregated price and quantity data. This procedure yields estimates of the probability that the central bank correctly identifies each shock type and points to economically meaningful misattribution, with somewhat more accurate identification of supply-driven inflation than demand-driven inflation. Next, we embed these estimates in a heterogeneous-agent New Keynesian model to study the policy trade-offs generated by shock-type uncertainty. Misidentification distorts monetary policy by making the response insufficiently strong to demand shocks and excessively strong to supply shocks. Absent information frictions, welfare rises for all households, with lower-wealth households experiencing the greatest gains. These gains arise primarily from avoiding excessive policy responses to supply-driven inflation.

**Keywords:** *monetary policy, imperfect information, demand and supply shocks, heterogeneous-agent models, distributional effects, trade-offs.*

**JEL classification:** *D63, D83, E31, E32, E52, E58, E61.*

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# 1. Introduction

The classical prescription from monetary theory is to react strongly to demand shocks and to look through the supply disturbances.<sup>1</sup> The ability of the central bank to follow these prescriptions depends on its ability to differentiate between supply-driven and demand-driven inflation – a task that is often challenging in real time despite substantial resources devoted to assessing current and future economic conditions.<sup>2</sup> As a result, the welfare consequences of a particular policy could be different from the intended outcomes due to information frictions the central bank faces. Not only do these frictions alter the aggregate outcomes, but they also have unequal burden across the population and thus affect the distributional consequences of monetary policy. While the distributional effects of monetary policy in the recent years have received considerable attention in the literature, the literature examining the distributional effects of monetary policy has largely abstracted from central-bank information frictions. We relax this assumption.

We quantify the welfare costs across the distribution of shock-type uncertainty—the probability with which central banks misidentify demand and supply shocks. We pursue a two-step approach. First, we measure the central bank’s misattribution of demand and supply components of inflation using forecast revisions, sectoral price and quantity data and sign-restriction identification, recovering probabilities of correct shock identification. Second, we embed these empirical estimates into a medium-scale heterogeneous-agent New Keynesian model and conduct welfare analysis across the wealth distribution. We find that shock-type uncertainty generates substantial welfare losses concentrated among low-wealth households, that are mainly driven by the over-reaction to supply shocks. Eliminating uncertainty improves welfare for all households in the economy and leads to more output stabilization.

Empirically, we recover the perceived by the central bank demand-supply decomposition of inflation from forecast revisions and compare it against a benchmark decomposition of

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1 See [Blanchard and Galí \(2007\)](#) for a discussion of the divine coincidence and how real wage rigidities generate a trade-off between inflation and output-gap stabilization.

2 Such information frictions also provide a structural interpretation of monetary policy shocks: unexpected policy movements may reflect discrepancies between policymakers’ real-time perceptions of economic conditions and the underlying state of the economy, rather than genuinely random disturbances to the policy rule.

inflation. Our novel methodology to recover perceived by the central bank demand and supply contributions to inflation employs Reserve Bank of Australia (RBA) forecast data. For the benchmark decomposition we apply [Shapiro \(2026\)](#) methodology to the Australian sectoral prices and quantities data. Our estimates imply correct-attribution rates of approximately 66% for demand-driven inflation and 73% for supply-driven inflation. Both correct-attribution rates are statistically below one, rejecting perfect shock identification by the central bank. We feed those misattribution probabilities directly into our quantitative model as parameters governing central bank information frictions to assess welfare consequences across the distribution of these frictions.

The quantitative model that we use as a laboratory to assess the welfare consequences is a medium-scale small open economy Heterogeneous Agent New Keynesian (HANK) model. Heterogeneous households facing [Bewley \(1980\)](#)-type idiosyncratic income risk save in two assets (liquid and illiquid, as in [Kaplan et al. \(2018\)](#)) and make labor supply decisions on the extensive margin. The central bank implements a targeted Taylor rule that responds differently to perceived demand and supply inflation components. Importantly, we allow the central bank’s perceived decomposition to differ from the true decomposition by parametrizing this gap using our empirical estimates. The model is estimated with a standard maximum likelihood techniques penalized by priors on parameters, and we calibrate steady-state parameters to match Australian data on wealth distribution, labor market features, and household balance sheet composition. We find that the likelihood of the model with a targeted Taylor rule is higher than the likelihood of the model with an untargeted Taylor rule which supports theoretical and empirical findings that have put forward the targeted Taylor rule in [Nakamura et al. \(2025\)](#) and [Hofmann et al. \(2024\)](#).

Exploring the mechanism, we show that the welfare effects of shock-type uncertainty operate through two margins. When the central bank misidentifies a supply shock as a demand shock, it tightens policy too aggressively, amplifying the contractionary output effects of the supply disturbance. Conversely, when it misidentifies a demand shock as a supply shock, it responds too weakly, allowing demand-driven inflation and its associated fluctuations to persist. Both policy deviations increase consumption volatility across the

wealth distribution for all households in the economy. This result is consistent with the frontiers in [Del Negro et al. \(2025\)](#): consumption volatility decreases with the strength of the monetary response to demand shocks but increases with the response to supply shocks. Therefore, both weaker reaction to demand shocks and stronger reaction to supply shocks increase the variability of consumption across the population. In our model, the resulting larger output fluctuations when the shock-type uncertainty is present, have particularly large consequences for low-wealth households, whose income and consumption are more exposed to labour-market conditions and who have limited capacity to smooth income fluctuations.

Armed with an understanding of the mechanism, we use the fully-fledged estimated model to assess quantitatively the welfare gains from eliminating shock-type uncertainty. In a counterfactual experiment when the central bank does not face shock-type uncertainty welfare increases for all wealth groups. The gains are largest for households in the lowest part of the wealth distribution. Across the full evaluation period 1992Q1–2025Q2, welfare improvements are around 0.2% of consumption-equivalent variation for the bottom 25% of households and 0.08% for the households at the top 25% of the wealth distribution. Decomposing those gains into two main margins: (1) the central bank’s weaker response to supply-driven inflation and (2) the stronger response to demand-driven inflation we find that the former margin’s contribution accounts for the majority of welfare losses. At the aggregate level, the targeted Taylor rule without shock-type uncertainty leads to higher volatility of inflation and lower volatility of output, which is highly beneficial in heterogeneous agent economies, see [Acharya et al. \(2023\)](#).

The paper proceeds as follows. Section 1.1 reviews related literature, Section 2 presents our empirical methodology for measuring shock-type uncertainty from central bank’s forecast data and reports regression results quantifying misidentification probabilities. Section 3 describes the quantitative model and discusses estimation results for the estimated targeted Taylor rule. Section 4 showcases the main mechanism at play and Section 5 presents our quantitative results on the welfare costs of shock-type uncertainty, decomposing costs by shock type and household wealth percentiles. Section 6 concludes and discusses policy implications.

## 1.1. Literature Review

Our study connects to several strands of literature. First, since [Taylor \(1993\)](#) central banks rules are described as reacting to inflation and output or unemployment gaps as those rules fit well the data. Yet, within this class of rules the source of inflation fluctuations does not matter, whereas theoretical results on optimal monetary policy suggest that the source of disturbances is crucial, see [Blanchard and Galí \(2007\)](#) or [Erceg et al. \(2000\)](#), [Bodenstein et al. \(2008\)](#) and [Bandera et al. \(2023\)](#) emphasizing monetary policy trade-offs arising from nominal wage rigidities, cost-push disturbances and sector-specific supply shocks. More recently, [Nakamura et al. \(2025\)](#) and [Hofmann et al. \(2024\)](#) propose a targeted Taylor rule in which coefficients in front of the supply-driven and demand-driven inflation differ. We incorporate the targeted Taylor rule into a heterogeneous agent model and estimate the likelihood of the model under targeted and untargeted Taylor rules. We contribute to this literature by showing that the targeted Taylor rule not only fits better the data when estimated empirically using OLS as in [Hofmann et al. \(2024\)](#), it also fits the data better through the lens of an estimated general equilibrium model.

Second, we connect to the literature that empirically identifies supply-driven from demand-driven inflation, see, for example, [Shapiro \(2026\)](#), [Firat and Hao \(2023\)](#) and [Read \(2026\)](#), with the latter paper highlighting limitations of the method. We construct a benchmark demand-supply decomposition of inflation using [Shapiro \(2026\)](#) methodology, which uses sign restrictions applied to sectoral price and quantity data —demand shocks move the two in the same direction, while supply shocks move them apart. We extend [Beckers et al. \(2023\)](#) who apply this methodology to Australian data to the most recent period. Since central banks do not usually forecast disaggregated price and quantity series, to recover misidentification we employ a different methodology based on forecast revisions, that is related to the methodology used in [Morley et al. \(2026\)](#) to study directional disagreement across professional forecasters.

Additionally, we connect to now vast literature studying distributional effects of monetary policy. Pioneered by [Auclert \(2019\)](#) and [Kaplan et al. \(2018\)](#) this literature studies the effects of monetary policy across the distribution as well as optimal monetary policy, see [Acharya et al. \(2023\)](#), [McKay and Wolf \(2022\)](#), [Dávila and Schaab \(2023\)](#), [Bhandari et al. \(2021\)](#) among

others and [Del Negro et al. \(2025\)](#) for the study of monetary policy trade-offs. In solving the model we employ sequence-space jacobian method developed in [Auclert et al. \(2021a\)](#). To this literature we contribute by assessing the distributional consequences of central banks information frictions that so far have been ignored.

Central bank information frictions have a long tradition. [Brainard \(1967\)](#) studies parameter uncertainty central banks face, [Orphanides \(2003\)](#) and [Orphanides \(2001\)](#) show that central banks are faced with noisy information and data that is subsequently revised. Imperfectly observable state in the economy that the central bank faces is studied more recently, for example, in [Iovino et al. \(2022\)](#), and for the communication of central bank’s information see, for example, [Fujiwara and Waki \(2022\)](#) and [Granziera et al. \(2025\)](#). In our study we focus on the misattribution of supply and demand drivers of inflation. In that regard a study closely related to ours is [Ferrara \(2025\)](#) who shows that when uncertainty rises, monetary policy becomes less sensitive to demand shocks.

Lastly, we connect to the studies that explore small open economies through the lens of heterogeneous agent general equilibrium models like [Auclert et al. \(2021b\)](#), [Guo et al. \(2023\)](#), [Faia and Shabalina \(2026\)](#), [Shabalina \(2025\)](#) and [Chipeniuk et al. \(2025\)](#), [De Ferra et al. \(2020\)](#) and to general equilibrium models calibrated to Australia such as [Justiniano and Preston \(2010\)](#) and [Gibbs et al. \(2018\)](#).

## 2. Measuring Shock-Type Uncertainty

To quantify the degree to which the central banks face shock-type uncertainty—that is, uncertainty about whether observed inflation deviations stem from demand or supply shocks—we employ Reserve Bank of Australia (RBA) forecasts, granular CPI data and decompositions of inflation into supply and demand components outlined below. The goal is to measure the probability of central bank’s misattribution of demand and supply inflation pressures. By comparing the perceived by the central bank demand-supply decomposition of inflation against the benchmark decomposition we recover empirical estimates of this probability with which the central bank correctly identifies each shock type. These estimates are then used in

a quantitative model in Sections 4 and 5 as measures of shock-type uncertainty that central bank faces.

## 2.1. Empirical Methodology

Our empirical strategy consists of three main steps. First, we recover the central bank's assessment of the demand-supply composition of inflation using its historical forecasts. Second, we obtain a benchmark decomposition of inflation into demand- and supply-driven components using Shapiro (2026) methodology. Third, we estimate the central bank's misattribution probabilities by regressing the perceived central bank's decomposition against the benchmark decomposition. For the ease of exposition, we firstly lay out the identification problem and how we recover misattribution probabilities using benchmark and central-bank's inflation decompositions and then outline how those series are constructed.

### 2.1.1. Recovering shock-type uncertainty

Suppose the central bank's beliefs satisfy

$$\mathbb{E}_t^{CB} \varepsilon_t^s = \omega^s \varepsilon_t^s + (1 - \omega^d) \varepsilon_t^d \quad (1)$$

$$\mathbb{E}_t^{CB} \varepsilon_t^d = \omega^d \varepsilon_t^d + (1 - \omega^s) \varepsilon_t^s \quad (2)$$

where  $(\mathbb{E}_t^{CB} \varepsilon_t^s, \mathbb{E}_t^{CB} \varepsilon_t^d)$  is the central bank's assessment of supply  $\varepsilon_t^s$  and demand  $\varepsilon_t^d$  shocks hitting the economy,  $\omega^s$  is the probability that the central bank correctly identifies a supply shock, and  $\omega^d$  is the probability it correctly identifies a demand shock. We allow  $\omega^s \neq \omega^d$ . When outlining below how we identify  $\omega^s, \omega^d$  using the benchmark and the perceived central bank's inflation decompositions, we focus on the supply component, but similar derivations are applicable to the demand component.

Let us specify inflation as being driven by the structural shocks such that  $\pi_t^s = \sum_{j=0}^{\infty} \theta_j^s \varepsilon_{t-j}^s$  where  $\theta_j^s$  are impulse-responses of inflation to those structural shocks. Similarly,  $\pi_t^d =$

$\sum_{j=0}^{\infty} \theta_j^d \varepsilon_{t-j}^d$  and  $\pi_t = \pi_t^s + \pi_t^d$ . Thus, the correlation between the supply component of inflation and the central bank's belief about the supply component of inflation is:

$$\begin{aligned}
\text{cov}(\mathbb{E}_t^{CB} \pi_t^s, \pi_t^s) &= \text{cov} \left( \sum_{j=0}^{H-1} \theta_j^s \mathbb{E}_t^{CB} \varepsilon_{t-j}^s, \sum_{j=0}^{\infty} \theta_j^s \varepsilon_{t-j}^s \right) \\
&= \text{cov} \left( \sum_{j=0}^{H-1} \theta_j^s [\omega^s \varepsilon_{t-j}^s + (1 - \omega^d) \varepsilon_{t-j}^d], \sum_{j=0}^{\infty} \theta_j^s \varepsilon_{t-j}^s \right) \\
&= \omega^s \cdot \text{cov} \left( \sum_{j=0}^{H-1} \theta_j^s \varepsilon_{t-j}^s, \sum_{j=0}^{\infty} \theta_j^s \varepsilon_{t-j}^s \right) \\
&= \omega^s \cdot \text{var}(\pi_t^s) \cdot \frac{\text{var} \left( \sum_{j=0}^{H-1} \theta_j^s \varepsilon_t^s \right)}{\text{var}(\pi_t^s)} \tag{3}
\end{aligned}$$

where in the second equality we used Equation 1 and in the third equality we used the standard assumption that the supply and demand shocks are orthogonal and where  $H$  represents the longest forecast horizon of the central bank.<sup>3</sup> Thus, the regression coefficient  $\beta^{s,s}$  in the OLS regressions

$$\begin{aligned}
\mathbb{E}_t^{CB} \pi_t^s &= \beta^{s,s} \pi_t^s + \beta^{s,d} \pi_t^d + u_t \\
\mathbb{E}_t^{CB} \pi_t^d &= \beta^{d,d} \pi_t^d + \beta^{d,s} \pi_t^s + v_t
\end{aligned} \tag{4}$$

is given by

$$\beta^{s,s} = \omega^s \cdot \underbrace{\frac{\text{var} \left( \sum_{j=0}^{H-1} \theta_j^s \varepsilon_t^s \right)}{\text{var}(\pi_t^s)}}_{\text{forecast truncation bias}}$$

The coefficient measures the misidentification parameter  $\omega^s$  with the forecast truncation bias that is always between 0 and 1 and converges to 1 when  $H \rightarrow \infty$ . Similarly, the correlation between central bank's belief about the demand-driven inflation and the supply inflation is:

$$\text{cov}(\mathbb{E}_t^{CB} \pi_t^d, \pi_t^s) = (1 - \omega^s) \cdot \frac{\text{var} \left( \sum_{j=0}^{H-1} \theta_j^s \varepsilon_t^s \right)}{\text{var}(\pi_t^s)}$$

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<sup>3</sup> Note that the central bank's beliefs of inflation are truncated at horizon  $H$  instead of infinity, we provide more details about  $H$  when outlining the construction of central bank's decomposition in Section 2.1.2.

Accordingly, the ratio of regression coefficients  $\beta^{s,s}$  and  $\beta^{d,s}$  from empirical specification 4 satisfies  $\frac{\beta^{s,s}}{\beta^{d,s}} = \frac{\omega^s}{1-\omega^s}$ , which also allows us to correct for the truncation bias. Rearranging yields

$$\omega^s = \frac{\beta^{s,s}}{\beta^{s,s} + \beta^{d,s}} \quad (5)$$

Similarly,  $\omega^d = \frac{\beta^{d,d}}{\beta^{d,d} + \beta^{s,d}}$ . Hence, we use empirical specification 4 to recover shock-type uncertainty parameters of the central bank using Equation 5 that we will use in Sections 4 and 5 to quantify the welfare costs across the population this uncertainty induces.

### 2.1.2. Central bank's perceived demand-supply decomposition

To recover the central bank's assessment of the demand-supply composition of inflation, we develop a forecast-revision classification method. The idea behind the method is to exploit that the central bank forecasts inflation and output gap for multiple horizons. Therefore, each time period is associated with forecasts made for that specific period at multiple points in time before that time period arrives. Each revision either revises inflation forecast and output gap forecast in the same direction, or in the opposite ones. Based on the sign of the product of those two revisions, we infer if the central bank perceived that the demand or the supply shock has hit the economy. The methodology resembles the one used in [Morley et al. \(2026\)](#) to infer disagreement about the directional forecast revisions among the professional forecasters.

Let  $\mathbb{E}_t^{CB}\pi_{t+h}$  and  $\mathbb{E}_t^{CB}y_{t+h}$  denote the central bank's forecasts of inflation and output gap made at time  $t$  for horizon  $t+h$ . We assume that:

1. The central bank has the correct model of the economy, represented by the IRFs  $(\theta_j^s, \theta_j^h)_j$ .
2. The central bank's classification of *historical* shocks does not change over time,  $\mathbb{E}_t^{CB}\varepsilon_{t-j}^s = \mathbb{E}_{t-1}^{CB}\varepsilon_{t-j}^s = \dots = \mathbb{E}_{t-j}^{CB}\varepsilon_{t-j}^s \quad \forall j \geq 0$ .
3. The central bank's expectations of future shocks are unbiased,  $\mathbb{E}_t^{CB}\varepsilon_{t+h}^s = \mathbb{E}_t^{CB}\varepsilon_{t+h}^d = 0 \quad \forall h > 0$ .

Given these assumptions, the forecast revision at time  $t - h$  for inflation at time  $t$ :

$$\begin{aligned} \mathbb{E}_{t-h}^{CB} \pi_t - \mathbb{E}_{t-h-1}^{CB} \pi_t &= \mathbb{E}_{t-h}^{CB} \pi_t^s - \mathbb{E}_{t-h-1}^{CB} \pi_t^s + \mathbb{E}_{t-h}^{CB} \pi_t^d - \mathbb{E}_{t-h-1}^{CB} \pi_t^d = \\ &= \sum_{j=0}^H \theta_j^s (\mathbb{E}_{t-h}^{CB} - \mathbb{E}_{t-h-1}^{CB}) \varepsilon_{t-j}^s + \sum_{j=0}^H \theta_j^d (\mathbb{E}_{t-h}^{CB} - \mathbb{E}_{t-h-1}^{CB}) \varepsilon_{t-j}^d = \theta_h^s \mathbb{E}_{t-h}^{CB} \varepsilon_{t-h}^s + \theta_h^d \mathbb{E}_{t-h}^{CB} \varepsilon_{t-h}^d \end{aligned} \quad (6)$$

where in the second equality we used first equality from Equation 3. The supply and demand contributions to inflation are:

$$\mathbb{E}_{t-h}^{CB} \pi_t^s - \mathbb{E}_{t-h-1}^{CB} \pi_t^s = \theta_h^s \mathbb{E}_{t-h}^{CB} \varepsilon_{t-h}^s \quad (7)$$

$$\mathbb{E}_{t-h}^{CB} \pi_t^d - \mathbb{E}_{t-h-1}^{CB} \pi_t^d = \theta_h^d \mathbb{E}_{t-h}^{CB} \varepsilon_{t-h}^d \quad (8)$$

Similarly,  $\mathbb{E}_{t-h}^{CB} y_t - \mathbb{E}_{t-h-1}^{CB} y_t = \tilde{\theta}_h^s \mathbb{E}_{t-h}^{CB} \varepsilon_{t-h}^s + \tilde{\theta}_h^d \mathbb{E}_{t-h}^{CB} \varepsilon_{t-h}^d$ , where  $(\tilde{\theta}^s, \tilde{\theta}^d)$  are output gap impulse-responses to structural shocks. We use sign restrictions to classify revisions of inflation forecast into demand- and supply-driven components:

$$\mathbb{E}_{t-h}^{CB} \pi_t - \mathbb{E}_{t-h-1}^{CB} \pi_t = \begin{cases} \mathbb{E}_{t-h}^{CB} \pi_t^s - \mathbb{E}_{t-h-1}^{CB} \pi_t^s & \text{if } (\mathbb{E}_{t-h}^{CB} \pi_t - \mathbb{E}_{t-h-1}^{CB} \pi_t)(\mathbb{E}_{t-h}^{CB} y_t - \mathbb{E}_{t-h-1}^{CB} y_t) < 0 \\ \mathbb{E}_{t-h}^{CB} \pi_t^d - \mathbb{E}_{t-h-1}^{CB} \pi_t^d & \text{otherwise} \end{cases} \quad (9)$$

The central bank's cumulative assessment of each shock type contribution for a given inflation observation at time  $t$  is recovered by summing across all available forecast horizons  $h = 0, 1, \dots, H$  the contributions of supply- and demand-driven revisions:

$$\mathbb{E}_t^{CB} \pi_t^s = \sum_{j=0}^{H-1} \theta_j^s \mathbb{E}_{t-j}^{CB} \varepsilon_{t-j}^s \quad (10)$$

$$= \sum_{j=0}^{H-1} (\mathbb{E}_{t-j}^{CB} \pi_t^s - \mathbb{E}_{t-j-1}^{CB} \pi_t^s) \quad (11)$$

where  $H$  denotes the maximum forecast horizon available. Similarly for demand-driven

inflation  $\mathbb{E}_t^{CB} \pi_t^d = \sum_{j=0}^{H-1} (\mathbb{E}_{t-j}^{CB} \pi_t^d - \mathbb{E}_{t-j-1}^{CB} \pi_t^d)$ .<sup>4</sup> This motivates the following algorithm for recovering the central bank's assessment of supply and demand components of inflation:

1. Fix  $t$ . For each  $h = 0, \dots, H-1$ , classify the forecast revision  $\mathbb{E}_{t-h}^{CB} \pi_t - \mathbb{E}_{t-h-1}^{CB} \pi_t$  into either supply or demand based on the sign of inflation and output gap revisions.
2. Construct the assessment of time  $t$  inflation by summing up those classified revisions:

$$\begin{aligned}\mathbb{E}_t^{CB} \pi_t^s &= \sum_{j=0}^{H-1} (\mathbb{E}_{t-j}^{CB} \pi_t^s - \mathbb{E}_{t-j-1}^{CB} \pi_t^s) \\ \mathbb{E}_t^{CB} \pi_t^d &= \sum_{j=0}^{H-1} (\mathbb{E}_{t-j}^{CB} \pi_t^d - \mathbb{E}_{t-j-1}^{CB} \pi_t^d)\end{aligned}$$

which delivers for each time  $t$  the contribution of demand-driven inflation and supply-driven inflation. The realized inflation is given by  $\pi_t = \mathbb{E}_t^{CB} \pi_t^s + \mathbb{E}_t^{CB} \pi_t^d + \nu_t^{CB} + \mathbb{E}_{t-H}^{CB} \pi_t$ , where  $\nu_t^{CB}$  is the nowcasting inflation error of the central bank, which, as is assessed in Section 2.3, tends to be small. With respect to the first forecast  $\mathbb{E}_{t-H}^{CB} \pi_t$  we entertain possibilities to assign it based on signs of  $\mathbb{E}_{t-H}^{CB} \pi_t$  and  $\mathbb{E}_{t-H}^{CB} y_t$  or to assign it to the ‘ambiguous’ category. Results are robust to this variation in the classification.

### 2.1.3. Benchmark supply-demand decomposition of inflation

We employ the decomposition method of Shapiro (2026) to obtain a benchmark classification of inflation as demand- or supply-driven. The Shapiro (2026) approach uses a sign-restriction identification strategy applied to disaggregated price and quantity data in the following way. We observe movements in sectoral prices  $p_i$  and quantities  $q_i$ . A demand shock moves prices and quantities in the same direction, conversely, a supply shock moves prices and quantities in opposite directions. Specifically, assume the following system of equations for each disaggregated price and quantity series:

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<sup>4</sup> As pointed out in Section 2.1.1 exploiting as many forecast horizons as possible when constructing the central bank's decomposition of inflation is also beneficial since it minimizes the forecast truncation bias.

$$\Delta q_{i,t} = \sigma^i \Delta p_{i,t} + \varepsilon_{i,t}^s, \quad (12)$$

$$\Delta p_{i,t} = -\delta^i \Delta q_{i,t} + \varepsilon_{i,t}^d, \quad (13)$$

where the first equation stands for the supply equation and the second one for the demand. This system could be written in the structural VAR form:

$$A^i z_{i,t} = \sum_{j=1}^N A_j^i z_{i,t-j} + \epsilon_{i,t}, \quad (14)$$

where

$$z_i = \begin{bmatrix} q_i \\ p_i \end{bmatrix}, \quad A^i = \begin{bmatrix} 1 & -\sigma^i \\ \delta^i & 1 \end{bmatrix},$$

and it follows that

$$\epsilon_{i,t} = \begin{bmatrix} \epsilon_{i,t}^s \\ \epsilon_{i,t}^d \end{bmatrix}$$

are structural demand and supply shocks. Imposing sign restrictions such as if  $\nu_{i,t}^p \nu_{i,t}^q > 0 \rightarrow \varepsilon_{i,t}^d \neq 0$  and  $\varepsilon_{i,t}^s = 0$  otherwise, with  $\text{sign}(\varepsilon_{i,t}^o) = \text{sign}(\nu_{i,t}^q) \forall o \in \{d, s\}$ , and where  $\varepsilon_{i,t} = A^i \nu_{i,t}$ , we can decompose the dynamics of aggregate inflation series into supply- and demand-driven components by assigning movements in disaggregated price series as contributing to demand if  $\varepsilon_{i,t}^d \neq 0$  and to supply otherwise, and then summing up those contributions of disaggregated price movements using weights of the disaggregated price indices in the aggregate CPI. The VAR is estimated on a rolling-window basis, and if the co-movement of sectoral prices and quantities falls within an  $\alpha$  interval, the contribution of the price dynamics is classified as ambiguous. For more details, see [Shapiro \(2026\)](#).

## 2.2. Data

Our empirical implementation combines two primary data sources.

### 2.2.1. RBA forecasts and economic data

For the central bank’s forecast data we employ Reserve Bank of Australia vintage forecast data that contains forecasts for the seasonally adjusted headline CPI inflation (year-ended growth), real GDP (year-ended growth) and seasonally adjusted unemployment rate at horizons from 0 to 8 quarters.<sup>5</sup> Those forecasts are published in the Statement on Monetary Policy that RBA publishes. Our decomposition sample covers the period from 2013Q3 to 2026Q2, yielding 51 quarterly observations. Forecasts for the not seasonally adjusted headline inflation are available from 2009Q1. Appendix A presents decomposition using not seasonally adjusted series, which shows similar patterns and delivers similar estimates for the misidentification parameters  $\omega^s$  and  $\omega^d$ . Additionally, in the baseline classification we exclude forecasts for the covid period, for which not all forecast horizons are available, so this excludes observations from 2019Q4 to 2020Q3. We check the robustness of the results without this exclusion. For more details about the forecast dataset see [McCarthy et al. \(2026\)](#).

For the output gap, we use RBA estimates of the potential output. We assume that the potential output is not revised throughout the 8 forecast quarters that we use for each time period. As a robustness check, we also use the sign-restriction classification based on unemployment deviations from its neutral rate, the results remain robust, but imply a later contribution of supply shocks to inflation in the post-covid episode and therefore, our preferred decomposition uses output gap forecasts. The inflation target in line with the RBA target is set to 2.5. For the actual outcomes we use real GDP, headline inflation and unemployment data from the Australian Bureau of Statistics.

### 2.2.2. Benchmark demand-supply decomposition

Following [Shapiro \(2026\)](#), we construct the benchmark decomposition using detailed sectoral price and quantity data from the Australian Bureau of Statistics. We employ 18 price and quantity series.<sup>6</sup> The selection of demand and supply shocks in each sector-time pair relies

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5 At some time periods forecasts are available at longer horizons than 8, but the number of observations decreases significantly if longer horizons are used.

6 Categories include: food, tobacco, alcohol, clothing, dwelling rent, gas and electricity, renovation, health, motor vehicle purchases, motor vehicle operation, traveling, communications, recreation and culture, education, dining, insurance, dwelling investment, and other.

on the sign restriction described above, with ambiguous classifications determined by a prediction interval with  $\alpha = 0.25$ . The rolling window length is set as in [Shapiro \(2026\)](#) to 40 quarters, the number of lags for each VAR is optimized with the restriction of the maximum number of lags to be 12. The analysis builds on [Beckers et al. \(2023\)](#) who provides a comprehensive discussion of the application of demand-supply decomposition methods to Australian inflation dynamics and which results we extend to the time period from 1998Q2 to 2026Q2.

## 2.3. Results

### 2.3.1. Comparison of decompositions

Figure 1 displays the perceived central bank’s demand-supply decomposition of CPI inflation over the sample period. The stacked area chart shows the contribution of demand-driven (blue) and supply-driven (green) inflation, alongside the actual inflation path (black line). The decomposition shows substantial variation in the relative importance of demand versus supply pressures over time. Specifically, while perceived demand shocks contributed negatively to inflation in the pre-covid period, in the covid and post-covid period they contributed positively to inflation. At the same time, perceived contribution of supply shocks was small in the pre-covid period and dominated the inflation dynamics following 2020. The results align well with the narratives that RBA was pointing to in their statements as in the pre-covid period weak inflation outcomes were associated with weak household demand amid low wage growth and after 2020 supply chain bottlenecks and low productivity growth were mentioned among the reasons for high inflation outcomes.

Figure 2 presents the benchmark decomposition with the demand-driven component shown in blue and a supply-driven component shown in green. Comparing the two decompositions in Figures 1 and 2 shows that both assign mostly negative contribution of demand shocks to inflation in the pre-covid period, while a positive contribution of those shocks is present after 2020. The inflation surge in the post-covid period in both decompositions is also associated with the large and positive contribution of the supply shocks. On the other hand, there are also some differences in the decompositions. According to the benchmark decomposition,

supply shocks were contributing mostly negatively to inflation in the pre-covid period and their contribution was roughly equal to the contribution of the demand shocks in that period. After 2020, the contribution of demand component is more pronounced in the benchmark decomposition in comparison to the perceived by the RBA decomposition.

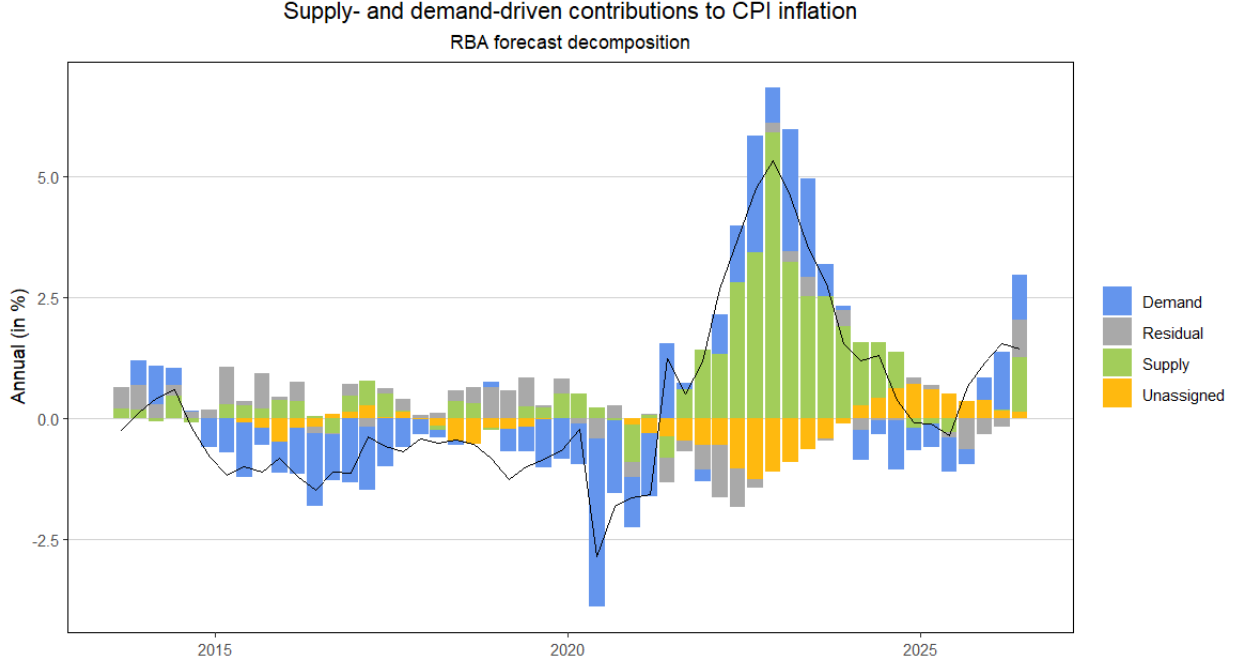


**Figure 1: Decomposition of annual headline CPI into supply- and demand-driven components using central bank forecasts.** 'Unassigned' indicates the contribution from the forecast made 8 quarters ahead. 'Residual' indicates the central bank's nowcasting error. The dark line shown actual headline inflation.

Hence, the decompositions show that while there are similarities between the decompositions, there are notable differences. The next section shows regression results which recover misidentification parameters  $\omega^d$  and  $\omega^s$ .

### 2.3.2. Regression results

Armed with the perceived inflation decomposition obtained using central bank forecasts and the inflation decomposition using [Shapiro \(2026\)](#) methodology we estimate empirical specification presented in Equation 4 to recover parameters  $\omega^s$  and  $\omega^d$ . Table 1 shows estimation results.

The top half of the table shows results from the first equation in the empirical specification stated in Equation 4 and the bottom half from the second equation. Firstly, both supply

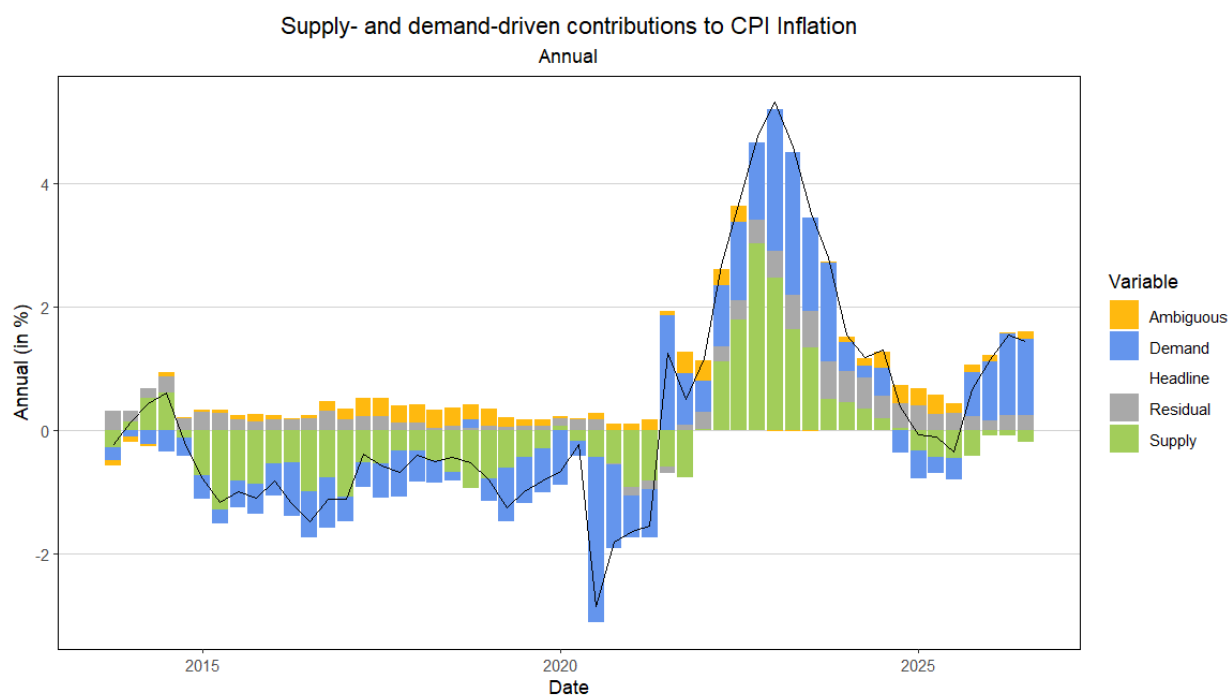


**Figure 2: Decomposition of annual headline CPI into supply- and demand-driven components.** 'Ambiguous' indicates the contribution from components for which inflation or quantity forecast errors are within the 25% prediction interval. 'Residual' indicates the contribution from unmodelled components due to an incomplete matching between HFCE expenditure categories and CPI categories. The dark line shown actual headline inflation. Since the decomposition includes 2.5 inflation target, to align with the perceived decomposition 1.25 was subtracted from both supply and demand components.

and demand from the benchmark decomposition are highly significant when perceived supply and perceived demand inflation are regressed on them. This indicates that there is misidentification. The coefficients  $\beta^{s,d} = 0.34$  and  $\beta^{d,d} = 0.66$  indicate that when there is a 1 percentage point increase in the demand-driven inflation, the perceived supply-driven inflation increases by 0.34 percentage points and the perceived demand-driven inflation increases by 0.66 percentage points. Similarly, when supply-driven inflation increases by 1 percentage point, the perceived supply-driven inflation rises by 0.73 percentage points and the perceived demand-driven inflation rises by 0.27 percentage point. The asymmetry suggests that the central bank performs somewhat better at recognizing supply pressures than demand pressures. Therefore, from the baseline specification the parameters we use in Sections 4 and 5 are  $\omega_s = 0.67$  and  $\omega_d = 0.66$  that follow from the regression results in Table 1 and the assumptions in Equation 1.

Note, that there are restrictions imposed on the regression coefficients. When estimating the same regressions without restrictions on the coefficients, the hypotheses that  $\beta^{s,d} + \beta^{s,s} = 1$  and that  $\beta^{d,d} + \beta^{d,s} = 1$  are not rejected.<sup>7</sup> The robustness results without restrictions are reported in Appendix A,<sup>8</sup> which also reports results using either OLS or SUR specification. The coefficients of interest change minimally. Note also that the constant is not zero and is negative and statistically significant. This is due to the fact that the benchmark inflation components contain 2.5 inflation target, whereas perceived inflation components are obtained as deviations from 2.5 inflation target. In both regressions the intercept deviates from 2.5% as there are also residual and ambiguous components with non-zero means.

To account for potential serial correlation in the residuals, we also report robustness results using Newey-West heteroskedasticity and autocorrelation-consistent (HAC) standard errors with a 4-quarter lag. The Newey-West specification tests confirm that all reported coefficients remain statistically significant at conventional levels.

Overall, the results are remarkably significant even though the benchmark and the perceived decompositions of supply and demand inflation use different methodologies. They also indicate a high degree of correct identification of demand and supply driven inflation components by

<sup>7</sup> Since we are using ratios as stated in Equation 5 we do not necessarily require any restrictions on the coefficients.

<sup>8</sup> We entertain restrictions on either  $\beta^{s,d} + \beta^{s,s} = 1$  and  $\beta^{d,d} + \beta^{d,s} = 1$  or  $\beta^{d,s} + \beta^{s,s} = 1$  and  $\beta^{d,d} + \beta^{s,d} = 1$ .

**Table 1: Regression Estimation Results**

| Supply       |          |            |                     |                 |
|--------------|----------|------------|---------------------|-----------------|
| Variable     | Estimate | Std. Error | <i>t</i> -statistic | <i>p</i> -value |
| Intercept    | −0.62*** | 0.15       | −4.22               | < 0.001         |
| Demand       | 0.34**   | 0.11       | 3.12                | 0.002           |
| Supply       | 0.73***  | 0.11       | 6.80                | < 0.001         |
| Observations |          |            |                     | 47              |
| $R^2$        |          |            |                     | 0.72            |
| Demand       |          |            |                     |                 |
| Variable     | Estimate | Std. Error | <i>t</i> -statistic | <i>p</i> -value |
| Intercept    | −1.29*** | 0.14       | −9.50               | < 0.001         |
| Demand       | 0.66***  | 0.11       | 5.97                | < 0.001         |
| Supply       | 0.27*    | 0.11       | 2.54                | 0.01            |
| Observations |          |            |                     | 47              |
| $R^2$        |          |            |                     | 0.73            |

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ .

the central bank, though there is a statistically and economically significant misattribution and as we show in Sections 4 and 5 this leads to economically significant welfare losses at the aggregate level and across the distribution.

### 2.3.3. Robustness and sensitivity analysis

We assess robustness along the following dimensions:

**Inflation measure:** We consider both headline CPI (baseline) and underlying CPI. We also consider seasonally adjusted and not seasonally adjusted headline CPI.

**Slack measure:** We use output gap in the baseline. We conduct robustness checks using unemployment gap as an alternative slack measure.

**Methodology:** Our baseline uses central bank’s forecast revisions to infer shock classifications. As a robustness check, we also implement an alternative methodology where in each period inflation is classified as supply- or demand-driven based on the sign of the product of output and inflation gaps forecasted one quarter ahead. This closely follows benchmark decomposition using VAR with sign-restrictions, but since there are no central bank forecasts

available for the CPI subcomponents, in each period the entire inflation realization is classified as demand or supply.

**Maximum forecast horizon:** We use  $H = 8$  quarters in the baseline. We explore sensitivity to this choice, noting that longer horizons reduce truncation bias but provide fewer observations.

**Assignment of the first forecast at  $H = 8$ :** In the perceived decomposition we also explore assignment of the 8 quarters ahead forecast to demand or supply components of inflation based on the sign of the product of inflation and output gaps forecasts.

Results from these robustness checks are reported in Appendix A. Quantitatively, coefficients vary modestly, with  $\omega_s$  ranging from approximately 0.67 to 0.85, and  $\omega_d$  ranging from 0.56 to 0.80.<sup>9</sup>

### 3. Quantitative Model

In this section, we lay out the quantitative model used in our analysis in Sections 4 and 5 and discuss the identification and estimation results.

#### 3.1. Model Description

The model is a medium-scale small open economy HANK model. The economy is populated by a unit mass of infinitely-lived households facing idiosyncratic income risk. Heterogeneous households consume home goods and imported goods, supply labour to unions, and save in liquid and illiquid assets. Hours worked are chosen by the labour union subject to wage adjustment costs, while households make labour supply decisions on the extensive margin.

To reflect Australian environment, there are two production sectors in the economy: a resource sector and a non-resource sector. The resource sector is perfectly competitive, with the world price of resources exogenously given. The non-resource sector is populated by monopolistically competitive firms who sell their differentiated products to a final home goods

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<sup>9</sup> Except with a different unemployment measure where  $\omega_s$  turns negative.

producer and face price adjustment costs. Firms in both sectors are subject to investment adjustment costs and capital utilization costs for a better business-cycle fit.

The import sector is populated by monopolistically competitive importers who convert a homogenous foreign good into a differentiated product and sell it to a final import goods producer. We assume price stickiness in local currency prices to capture incomplete exchange rate pass-through to import prices. The export sector is perfectly competitive, with firms exporting the domestic final good to the world market. Perfect competition implies that the export price exhibits complete exchange rate pass-through. The rest of the world is represented by a standard 3-equation New Keynesian model.

Government sets progressive income taxes, consumption taxes and profit taxes to finance government expenditures and issues long-term and short-term debt. Fiscal authority chooses average level of income taxes according to a fiscal rule, while government debt balances the budget. Monetary policy operates according to a targeted Taylor rule.

Time is discrete and in quarters. In the following, we provide a detailed description of the household block and the monetary policy block, as they are central to our analysis. The rest of the model is standard, and we relegate its full description to Appendix B.

### 3.1.1. Household

**Labour income.** Households are ex-ante identical. At the beginning of each period  $t$ , each household  $i \in [0, 1]$  experiences an idiosyncratic productivity shock  $e_{i,t}$  that follows a stationary Markov process. Real after-tax labour income  $y_{it}^d$  at time  $t$  is a function of idiosyncratic productivity state  $e_{it}$ , the real wage,  $w_t$ , the labour hours  $n_{it}$ , and the income taxes which follow a progressive scheme as in Benabou (2002):  $y_{it}^d = \xi_t(e_{it}w_t n_{it})^{1-\tau} = \xi_t(y_{it}^{pre-tax})^{1-\tau}$ , where  $\tau$  measures the degree of tax progressivity.

**Participation and employment.** Labour supply is indivisible. After observing the idiosyncratic productivity shock, households can choose whether to participate in the labour market, or receive a fixed amount of home goods  $u^h$  which can be interpreted as home production. Participation decision is introduced as in Faia et al. (2023) and Ferriere and Navarro (2024) through the comparison of value functions in employment and non-employment

states with an addition of amenity shocks,  $\zeta_t^{LF}$ , that follow Gumbel distribution with standard deviation  $\sigma_\zeta$ .<sup>10</sup> If a household chooses to participate, then with probability  $\theta_{it} \in [0, 1]$  it finds a job, works  $n_{it}$  hours, and earns labour income  $y_{it}^{pre-tax}$ ; otherwise it becomes unemployed and receives unemployment benefits  $u^b$  in home goods provided by the government.

**Two assets.** Consumption-savings decisions are as in [Kaplan et al. \(2018\)](#) and [Auclert et al. \(2021a\)](#) where households maximize life-time expected utilities and save in liquid asset  $b_{it}$  and illiquid assets  $a_{it}$  with returns  $r_t^b$  and  $r_t^a$ , respectively. Illiquid assets are subject to convex portfolio adjustment costs such that each household forms a portfolio of the two assets. The instantaneous utility takes a standard separable form  $u(c, n) = \frac{c^{1-\sigma}}{1-\sigma} - \varphi \frac{n^{1+\nu}}{1+\nu}$ , where  $c$  stands for consumption and  $n$  stands for hours worked. The portfolio adjustment costs take the functional form:  $\Phi(a_{it}, a_{it-1}) = \frac{\chi_1}{\chi_2} \left| \frac{a_{it} - (1-r_t^a)a_{it-1}}{(1+r_t^a)a_{it-1} + \chi_0} \right|^{\chi_2} [(1+r_t^a)a_{it-1} + \chi_0]$ , with  $\chi_0 > 0$ ,  $\chi_1 > 0$  and  $\chi_2 > 1$ .<sup>11</sup> Households can borrow in liquid assets subject to a borrowing limit,  $b_{it} \geq \underline{b}$ , and an interest rate spread,  $\kappa^b > 0$ , between borrowing and lending rates. Households cannot borrow in illiquid assets,  $a_{it} \geq 0$ .

**Offset accounts.** As documented in [La Cava and Wang \(2021\)](#), Australian households hold dis-proportionally large amount of liquid assets (twice as much as in the US) which are concentrated among the rich. To account for the distribution of liquid assets, we introduce offset accounts that allow a household to earn higher asset return on liquid savings if she pays the offset account fee,  $o^f > 0$ , in line with [Graham \(2024\)](#). This gives wealthy households additional incentive to save in the form of liquid assets.

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<sup>10</sup> This follows [Rust \(1987\)](#) tradition and is common in dynamic discrete-choice models.

<sup>11</sup> Functional form is taken from [Auclert et al. \(2021a\)](#).

**Bellman equation.** Given the labour market state  $s_{it}$ , the household's problem can be written as:

$$\begin{aligned}
V_t(e_{it}, b_{it-1}, a_{it-1}; s_{it}) &= \max_{c_{it}, b_{it}, a_{it}} u(c_{it}, n_{it}) + \beta \mathbb{E}_{it} V_{t+1}(e_{it+1}, b_{it}, a_{it}; s_{it+1}) \\
s.t. \quad &(1 + \tau^c)c_{it} + b_{it} + a_{it} = y_{it} + (1 + r_t^b(b_{it-1}))b_{it-1} + (1 + r_t^a)a_{it-1} \\
&\quad - \Phi(a_{it}, a_{it-1}) - o^f \mathbf{1}\{o^r b_{it-1} > o^f\} \\
y_{it} &= \begin{cases} \xi_t(e_{it}w_t n_{it})^{1-\tau} & \text{if } s_{it} = \text{employed} \\ p_t^H u^b & \text{if } s_{it} = \text{unemployed} \\ p_t^H u^h & \text{if } s_{it} = \text{not participating} \end{cases} \\
r_t^b(b_{it-1}) &= r_t^b + o^r \mathbf{1}\{o^r b_{it-1} > o^f\} + \kappa^b \mathbf{1}\{b_{it-1} < 0\} \\
b_{it} &\geq \underline{b} \\
a_{it} &\geq 0
\end{aligned}$$

where  $p_t^H$  is the relative price of home goods and  $\tau^c$  is consumption tax. The participation decision is taken according to  $\mathbf{1}_{LF} = \arg\max_{j \in \{LF, \text{notin } LF\}} [\tilde{V}_t^j + \phi_t^j]$ , where  $\tilde{V}$  is the value function evaluated at the optimal consumption-saving policy and  $\phi_t^j$  are Gumbel type shocks.

### 3.1.2. Monetary Policy

The central bank sets the nominal interest rate according to a *targeted* Taylor rule that differentiates between demand- and supply-driven inflation:

$$i_t = \rho_r i_{t-1} + (1 - \rho_r) [i^* + \phi_\pi^s \mathbb{E}^{CB} \pi_t^s + \phi_\pi^d \mathbb{E}^{CB} \pi_t^d + \phi_y (U_t - \bar{U})] + \varepsilon_t^i \quad (15)$$

where  $i^*$  is the steady-state nominal interest rate,  $\mathbb{E}^{CB} \pi_t^d$  ( $\mathbb{E}^{CB} \pi_t^s$ ) denotes the demand- (supply-) driven inflation deviation perceived by the central bank,  $U_t$  is the unemployment rate,  $\bar{U}$  is the steady-state unemployment rate, and  $\varepsilon_t^i$  is the monetary policy shock. Specifically, the central bank classifies shocks into demand- and supply-side categories and reacts differentially to each type, as reflected in the targeted Taylor rule. However, as in the empirical section,

we assume that the central bank has incomplete information about the nature of shocks. Consistent with the empirical framework in Equations 1 and 2, we posit the following reduced-form relationship for its perceived demand- and supply-driven inflation:

$$\mathbb{E}_t^{CB} \pi_t^s = \omega^s \pi_t^s + (1 - \omega^d) \pi_t^d \quad (16)$$

$$\mathbb{E}_t^{CB} \pi_t^d = (1 - \omega^s) \pi_t^s + \omega^d \pi_t^d \quad (17)$$

Substituting these perceived inflations into the targeted Taylor rule in Equation 15 allows us to express the central bank's policy reaction in terms of the actual demand- and supply-driven inflation components.

$$i_t = \rho_r i_{t-1} + (1 - \rho_r) \left[ r^* + \underbrace{[\omega^s \phi_\pi^s + (1 - \omega^s) \phi_\pi^d]}_{\equiv \tilde{\phi}_\pi^s} \pi_t^s + \underbrace{[\omega^d \phi_\pi^d + (1 - \omega^d) \phi_\pi^s]}_{\equiv \tilde{\phi}_\pi^d} \pi_t^d + \phi_y (U_t - \bar{U}) \right] + \varepsilon_t^i \quad (18)$$

To close the model, we assume that the private sector forms expectations about future monetary policy based on the reduced-form Taylor rule in Equation 18.

Note that Equation 18 is observationally equivalent to a targeted Taylor rule with complete information about the nature of shocks. Structural estimation recovers the effective policy response coefficients  $\tilde{\phi}_\pi^s$  and  $\tilde{\phi}_\pi^d$ , which encapsulate both the central bank's original preferences and its uncertainty in classifying supply- and demand-driven inflation (see Section B.12 in Appendix B for the proof of observational equivalence). Combining with our empirical estimates of  $\omega^s, \omega^d$  allows us to back out the central bank's original policy preferences  $\phi_\pi^s$  and  $\phi_\pi^d$  from the estimated effective coefficients  $\tilde{\phi}_\pi^s$  and  $\tilde{\phi}_\pi^d$ . Empirical estimates of  $\omega^s$  and  $\omega^d$  are crucial for disentangling the central bank's true policy preferences from the observed effective coefficients.

### 3.2. Estimation Results

As is standard in the HANK literature, we calibrate the steady-state parameters of the model and log-linearise the model around the calibrated steady state to obtain a first-order

approximation of its dynamics. Then we estimate the model using standard maximum likelihood techniques penalized by priors on the parameters.

The model features 16 exogenous shocks consisting of 12 domestic shocks and 4 foreign shocks. These include conventional disturbances such as productivity ( $\times 2$ ), price and wage markup, investment efficiency ( $\times 2$ ), export demand, government consumption and transfer, monetary policy, UIP, liquidity premium, and foreign shocks ( $\times 4$ ). We classify productivity shocks, price and wage markup shocks, as well as the foreign price markup shock as supply shocks. All other shocks are classified as demand shocks.

We report the full estimation results in Appendix B and only discuss the estimated targeted Taylor rule parameters here. Table 2 reports the estimation results for the baseline specification and a specification with an untargeted Taylor rule. The estimated smoothing parameter,  $\rho_r$ , and response to unemployment,  $\phi_y$ , are essentially identical across the baseline and untargeted Taylor rule specifications. The estimated response to supply-driven inflation  $\tilde{\phi}_\pi^s$  is about 25% lower than the response to demand-driven inflation  $\tilde{\phi}_\pi^d$ , and both of them satisfy the Taylor principle. Reassuringly, the untargeted response to inflation is in between the estimated responses to supply- and demand-driven inflation, but closer to the demand-driven response, reflecting the relative importance of demand shocks in the economy.

As discussed above, the estimated targeted responses do not reflect the central bank's original preferences directly in the presence of central bank's uncertainty about the nature of shocks. We use the estimated values of uncertainty parameters  $\omega^s$  and  $\omega^d$  and Equation 18 to back out the central bank's desired responses  $\phi_\pi^s$  and  $\phi_\pi^d$  from the estimated effective coefficients  $\tilde{\phi}_\pi^s$  and  $\tilde{\phi}_\pi^d$ . Our estimation results imply that  $\phi_\pi^s = 0.918$  and  $\phi_\pi^d = 2.217$ , which indicate a significantly larger gap between the central bank's desired responses to supply- and demand-driven inflation compared to the reduced-form estimates. In particular, the desired response to supply-driven inflation is below 1, violating the Taylor principle. In sharp contrast, the desired response to demand-driven inflation is well above 1. This is consistent with look-through policy, where the central bank aims to stabilize demand-driven inflation while being more tolerant to supply-driven inflation. In fact, underreaction to supply-driven inflation is also consistent with optimal monetary policy under commitment, as

**Table 2: Estimated Targeted Taylor rule**

| Parameter                       | Description                              | Baseline | Untargeted TR |
|---------------------------------|------------------------------------------|----------|---------------|
| <b>Taylor rule</b>              |                                          |          |               |
| $\rho_r$                        | Interest rate smoothing                  | 0.794    | 0.800         |
| $\tilde{\phi}_\pi^s$            | Supply-driven inflation response         | 1.345    | 1.640         |
| $\tilde{\phi}_\pi^d$            | Demand-driven inflation response         | 1.779    | 1.640         |
| $\phi_y$                        | Unemployment response                    | 0.221    | 0.221         |
| <b>Implied desired response</b> |                                          |          |               |
| $\phi_\pi^s$                    | Desired supply-driven inflation response | 0.918    | 1.640         |
| $\phi_\pi^d$                    | Desired demand-driven inflation response | 2.217    | 1.640         |
| <b>Model comparison</b>         |                                          |          |               |
| Marginal (log) likelihood       |                                          | -1506    | -1516         |

recently discussed by [Nakamura et al. \(2025\)](#). Our results therefore highlight the importance of recognizing the information constraint faced by the central bank when assessing the optimality of its policy and hint the potential welfare loss from the information limitation, which we discuss in Sections 4 and 5.

As our Taylor rule also features output stabilization component through its response to unemployment, one may argue that even the untargeted Taylor rule provides some degree of shock-dependent responses. We therefore ask whether the baseline provides a better fit to the data compared to the specification with an untargeted Taylor rule. Our results indicate that the baseline model with a targeted Taylor rule provides a better fit to the data compared to the specification with an untargeted Taylor rule, as evidenced by the higher marginal (log) likelihood. In other words, the data favor a Taylor rule that responds differently to supply and demand shocks beyond those warranted by the output stabilization component.

## 4. Implications of Shock-Type Uncertainty

Having established the empirical evidence for shock-type uncertainty and shock-dependent monetary policy, we now turn to analyzing its implications using the estimated HANK model. For the ease of illustration, in this section we focus on two shocks representative of supply and demand disturbances, namely the price markup shock and the marginal efficiency of

investment (MEI) shock. Section 5 quantifies the welfare losses using fully-fledged model and all modeled shocks.

#### 4.1. Impulse responses

We first look at the impulse responses of interest rate, GDP, and inflation under the counterfactual targeted response (full information) and under shock-type uncertainty. Specifically, we compute the former by setting the inflation response coefficient to the counterfactual value backed out in the previous section, holding other structural parameters fixed.

**Demand shock .** Figure 3 shows the impulse responses to a negative MEI shock, which we refer to as the demand shock in this context. Consistent with the notion of a demand shock, both inflation and GDP decline following the shock, regardless of shock-type uncertainty. However, under shock-type uncertainty, inflation decreases significantly more than under the counterfactual targeted response, while the GDP decline is also mildly amplified. Recall that the counterfactual targeted response to demand shock is  $\phi_{\pi}^d = 2.22$ , while the response under shock-type uncertainty is  $\tilde{\phi}_{\pi}^d = 1.78$ . Therefore, monetary policy under shock-type uncertainty is effectively less accommodative than under the counterfactual response, resulting in a more recessionary response. Interestingly, the interest rate response is virtually unchanged and, if anything, becomes slightly more accommodative under shock-type uncertainty. This highlights the importance of monetary policy *expectations* in shaping macroeconomic outcomes.

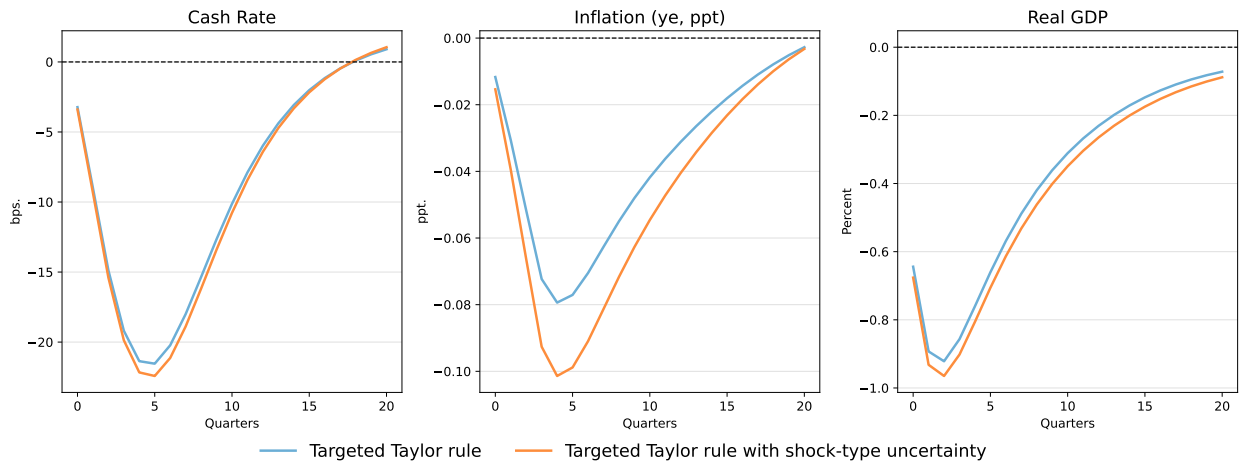


**Figure 3: IRFs to demand shock.** Impulse responses of interest rate, year-end inflation, and real GDP. The demand shock is a one-standard deviation AR(1) innovation to the marginal efficiency of investment in the non-resource sector. The sign of the shock is chosen to be recessionary.

**Supply shock .** Figure 4 shows the impulse responses to a positive price markup shock, which we refer to as the supply shock in this context. Consistent with the notion of a supply shock, inflation rises while GDP declines on impact, regardless of shock-type uncertainty. Symmetric to the case of the demand shock, monetary policy under shock-type uncertainty is more aggressive than under the counterfactual response, resulting in a more pronounced contraction in GDP in the short run. Consequently, inflation response is slightly attenuated by the lower marginal cost.

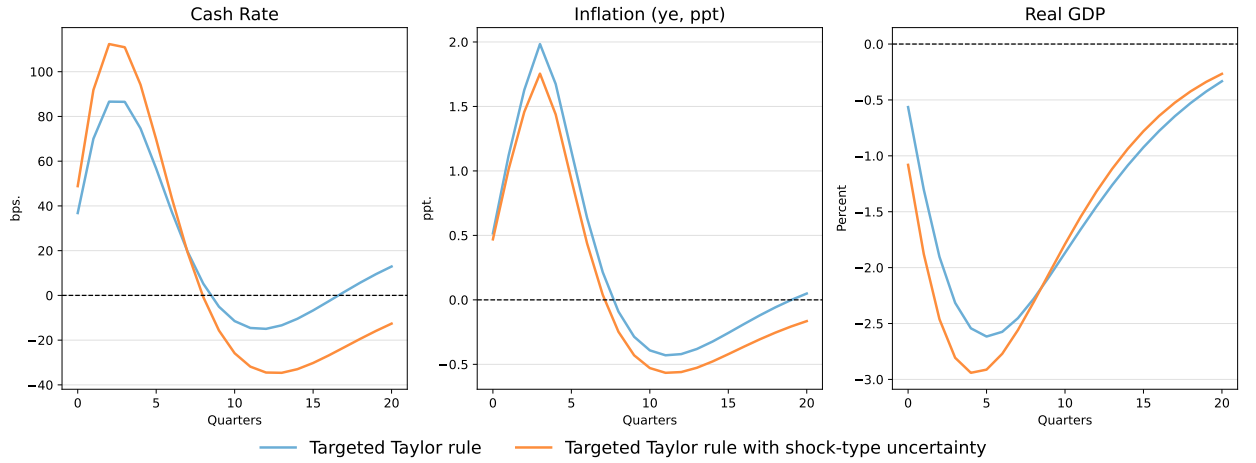


**Figure 4: IRFs to supply shock.** Impulse responses of interest rate, year-end inflation, and real GDP. The supply shock is a one-standard deviation AR(1) innovation to the desired markup of firms in the non-resource sector. The sign of the shock is chosen to be stagflationary.

## 4.2. Welfare effects

We now turn to the welfare effects of shock-type uncertainty for heterogeneous households. In the following, we consider welfare conditional on the realization of a demand or supply shock. Our welfare metric is the consumption-equivalent variation (CEV) of the expected life-time utility at time 0 when the shock hits, which captures all the general equilibrium effects of the shock on a household's welfare. Given our heterogeneous-agent framework, these effects can vary across the wealth distribution. To explore these heterogeneous welfare effects, we group households into quartiles based on their net wealth at the beginning of time 0 and compute the average CEV across households within each wealth quartile.

**Demand shock .** Figure 5 shows the welfare effects of a negative MEI shock across the wealth distribution. All households experience welfare losses from the negative demand shock,

with the magnitude of the loss declining with wealth. This is consistent with the fact that wealthier households can better smooth consumption in response to a decline in income. Importantly, the welfare losses are more pronounced under shock-type uncertainty, and this is true across all wealth quartiles. Intuitively, as discussed before, shock-type uncertainty effectively makes monetary policy less accommodative, resulting in a more pronounced recession and hence larger welfare losses.

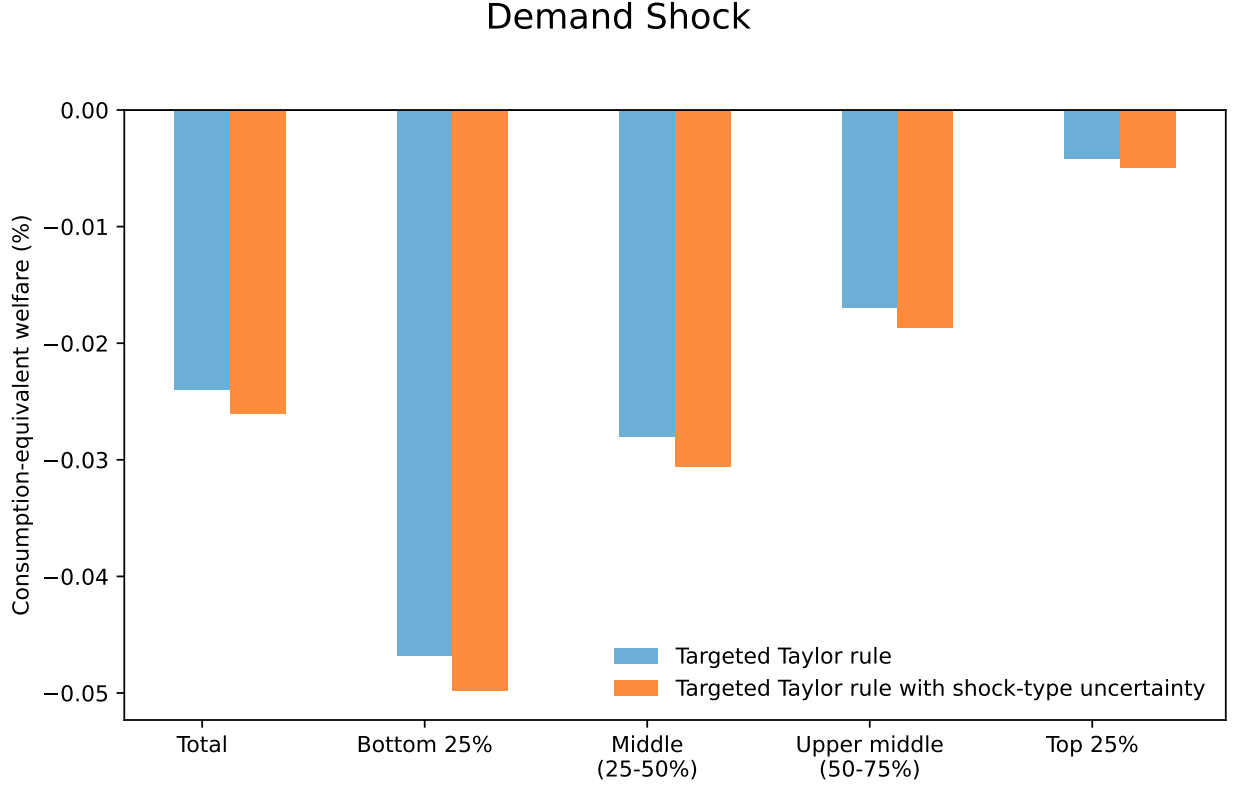


**Figure 5: Welfare effects of demand shock.** The demand shock is a one-standard deviation AR(1) innovation to the marginal efficiency of investment in the non-resource sector. The sign of the shock is chosen to be recessionary.

**Supply shock .** Figure 6 shows the welfare effects of a positive price markup shock across the wealth distribution. Unlike the demand shock, the supply shock hurts the majority of households but benefits the wealthiest 25%. This is because the price markup shock increases the profits of firms (at the expense of lower wages), which are disproportionately distributed to the wealthiest households who own equity. This redistributive nature of supply shocks is consistent with previous findings in the literature, notably [Del Negro et al. \(2025\)](#) and [Gornemann et al. \(2021\)](#). Despite the heterogeneous welfare effects, shock-type uncertainty leads to welfare losses for all households, as is evident from comparing the welfare effects

under counterfactual responses and under shock-type uncertainty in Figure 6. We discuss the intuition below.

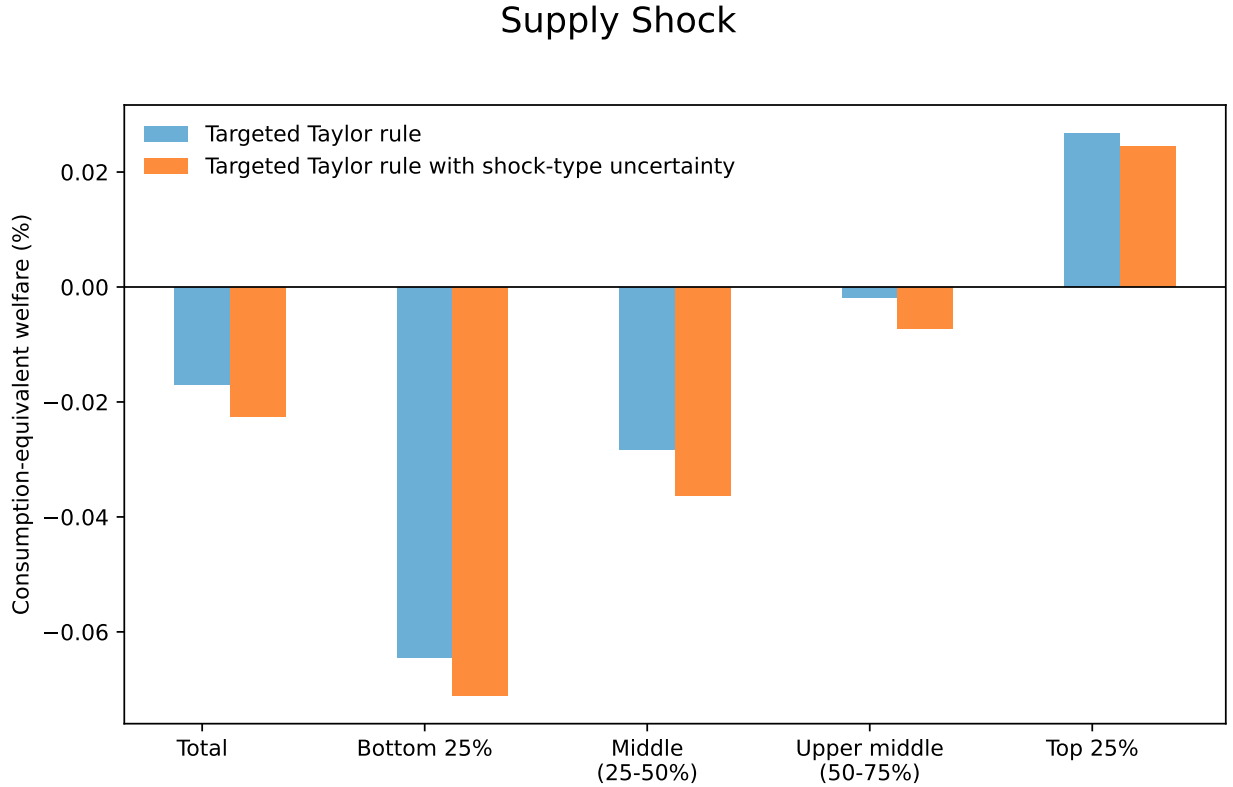


**Figure 6: Welfare effects of supply shock.** The supply shock is a one-standard deviation AR(1) innovation to the desired markup of firms in the non-resource sector. The sign of the shock is chosen to be stagflationary.

**Understanding the welfare results .** To this end, to identify the sources of the losses from shock-type uncertainty, we decompose the welfare effects into the labour and capital income channel. Specifically, the capital income channel is obtained by holding the real wage, hours worked, employment probability, and income tax constant when computing the welfare effects; similarly, the labour income channel is obtained by holding returns on liquid and illiquid assets constant.

Figure 7 presents the welfare decomposition for the two types of shocks. The bars on the left show welfare effects under the counterfactual policy responses, while those on the right show welfare effects under shock-type uncertainty. Overall, the decomposition reveals that welfare losses are driven entirely by the declines in labour income, with increases in capital income partially offsetting these losses. Moreover, shock-type uncertainty amplifies welfare losses by further reducing labour income while generating only a modest increase in capital

income. As we show in Section 5 the welfare losses from shock-type uncertainty are driven by the lack of output stabilization and are largest at the bottom of the wealth distribution which is in line with labour channel being the dominant force in the presented decomposition in Figure 7.

Following a demand shock, shock-type uncertainty effectively makes monetary policy less accommodative. The resulting larger contraction in output accounts for the additional deterioration in labour income. Although the real interest rate falls in the short run because of monetary easing, it subsequently increases as lower investment raises marginal costs in the medium run, putting upward pressure on inflation and prompting monetary tightening. In present value terms, the resulting capital income channel has a small positive effect on the welfare.

For the supply shock, the capital income channel is considerably stronger owing to higher firm profits. Indeed, for the wealthiest quartile of households, gains from the capital income channel exceed losses from the labour income channel, explaining the net welfare gain. Shock-type uncertainty induces a more aggressive monetary policy response, which stabilizes inflation at the expense of output. However, this stronger policy response is ultimately welfare reducing, as the decline in hours worked and employment more than offsets the benefits of slightly more stable real wages and marginally higher capital income associated with higher interest rates.

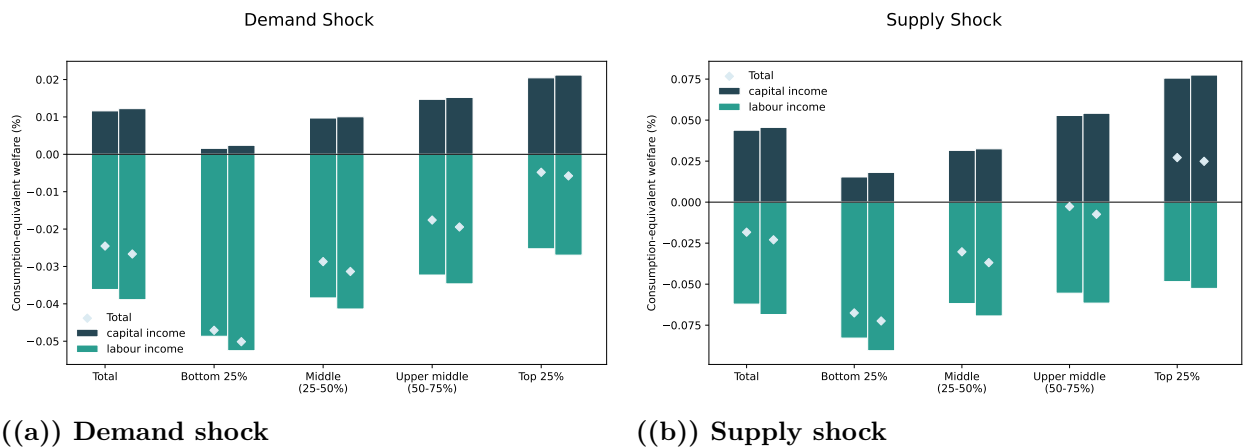


**Figure 7: Decomposition of welfare effects under demand and supply shocks.** The demand shock is a one-standard deviation AR(1) innovation to the marginal efficiency of investment in the non-resource sector. The supply shock is a one-standard deviation AR(1) innovation to the desired markup of firms in the non-resource sector. The signs of the shocks are chosen to be recessionary.

### 4.3. Frontier curves

Our welfare analysis has focused on the first-order effects of shocks on household welfare. Evaluating unconditional welfare requires a second-order solution, which is beyond the scope of this paper. Instead, following [Del Negro et al. \(2025\)](#), we examine frontier curves of consumption volatility as a function of the monetary policy response to provide insight into unconditional welfare outcomes. Specifically, we plot the standard deviation of log consumption for each wealth quartile following either a demand or a supply shock, while varying the corresponding policy response parameter  $(\phi_\pi^d, \phi_\pi^s)$ . These frontier curves illustrate the trade-offs across the wealth distribution associated with alternative policy responses.

Figure 8 presents the frontier curves for both demand and supply shocks. Following a demand shock, a stronger policy response reduces consumption volatility for all wealth quartiles. This finding is consistent with the conditional welfare analysis, which shows that a stronger effective policy response mitigates welfare losses from demand shocks across the entire wealth distribution. Although the frontier curves are downward sloping for all quartiles, they are nearly flat for households outside the poorest quartile. Consequently, the welfare costs of shock-type uncertainty are concentrated among poorer households. Because shock-type uncertainty makes the effective policy response less accommodative, it significantly increases consumption volatility for these households.

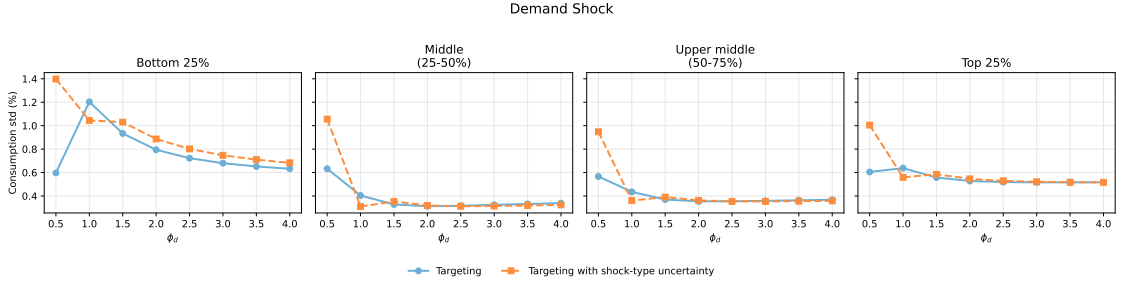
In contrast, following a supply shock, all households benefit from a weaker policy response in terms of reduced consumption volatility. This reflects the standard trade-off faced by central banks when responding to supply disturbances: stabilising inflation requires accepting greater fluctuations in real economic activity and consumption. When the counterfactual policy response is weak (that is, when  $\phi_\pi^s$  is low), shock-type uncertainty makes the effective response stronger ( $\tilde{\phi}\pi^s > \phi\pi^s$ ), leading to higher consumption volatility. Unlike the demand-shock case, the costs of shock-type uncertainty are distributed more evenly across the wealth distribution. All quartiles experience an increase in consumption volatility when the effective policy response deviates from the counterfactual one, although the magnitude of the effect remains modest.<sup>12</sup>

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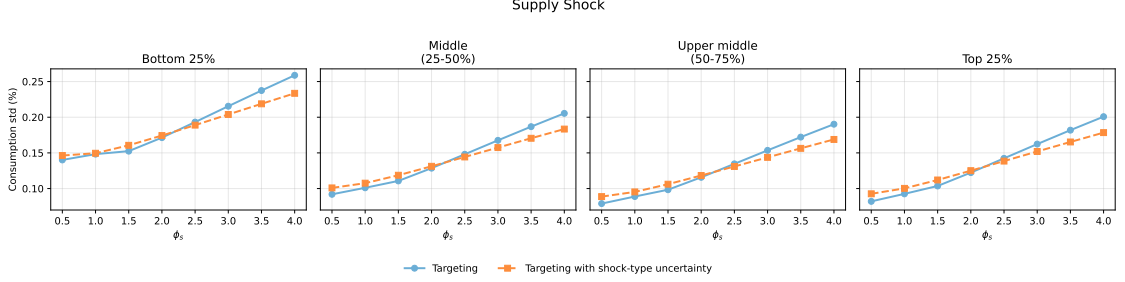
<sup>12</sup> The opposite is true when  $\phi_\pi^s > \phi_\pi^d$ . However, this is less relevant in practice.

Finally, the results highlight an additional trade-off in the design of shock-dependent monetary policy rules under shock-type uncertainty. To offset the effects of shock-type uncertainty following a demand shock, the central bank would need to choose a stronger desired response to supply shocks. However, such a response may be suboptimal when a supply shock actually occurs. Similarly, mitigating the effects of shock-type uncertainty following a supply shock requires a weaker desired response to demand shocks, which may not be optimal in the event of a demand disturbance. Consequently, the welfare costs of shock-type uncertainty may be even larger when policymakers must account for multiple types of shocks simultaneously.

Overall, since all demand frontier curves are downward-sloping and all supply frontier curves across the distribution are upward-sloping, shock-type uncertainty, which implies weaker reaction to demand shocks and stronger reaction to supply shocks, leads to higher consumption volatility. For almost all values of  $\phi_d$  (above 1) shock-type uncertainty in response to demand shocks implies for all households higher consumption volatility than without the uncertainty. For various  $\phi_s$  coefficients the curves rotate and become flatter at the value when uncertainty is irrelevant, i.e. when  $\phi_d = \phi_s$ .



((a)) Demand shock



((b)) Supply shock

**Figure 8: Frontier curves across the wealth distribution.** The demand shock is a one-standard deviation AR(1) innovation to the marginal efficiency of investment in the non-resource sector. The supply shock is a one-standard deviation AR(1) innovation to the desired markup of firms in the non-resource sector. The signs of the shocks are chosen to be recessionary.

## 5. Welfare Costs of Shock-type Uncertainty

Building on Section 2 that quantifies the central bank’s misattribution of supply and demand shocks through the parameters  $\omega_s$  and  $\omega_d$  and Section 4 that inspects the mechanism for a single supply and a single demand shock, this section uses the fully-fledged model outlined in Section 3 to quantify aggregate welfare costs of shock-type uncertainty that households face. The comparison is between a benchmark in which policy is set under the estimated targeted Taylor rule and a counterfactual in which the central bank observes the underlying shocks without uncertainty and as a result implements a counterfactual targeted Taylor rule.

Before turning to the distributional consequences, which are the main focus of the paper, Table 3 summarizes the implications for inflation and output volatility of the counterfactual targeted Taylor rule. Comparing the first row (with shock-type uncertainty) to the second row (full information) inflation volatility increases from 0.28 to 0.48 and output volatility falls from 0.96 to 0.53 and as a result their ratio drops from 3.44 to 1.09.<sup>13</sup> To infer whether the

<sup>13</sup> The real rate standard deviation increases from 0.3 with the estimated rule to 0.4 with the targeted Taylor rule.

increase in inflation volatility and the decrease in output volatility is because of a stronger reaction to demand shocks (higher  $\phi_d$ ) or due to a weaker reaction to supply shocks (lower  $\phi_s$ ) we further employ two counterfactuals. In the first one we only change the coefficient in front of the supply-driven inflation, leaving the coefficient in front of the demand-driven inflation at its estimated level (weaker response to supply shocks), in the second one, we only change the coefficient in front of the demand-driven inflation, leaving the coefficient in front of the supply-driven inflation at its estimated level (stronger response to demand shocks row). These counterfactuals correspond to the cases when either  $\omega_d$  or  $\omega_s$  are assumed to one respectively. The increase in inflation volatility stems from the weaker reaction of the central bank to the supply shocks (the inflation volatility in the third row is also equal to 0.48), while the contribution of the stronger reaction to demand shocks (forth row) to inflation volatility is minimal. On the other hand, both stronger reaction to demand shocks and weaker reaction to supply shocks decrease output volatility from 0.96 to 0.90 and to 0.57 respectively. Therefore, the counterfactual economy features higher inflation volatility but better output stabilization.

While studying optimal monetary policy is beyond the scope of this paper, as we focus on the costs of shock-type uncertainty, the result that counterfactual economy leads to a better output stabilization and therefore higher welfare (shown below) echoes [Acharya et al. \(2023\)](#). They show that in a heterogeneous-agent economy the welfare-maximizing monetary policy places greater emphasis on stabilizing aggregate activity than in a representative-agent setting. In this interpretation, shock-type uncertainty acts as a friction that prevents the central bank from implementing its preferred stabilization policy, generating welfare losses through reduced output stabilization.

Turning to the distributional consequences of shock-type uncertainty, Figure 9 reports cumulative welfare costs across the net wealth distribution in the benchmark economy with the estimated targeted Taylor rule (orange bars) and in the counterfactual economy (blue bars). Welfare costs are evaluated over 134 quarters, from 1992Q1 to 2025Q2, and reported on a cumulative basis.<sup>14</sup> All wealth groups experience negative welfare outcomes in the

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<sup>14</sup> Average welfare costs can be obtained by dividing the cumulative costs by 134, corresponding to the number of quarters between 1992Q1 and 2025Q2.

**Table 3: Inflation and output volatility under full information and shock-type uncertainty.** The table shows standard deviations of quarterly inflation, quarterly aggregate GDP growth and their ratio for the period from 1992Q1 to 2025Q2 using shocks from historical shock decomposition. All variables are in percent. The decomposition is performed using the data and either the estimated model (first row;  $\phi_s = 1.35, \phi_d = 1.78$ ), the model with the Taylor rule without shock-type uncertainty (second row;  $\phi_s = 0.92, \phi_d = 2.22$ ), with only weaker reaction to supply shocks (third row;  $\phi_s = 0.92, \phi_d = 1.78$ ) and with only stronger reaction to demand shocks (forth row;  $\phi_s = 1.35, \phi_d = 2.22$ ).

|                                                 | std( $\pi$ ) | std( $Y$ ) | std( $Y$ ) / std( $\pi$ ) |
|-------------------------------------------------|--------------|------------|---------------------------|
| Shock-type uncertainty                          | 0.28         | 0.96       | 3.44                      |
| Full information                                | 0.48         | 0.53       | 1.09                      |
| Weaker response to supply shocks ( $\phi_s$ )   | 0.48         | 0.57       | 1.19                      |
| Stronger response to demand shocks ( $\phi_d$ ) | 0.25         | 0.90       | 3.66                      |

benchmark economy, reflecting the sequence of shocks recovered from the historical shock decomposition and their implications for households’ welfare. Our focus, however, is on the comparison across policy rules. Eliminating uncertainty raises welfare for all wealth groups, implying that mis-identification distorts the policy response in a systematically costly way. The gains are largest for households in the lower and middle parts of the wealth distribution, indicating that these households are more exposed to the macroeconomic instability created by incorrect shock attribution.

Similarly to the volatility decomposition in Table 3, Figure 10 decomposes the welfare gains from eliminating shock-type uncertainty (the blue bars, equal to the difference between the blue and orange bars in Figure 9) into the two policy margins. The dominant contribution comes from the weaker response to supply-driven inflation, captured by changes in  $\phi_s$ . This finding is consistent with the volatility results in Table 3, where changes in  $\phi_s$  account for a larger decrease in output volatility. The contribution of stronger responses to demand-driven inflation, captured by changes in  $\phi_d$ , is also positive but substantially smaller across the wealth distribution. This suggests that the welfare gains arise primarily from the central bank’s ability to “look through” supply-driven inflation rather than from a stronger stabilization in response to demand shocks. Relative to total welfare gains, the contribution of  $\phi_d$  is U-shaped across the wealth distribution: households in the middle benefit the least from stronger demand stabilization, with  $\phi_d$ -related gains accounting for around 30% of total

## Welfare losses

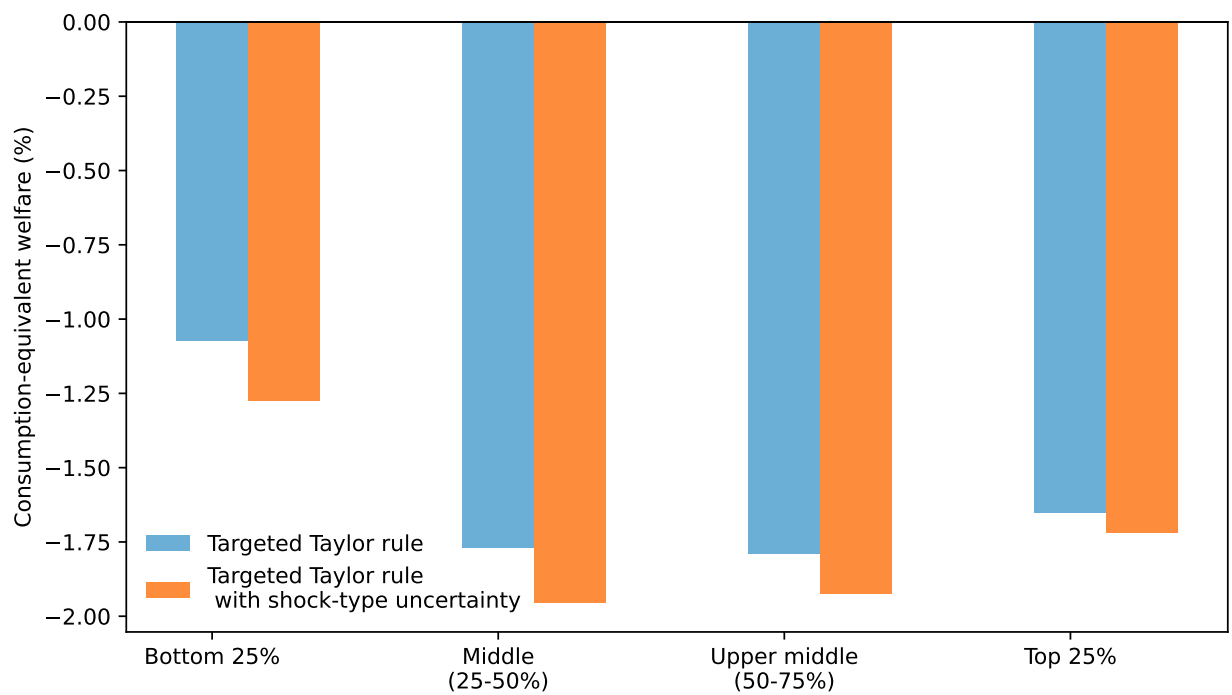


**Figure 9: Total welfare costs of shock-type uncertainty.** Each bar shows welfare costs each group of households incurred over the period from 1992Q1 to 2025Q2. Welfare is reported in consumption-equivalent units for each wealth group. The blue bars show the results without shock-type uncertainty (counterfactual economy), the orange bars show the results with shock-type uncertainty (estimated model).

gains, compared with 32% for the wealthiest households and 37% for the poorest households. U-shaped distributional effects also arise in studies of distributional effects of monetary policy shocks (Amberg et al., 2022; Bardóczy et al., 2026) and when studying individual earnings responses to aggregate output fluctuations (Guvenen et al., 2017). In our setting, the U-shaped pattern arises when comparing the effects of alternative monetary policy rules following demand-driven shocks.

## Welfare benefits across population from eliminating uncertainty

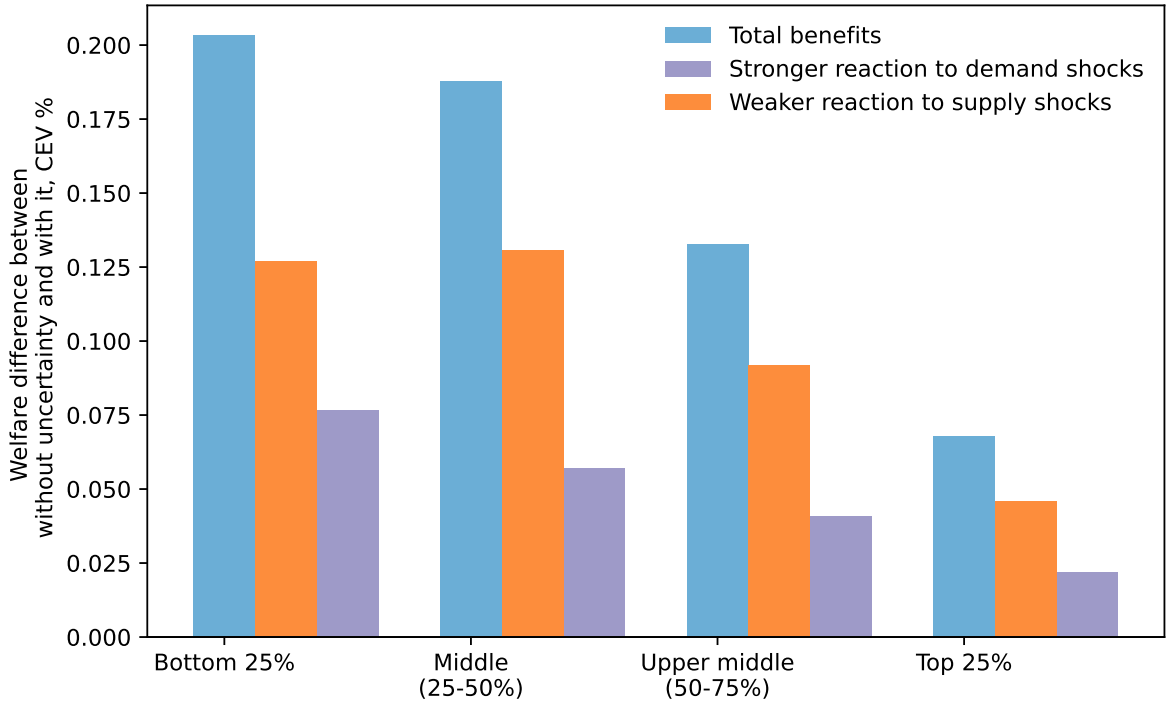


**Figure 10: Decomposition of welfare costs into the weaker policy response to supply shocks ( $\phi_s$ ) and the stronger policy response to demand shocks ( $\phi_d$ ).** Each bar shows welfare costs of shock-type uncertainty each group of households incurred over the period from 1992Q1 to 2025Q2. Welfare is reported in consumption-equivalent units for each wealth group. The blue bars show the total welfare losses with the bars equal to the difference between bars in Figure 9 for each net wealth percentile. The orange bars show results when the central bank's response to supply shocks is weaker ( $\phi_s = 0.92, \phi_d = 1.78$ ), the purple bars show results when the central bank's response to demand shocks is stringer ( $\phi_s = 1.35, \phi_d = 2.22$ ). The sum of orange and purple yields the blue bar for each net wealth percentile.

Finally, further decomposing the total welfare costs of shock-type uncertainty by each structural shock Figure 11 shows that while for most shocks uncertainty is costly, for some shocks it is beneficial (negative values on the x-axis). This is especially so for the oil price and risk premium shocks to which stronger reaction (larger  $\phi_d$ ) implies welfare losses. Since

we do not optimize policy in response to each shock, it could be the case that for these two shocks optimal  $\phi_d$  is smaller than the  $\phi_d$  from the counterfactual. For the majority of the shocks though misattribution is costly. The largest gains for all wealth percentiles (shown on the y-axis) are due to smaller reaction to TFP shocks and stronger reaction to liquidity premium and investment shocks which are the main drivers of consumption and investment dynamics respectively (see Figure 14 in Appendix C for the historical shock decomposition of investment and consumption).

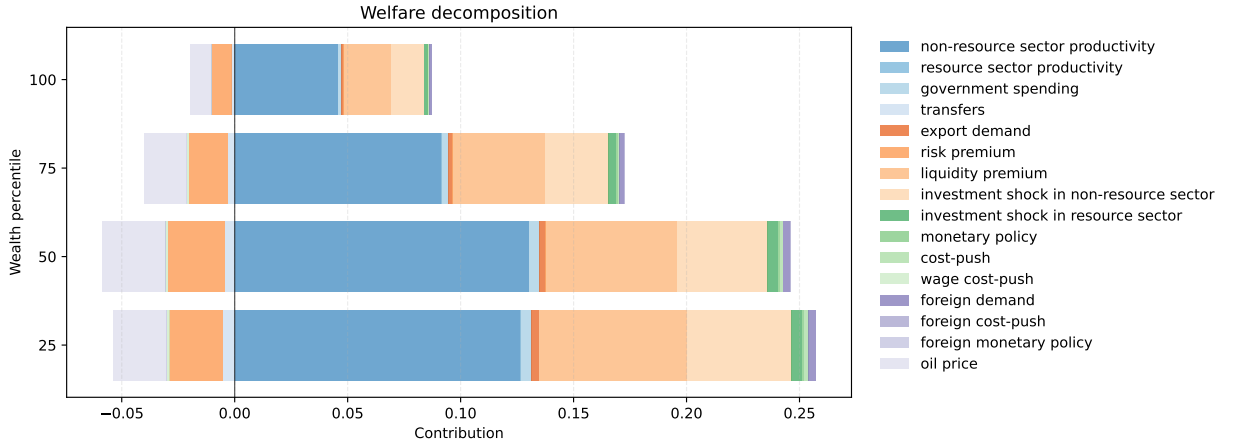


**Figure 11: Decomposition of total welfare costs across structural shocks.** Each bar shows welfare losses/benefits across the net wealth distribution of the shock-type uncertainty. The wealth percentiles are shown on the y-axis, contributions are shown on the x-axis. Shocks are shown with different colors. Positive contribution stands for losses due to shock-type uncertainty, negative contributions show benefits from the shock-type uncertainty. The sum of all contributions across all shocks yields blue bars in Figure 10. Welfare is reported in consumption-equivalent units.

Figure 15 in Appendix C shows how the welfare costs vary over time. The gains from eliminating uncertainty are not evenly distributed across time periods: the largest gains are in the GFC, post-GFC and Covid periods. Examining a similar decomposition across shocks as in Figure 10 but excluding Covid (and post-covid) periods, leads to the same conclusions about the importance of various shocks. While quantitatively results change, qualitatively TFP, liquidity, oil price, investment and risk premium shocks are the largest contributors to the welfare costs of shock-type uncertainty.

Finally, to confirm that our results are not dependent on the realized sequence of shocks we perform a simulation exercise. Across 200 simulations each containing 1000 quarters of data we evaluate welfare under the estimated Taylor rule and the counterfactual Taylor rule without shock-type uncertainty. In each simulation we use all 16 normally distributed shocks

with means equal to zero for each shock and standard deviations at the estimated levels. We confirm our findings that welfare increases when uncertainty is eliminated and the largest gains are at the bottom of the wealth distribution. The welfare improves mainly due to weaker reaction to supply shocks. See Table 8 in Appendix C for the results.

## 6. Conclusion

This paper studies a shock-type informational friction in monetary policy: central banks observe inflation and activity, but they do not directly observe whether inflationary pressure is driven by demand or by supply. That distinction matters because optimal policy responses differ sharply across shock types. We use Australian data to measure the probability with which the central bank mis-identifies demand and supply disturbances, and we then quantify the macroeconomic and welfare costs of that shock-type uncertainty in a heterogeneous-agent New Keynesian model.

Our empirical contribution is to recover the central bank’s perceived demand-supply decomposition of inflation from forecast revisions and compare it with a benchmark decomposition based on disaggregated price and quantity data. The results imply that the Reserve Bank of Australia identifies supply shocks slightly more accurately than demand shocks, but that both forms of mis-attribution are quantitatively important. These estimates provide discipline for the informational friction in the quantitative model as they anchor assumed uncertainty in central bank’s forecast data.

The quantitative HANK model then shows how this friction distorts monetary policy. When the central bank is uncertain about the source of inflation, it responds too weakly to demand shocks and too strongly to supply shocks. Less demand stabilization raises consumption volatility for all households because the demand frontiers are downward sloping throughout the wealth distribution. At the same time, stronger responses to supply shocks are also costly for all households because the supply frontiers are upward sloping across the wealth distribution. Therefore, shock-type uncertainty creates no winners across the distribution.

In the fully-fledged model, these distorted responses translate into economically meaningful welfare losses. A counterfactual in which the central bank observes the shock type and can condition policy accordingly delivers higher welfare for all wealth groups. The gains are largest for the most wealth-poor households, indicating that they are especially exposed to the additional macroeconomic instability generated by mis-identification. Most of the gains from eliminating uncertainty come from weaker reaction to supply shocks, which at the aggregate level results in better output stabilization amid larger inflation volatility.

The broader implication is that informational imperfections about the source of inflation can materially alter both aggregate stabilisation outcomes and their distributional consequences. Improving real-time diagnosis of demand and supply pressures is therefore not merely a forecasting exercise; it changes the effective conduct of monetary policy and the welfare consequences that policy generates across households. More generally, our results suggest that communication, data collection and modelling strategies that sharpen the central bank's assessment of shock types can yield welfare gains especially at the bottom of the wealth distribution. Taking uncertainty as given, there might be benefits in reacting weakly to supply shocks, especially when certain that the inflation pressures are supply-driven. A limitation of our analysis though is that in our exercises inflation expectations remain anchored, de-anchoring of the expectations could impede the ability of the central bank to extract welfare gains from weaker responses to supply-driven inflation.

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## A. Appendix

Figures 12 and 13 show the same decompositions as Figures 1 and 2 except they show those for the not seasonally adjusted headline CPI inflation. Table 4 shows robustness results for the estimated  $\omega_s$  and  $\omega_d$  using various specifications.

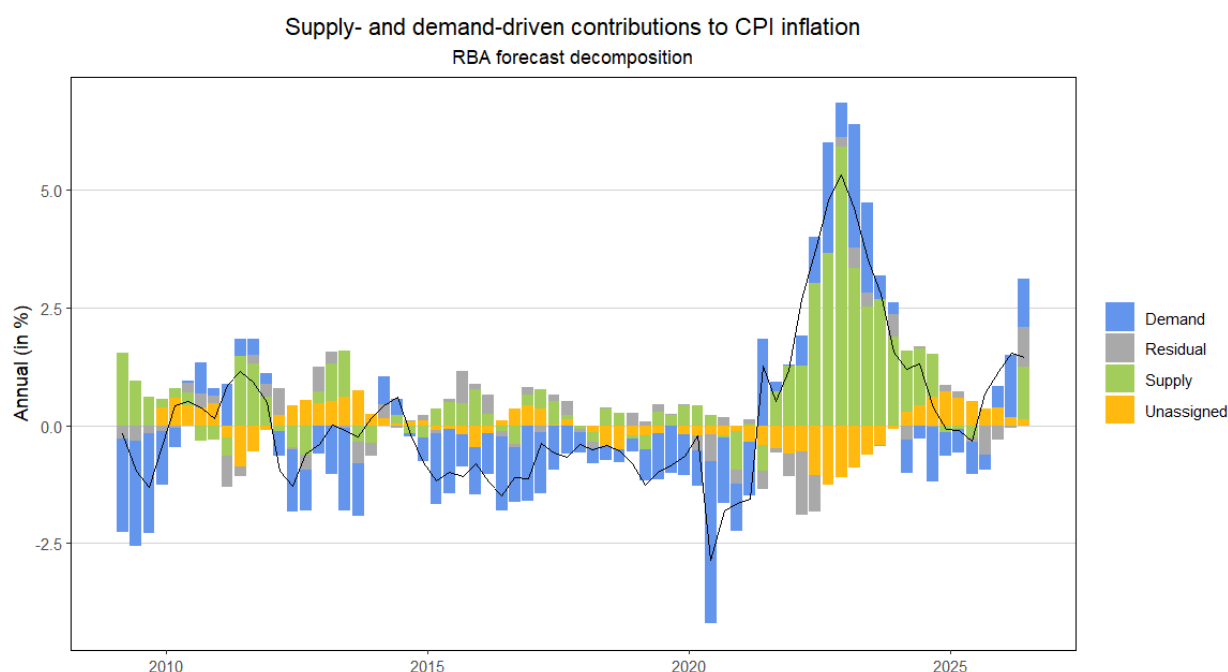


**Figure 12: Decomposition of annual headline not seasonally adjusted CPI into supply- and demand-driven components using central bank forecasts.** 'Unassigned' indicates the contribution from the forecast made 8 quarters ahead. 'Residual' indicates the central bank's nowcasting error. The dark line shown actual headline inflation.

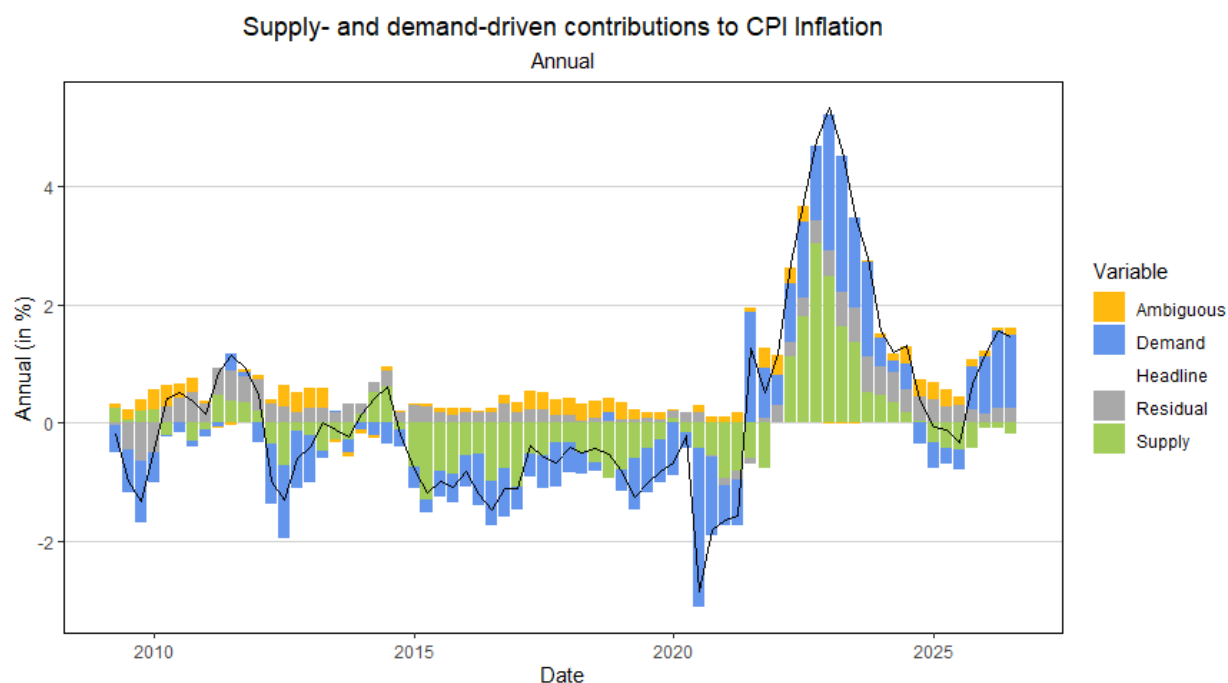


**Figure 13: Decomposition of annual headline CPI into supply- and demand-driven components from 2009Q1 to 2026Q2.** 'Ambiguous' indicates the contribution from components for which inflation or quantity forecast errors are within the 25% prediction interval. 'Residual' indicates the contribution from unmodelled components due to an incomplete matching between HFCE expenditure categories and CPI categories. The dark line shown actual headline inflation. Since the decomposition includes 2.5 inflation target, to align with the perceived decomposition 1.25 was subtracted from both supply and demand components.

**Table 4: Robustness of  $\omega_s$  and  $\omega_d$ .** The baseline specification uses seemingly unrelated regression specification with the restrictions on the coefficients. The top part of the table shows robustness of the results to estimation of the two equations separately and using OLS, separately using OLS and HAC standard errors, estimation of the two equations as a system, estimation of the two equations as a system using OLS and with restrictions on the coefficients. In the baseline specification we use seasonally adjusted headline inflation measure and output gap measure. The middle part of the table shows robustness of the results to using not seasonally adjusted CPI inflation, underlying inflation, unemployment gap instead of output gap measure or using the methodology when the entire inflation realization is classified as either demand or supply-driven. The baseline specification excludes Covid period, sets  $H = 8$  and classifies the first forecast as ‘ambiguous’. The bottom part of the table shows robustness of the results to the inclusion of the Covid period, to setting  $H = 9$  or  $H = 7$  and to the assignment of the first forecast.

| Various specifications             |                            |                |                         |                                       |
|------------------------------------|----------------------------|----------------|-------------------------|---------------------------------------|
| Specifications                     | OLS,<br>unrestricted       | OLS with HAC   | System,<br>unrestricted | System,<br>restricted OLS             |
| $\omega_s$                         | 0.73                       | 0.70           | 0.73                    | 0.78                                  |
| $\omega_d$                         | 0.65                       | 0.76           | 0.65                    | 0.65                                  |
| Various measures                   |                            |                |                         |                                       |
| Measures                           | Headline CPI<br>not SA     | Underlying CPI | Slack,<br>unemployment  | Methodology,<br>1-step ahead forecast |
| $\omega_s$                         | 0.73                       | 0.70           | -0.07                   | 0.85                                  |
| $\omega_d$                         | 0.72                       | 0.56           | 0.65                    | 0.68                                  |
| Various empirical strategy choices |                            |                |                         |                                       |
| Choices                            | Covid period,<br>including | $H = 9$        | $H = 7$                 | First forecast<br>assigned            |
| $\omega_s$                         | 0.75                       | 0.72           | 0.73                    | 0.67                                  |
| $\omega_d$                         | 0.80                       | 0.66           | 0.63                    | 0.66                                  |

## B. Appendix: Model Description

This appendix provides a description of the model details not outlined in Section 3. The model is a medium-scale small open economy HANK model calibrated to the Australian economy. Time is discrete and measured in quarters.

### B.1. Labour Unions and Wage Setting

There is a continuum of monopolistically competitive labour unions indexed by  $k \in [0, 1]$ . Each union maximizes the welfare of its members subject to wage adjustment costs. Union  $k$  hires labour services from households in its sector and faces a downward-sloping labour demand from competitive labour packers with elasticity  $\varepsilon_w$ .

The union's optimization problem is:

$$\max_{w_{k,t}, n_{k,t}} \sum_{s=0}^{\infty} \mathbb{E}_t \beta^s \left[ \int \left( \frac{c_{t+s}^{1-\sigma}}{1-\sigma} - \varphi \frac{n_{t+s}^{1+\nu}}{1+\nu} \right) p(\theta_{t+s}) \mathbb{1}_{LF,t+s} dD_t \right. \quad (19)$$

$$\left. - \frac{\varepsilon_w}{2\kappa_w} \left[ \ln \left( \frac{w_{k,t+s}}{(\pi_{t+s-1}^w)^{\chi_w} w_{k,t+s-1}} \right) \right]^2 \right] \quad (20)$$

subject to a labour demand constraint  $\int n_{k,t} e_t p(\theta_t) \mathbb{1}_{LF,t} dD_t = \left( \frac{w_{k,t}}{w_t} \right)^{-\varepsilon_w} l_t$ , where  $l_t$  is total efficient labour hours demanded by firms. In a symmetric equilibrium where all unions set the same wage  $w_{k,t} = w_t$ , this yields a wage Phillips curve:

$$\ln \left( \frac{w_t}{w_{t-1}} \right) = \beta \mathbb{E}_t \ln \left( \frac{w_{t+1}}{w_t} \right) - \chi_w \beta \ln \left( \frac{w_t}{w_{t-1}} \right) + \chi_w \ln \left( \frac{w_{t-1}}{w_{t-2}} \right) \quad (21)$$

$$+ \kappa_w \left[ \varphi \int n_t^{1+\nu} p(\theta_t) \mathbb{1}_{LF,t} dD_t - \frac{1}{\mu_w} \int c_t^{-\sigma} \xi_t (e_t n_t w_t)^{1-\tau} (1-\tau) p(\theta_t) \mathbb{1}_{LF,t} dD_t \right] \quad (22)$$

where  $\kappa_w$  governs the slope of the wage Phillips curve,  $\chi_w$  is the wage indexation parameter, and  $\mu_w = \varepsilon_w / (\varepsilon_w - 1)$  is the wage markup.

## B.2. Production Sectors

The economy comprises two production sectors reflecting Australia's nature as a resource-dependent commodity exporter.

### B.2.1. Resource Sector

The resource sector is perfectly competitive. Firms produce according to a Cobb-Douglas production function:

$$Y_t^z + Y_t^{z,ex} = z_t^z (K_{t-1}^z u_t^z)^{\nu^z} (L_t^z)^{1-\nu^z} \quad (23)$$

where  $z_t^z$  is total factor productivity,  $K_t^z$  is capital,  $u_t^z$  is capacity utilization,  $L_t^z$  is efficient labour hours,  $Y_t^z$  is output for domestic consumption (resource intermediate goods), and  $Y_t^{z,ex}$  is resource exports. The resource price  $p_t^z$  is exogenously set on international markets.

Resource firms maximize discounted profits:

$$J_{i,t}^z(k_{t-1}^z) = \max_{k_t^z, I_t^z, l_t^z, u_t^z} \left\{ (1 - \tau_t^f) \left[ \frac{p_t^z}{p_t} (y_t^z + y_t^{z,ex}) - w_t l_t^z - \frac{p_{H,t}^z}{p_t} I_t^z \right] + \frac{\mathbb{E}_t J_{i,t+1}^z(k_t^z)}{1 + r_{t+1}} \right\} \quad (24)$$

subject to capital accumulation with investment adjustment costs:

$$k_t^z = (1 - \delta_t^z) k_{t-1}^z + I_t^z - \frac{\varepsilon_I^z}{2} \left( \ln \frac{I_t^z}{I_{t-1}^z} \right)^2 I_t^z \quad (25)$$

Depreciation depends on utilization:

$$\delta_t^z = \delta_0^z + \delta_1^z (u_t^z - 1) + \frac{\delta_2^z}{2} (u_t^z - 1)^2 \quad (26)$$

The labour demand in the resource sector is determined by the marginal productivity of labour:

$$L_t^z = \left( \frac{(1 - \nu^z) p_t^z z_t^z (u_t^z K_{t-1}^z)^{\nu^z}}{w_t} \right)^{1/\nu^z} \quad (27)$$

### B.2.2. Non-Resource Sector

The non-resource sector comprises competitive final-good producers and monopolistically competitive intermediate-good producers.

**Final good producers** use a CES aggregator to combine differentiated intermediate goods:

$$Y_t = \left[ \int_0^1 y_{i,t}^{\frac{\eta-1}{\eta}} di \right]^{\frac{\eta}{\eta-1}} \quad (28)$$

where  $\eta$  is the elasticity of substitution between varieties. This yields demand for each intermediate variety:

$$y_{i,t} = \left( \frac{p_{i,t}}{p_{H,t}} \right)^{-\eta} Y_t \quad (29)$$

**Intermediate good producers** are monopolistically competitive firms that face quadratic Rotemberg-style price adjustment costs. Firm  $i$  maximizes:

$$J_{i,t}(k_{t-1}) = \max_{p_{i,t}, k_t, I_t, l_t^n, u_t, y_t^z} \left\{ (1 - \tau_t^f) \left[ \frac{p_{i,t}}{p_{H,t}} \frac{p_{H,t}}{p_t} Y_t - w_t l_t^n - \frac{p_{H,t}}{p_t} I_t - \frac{p_t^z}{p_t} y_t^z \right] \right. \quad (30)$$

$$\left. - \frac{\eta}{2\kappa_p} \ln \left( \frac{p_{H,t}}{\pi_{H,t-1}^{\chi_p} p_{H,t-1}} \right)^2 \frac{p_{H,t}}{p_t} Y_t \right] + \frac{\mathbb{E}_t J_{i,t+1}(k_t)}{1 + r_{t+1}} \Big\} \quad (31)$$

subject to production technology:

$$Y_t = z_t (K_{t-1} u_t)^{\nu^n} (L_t^n)^{1-\nu^n-\gamma} (Y_t^z)^\gamma \quad (32)$$

where the marginal cost is:

$$mc_t = \frac{w_t N_t (1 - \tau^f)}{(1 - \nu^n - \gamma) Y_t} \quad (33)$$

and capital accumulation:

$$k_t = (1 - \delta_t)k_{t-1} + I_t - \frac{\varepsilon_I}{2} \left( \ln \frac{I_t}{I_{t-1}} \right)^2 I_t \quad (34)$$

The optimal investment choice equates the marginal cost of investment to Tobin's Q, adjusted for investment costs:

$$-(1 - \tau^f)p_{H,t} + \varepsilon_t^{inv} Q_t \left( 1 - \frac{\varepsilon_I}{2} \left( \ln \frac{I_t}{I_{t-1}} \right)^2 - \varepsilon_I \ln \frac{I_t}{I_{t-1}} \right) \quad (35)$$

$$+ \frac{1}{1 + r_{t+1}} \varepsilon_{t+1}^{inv} Q_{t+1} \varepsilon_I \ln \frac{I_{t+1}}{I_t} \frac{I_{t+1}}{I_t} = 0 \quad (36)$$

Depreciation depends on utilization:

$$\delta_t = \delta_0 + \delta_1(u_t - 1) + \frac{\delta_2}{2}(u_t - 1)^2 \quad (37)$$

The first-order condition for capacity utilization is:

$$mc_t \alpha Z_t (K_{t-1} u_t)^\alpha N_t^{1-\alpha-\gamma} (Y_t^z)^\gamma / u_t = Q_t K_{t-1} (\delta_1 + \delta_2(u_t - 1)) \quad (38)$$

where  $Q_t$  is Tobin's Q. The no-arbitrage condition for capital determines Tobin's Q:

$$Q_t = \frac{(1 - \delta_{t+1})Q_{t+1} + mc_{t+1} \alpha Z_{t+1} (K_t u_{t+1})^\alpha N_{t+1}^{1-\alpha-\gamma} (Y_{t+1}^z)^\gamma / K_t}{1 + r_{t+1}} \quad (39)$$

In a symmetric equilibrium, the first-order condition for prices yields a price Phillips curve:

$$\begin{aligned} \ln(1 + \pi_{H,t}) - \chi_p \ln(1 + \pi_{H,t-1}) = \\ \kappa_p \left( \frac{mc_t}{(1 - \tau^f)p_{H,t}} - \frac{1}{\mu_p} \right) + \frac{1}{1 + r_{ss}} [\ln(1 + \pi_{H,t+1}) - \chi_p \ln(1 + \pi_{H,t})] \end{aligned} \quad (40)$$

where  $\kappa_p$  governs the slope of the Phillips curve,  $\chi_p$  is price indexation,  $r_{ss}$  is the steady-state real interest rate, and marginal cost is normalized by the tax rate and domestic price level.

### B.3. Import and Export Sectors

Households consume a CES basket of domestically-produced goods and imported foreign goods. The consumption aggregator is:

$$C_t = \left[ \gamma_{hb}^{\frac{1}{\eta^h}} \text{Im}_t^{\frac{\eta^h-1}{\eta^h}} + (1 - \gamma_{hb})^{\frac{1}{\eta^h}} C_{h,t}^{\frac{\eta^h-1}{\eta^h}} \right]^{\frac{\eta^h}{\eta^h-1}} \quad (41)$$

where  $\gamma_{hb}$  governs home bias and  $\eta^h$  is the elasticity of substitution between domestic and foreign goods. This implies demand for domestic and imported goods:

$$C_{h,t} = (1 - \gamma_{hb}) \left( \frac{p_{H,t}}{p_t} \right)^{-\eta^h} C_t \quad (42)$$

$$\text{Im}_t = \gamma_{hb} \left( \frac{p_{F,t}}{p_t} \right)^{-\eta^h} C_t \quad (43)$$

and a consumer price index:

$$p_t = \left[ \gamma_{hb} p_{F,t}^{1-\eta^h} + (1 - \gamma_{hb}) p_{H,t}^{1-\eta^h} \right]^{\frac{1}{1-\eta^h}} \quad (44)$$

Exchange rate pass-through to domestic prices is incomplete. The resource price in domestic currency follows a partial pass-through specification:

$$p_t^z = (Q_t p_t^z)^{p_z^{PT}} (p_{t-1}^z)^{1-p_z^{PT}} \quad (45)$$

where  $p_z^{PT}$  is the pass-through elasticity for resource prices (0 represents no pass-through, 1 represents complete pass-through).

Monopolistically competitive importers purchase foreign goods at price  $p_t^*$  in foreign currency and sell them domestically at price  $p_{F,t}$  in domestic currency. The importers face price stickiness a la Calvo, and we assume that they set reset price as  $\bar{p}_{F,t}/p_t = (Q_t p_t^*)^{p_F^{PT}}$ , where  $Q_t$  is the real exchange rate and  $p_F^{PT}$  is the pass-through parameter for foreign goods.

Denote the price adjustment frequency by  $\chi_F \in [0, 1]$ . The domestic import price follows the law of motion:

$$p_{F,t} = (\bar{p}_{F,t})^{1-\chi_F} (p_{F,t-1})^{\chi_F} \quad (46)$$

We further assume that these importer firms are owned by foreign households.

Non-resource exports from the domestic economy are driven by foreign output and the real exchange rate:

$$\text{Ex}_t = \gamma^f \left( \frac{p_{H,t}}{Q_t p_t^*} \right)^{-\eta^f} Y_t^f \quad (47)$$

where  $Y_t^f$  is rest-of-world output,  $\eta^f$  is the export demand elasticity, and  $Q_t$  is the real exchange rate.

## B.4. Fiscal Authority

The government collects labour income taxes (progressive scheme), consumption taxes, and profit taxes. It pays unemployment benefits and finances government expenditures through a combination of taxes and debt (short-term and long-term). The fiscal budget constraint is:

$$\int [e_t w_t n_t - \xi_t (e_t w_t n_t)^{1-\tau}] \mathbb{1}_{LF,t} p(\theta_t) dD_t + \tau_t^f \left[ \frac{p_{H,t}}{p_t} Y_t - w_t l_t^n - \frac{p_{H,t}}{p_t} I_t - \frac{p_t^z}{p_t} y_t^z \right] \quad (48)$$

$$+ \tau_t^f \left[ \frac{p_t^z}{p_t} (y_t^z + y_t^{z,ex}) - w_t l_t^z - \frac{p_{H,t}}{p_t} I_t^z \right] + \int \tau_t^c c_t dD_t + B_t^{g,ST} + q_t^b B_t^{g,LT} \quad (49)$$

$$= u^b \int (1 - p(\theta_t)) \mathbb{1}_{LF,t} dD_t + (1 + r_t - \omega_t) B_{t-1}^{g,ST} + (1 + \rho^b q_t^b) B_{t-1}^{g,LT} + \frac{p_{H,t}}{p_t} G_t \quad (50)$$

Average labour income taxes and long-term debt evolve according to fiscal rules. The average labour income tax rate rule is:

$$\frac{t_t^{av}}{t^{av}} - 1 = \rho_\tau \left( \frac{t_{t-1}^{av}}{t^{av}} - 1 \right) + (1 - \rho_\tau) \left[ \gamma_B^\tau \left( \frac{v L_{t-1} B_{t-1}^{g,LT} + B_{t-1}^{g,ST}}{v L B^{g,LT} + B^{g,ST}} - 1 \right) \right. \quad (51)$$

$$\left. + \gamma_Y^\tau \left( \frac{Y_{agg,t}}{Y_{agg}} - 1 \right) \right] + \varepsilon_t^t \quad (52)$$

where  $t^{av}$  is the average labour income tax rate. Long-term debt balances the budget and short-term debt is kept constant.

Long-term debt pricing follows no-arbitrage:

$$\mathbb{E}_t(1 + r_{t+1})q_t^b = 1 + \rho^b \mathbb{E}_t q_{t+1}^b \quad (53)$$

## B.5. Financial Intermediary and Asset Returns

A financial intermediary collects household savings in both liquid and illiquid assets and invests them in domestic assets (equities and government bonds) and foreign assets, while rebating returns to households net of intermediation costs. Let  $v_t$  and  $v_t^z$  denote equity valuations in non-resource and resource sectors. Bond valuations follow no-arbitrage conditions:

$$vL_t = \frac{1 + \rho^b vL_{t+1}}{1 + r_{t+1}}, \quad vL_t^* = \frac{1 + \rho^{b*} vL_{t+1}^*}{1 + r_{t+1}^*} \quad (54)$$

Equity valuations follow:

$$p_t = \frac{d_{t+1} + p_{t+1}}{1 + r_{t+1}}, \quad p_t^z = \frac{d_{t+1}^z + p_{t+1}^z}{1 + r_{t+1}^z} \quad (55)$$

where  $d_t$  is the dividend from non-resource firms and  $d_t^z$  is the dividend from resource firms.

Dividends are computed as:

$$d_t = (1 - \tau^f) (p_{H,t} Y_t - w_t L_t^n - p_{H,t} I_t - p_t^z Y_t^z) \quad (56)$$

$$d_t^z = (1 - \tau^f) (p_t^z (Y_t^z + Y_t^{z,ex}) - w_t L_t^z - p_{H,t} I_t^z) \quad (57)$$

Uncovered interest parity for long-term bonds holds:

$$\frac{1 + \rho^b vL_{t+1}}{vL_t} = \frac{\mathbb{E}_t Q_{t+1}}{Q_t} \frac{1 + \rho^{b*} vL_{t+1}^*}{vL_t^*} + \psi_t \quad (58)$$

For liquid assets, uncovered interest parity also holds with a liquidity premium wedge:

$$1 + r_{t+1} - \omega_{t+1} = \frac{\mathbb{E}_t Q_{t+1}}{Q_t} (1 + r_{t+1}^* - \omega_{t+1}^*) + \psi_t \quad (59)$$

where  $\psi_t = \psi_{NFA}(e^{-NFA_{t+1}} - 1) + \varepsilon_{UIP,t}$  is the country premium with an NFA-dependent component. The Fisher equation relates nominal and real interest rates:

$$1 + i_{t-1} = (1 + r_t - \omega_t)(1 + \pi_t) \quad (60)$$

The return on liquid assets is a weighted average of domestic and foreign short-term bond returns based on net foreign asset composition:

$$1 + r_t^b = \frac{NFA_{t-1}^{ST}}{B_{t-1}} \frac{Q_t}{Q_{t-1}} (1 + r_t^* - \omega_t^*) + \left(1 - \frac{NFA_{t-1}^{ST}}{B_{t-1}}\right) (1 + r_t - \omega_t) \quad (61)$$

The return on illiquid assets is:

$$1 + r_t^a = \frac{v_{t-1}}{A_{t-1}} \frac{d_t + v_t}{v_{t-1}} + \frac{v_{t-1}^z}{A_{t-1}} \frac{d_t^z + v_t^z}{v_{t-1}^z} + \frac{q_{t-1}^b B_{t-1}^{g,LT}}{A_{t-1}} \frac{1 + \rho^b q_t^b}{q_{t-1}^b} + \frac{NFA_{t-1}^{LT}}{A_{t-1}} \frac{Q_t}{Q_{t-1}} \frac{1 + \rho^{b*} q_t^{b*}}{q_{t-1}^{b*}} + \Psi_t \quad (62)$$

where  $\Psi_t$  captures portfolio adjustment costs and offset account fees redistributed across illiquid asset holders.

## B.6. Rest of World

The rest of the world is modelled as a small 3-equation New Keynesian economy with external habit in consumption. The foreign household Euler equation with habit is:

$$(C_t^* - hC_{t-1}^*)^{-\sigma} - h\beta(C_{t+1}^* - hC_t^*)^{-\sigma} = \beta(1 + r_{t+1}^*)\mathbb{E}_t[(C_{t+1}^* - hC_t^*)^{-\sigma} - h\beta(C_{t+2}^* - hC_{t+1}^*)^{-\sigma}] \quad (63)$$

The foreign Phillips curve is:

$$\pi_t^* = \beta \mathbb{E}_t \pi_{t+1}^* + \kappa^* (\text{mc}_t^* - 1/\mu_t^*) \quad (64)$$

where  $\text{mc}_t^*$  is real marginal cost. Foreign monetary policy follows a Taylor rule:

$$i_t^* = \rho^{r,*} i_{t-1}^* + (1 - \rho^{r,*}) (r^* + \phi_\pi^* \pi_t^* + \phi_y^* (Y_t^f - Y^f)) + \varepsilon_t^{r*} \quad (65)$$

## B.7. Market Clearing and Capital Flows

Labour market clearing requires total labour supply equals demand from both sectors:

$$l_t = l_t^n + l_t^z \quad (66)$$

The home goods market clearing condition is:

$$Y_t + \frac{p_{H,t}}{p_t} u^b \int (1 - \mathbb{1}_{LF,t}) dD_t = C_{h,t} + I_t + I_t^z + G_t + \text{Ex}_t \quad (67)$$

The net foreign asset position evolves according to:

$$NFA_t = (1 + \tilde{r}_t) NFA_{t-1} + \left( \text{Ex}_t + \frac{p_t^z}{p_t} y_t^{z,ex} - \text{Im}_t \right) \quad (68)$$

where  $\tilde{r}_t$  is the return on the previous period's net foreign asset position. Liquid and illiquid components of net foreign assets are tracked separately for portfolio management.

## B.8. Shock Structure

The model features 16 exogenous shocks representing domestic and foreign disturbances:

### Domestic shocks (12):

1. Productivity shocks to resource sector ( $z_t^z$ )
2. Productivity shocks to non-resource sector ( $z_t$ )

3. Price markup shocks (non-resource sector) ( $\mu_p$ )
4. Wage markup shocks ( $\mu_w$ )
5. Investment efficiency shocks (resource sector) ( $\varepsilon_t^{inv,z}$ )
6. Investment efficiency shocks (non-resource sector) ( $\varepsilon_t^{inv}$ )
7. Government consumption shocks ( $G_t$ )
8. Government transfer shocks ( $u^b$ )
9. Monetary policy shocks ( $\varepsilon_t^r$ )
10. Liquidity premium shocks ( $\omega_t$ )
11. Government debt shocks ( $\varepsilon_t^{Bg}$ )
12. Preference/discount factor shocks ( $\beta_t$ )

**Foreign shocks (4):**

1. Foreign productivity shocks ( $z_t^f$ )
2. Foreign price markup shocks ( $\mu_p^*$ )
3. Foreign monetary policy shocks ( $\varepsilon_t^{r*}$ )
4. UIP/Risk premium shocks ( $\varepsilon_t^{UIP}$ )

Supply shocks consist of productivity shocks (both sectors) and markup shocks (price, wage and foreign price). All other shocks are classified as demand shocks.

## B.9. Solution Method

The stochastic steady state is solved through an endogenous grid method extended to include a discrete choice, and the short run dynamics are solved with the sequence space Jacobian method of [Auclert et al. \(2021a\)](#). The solution has two nested layers. An inner layer solves the household problem and the induced distribution for a given set of prices. An outer layer searches over scalars so that the aggregate markets clear. For more details see [Faia et al. \(2023\)](#).

## B.10. Calibration Targets

Key calibration targets from Australian administrative and survey data include:

**Table 5: Selected Calibration Parameters**

| Parameter                                | Value and Source                                       |
|------------------------------------------|--------------------------------------------------------|
| <b>Household Parameters</b>              |                                                        |
| Time discount factor ( $\beta$ )         | 0.991, target $r = 0.00757$                            |
| EIS ( $\sigma$ )                         | 1.0, <a href="#">Gibbs et al. (2018)</a>               |
| Liquidity premium ( $\omega$ )           | 0.005, <a href="#">Auclert et al. (2021a)</a>          |
| Inverse Frisch elasticity ( $\nu$ )      | 1.0, <a href="#">Gibbs et al. (2018)</a>               |
| Borrowing penalty ( $\kappa^b$ )         | 0.0185, target 9% negative liquid assets               |
| Offset account fee ( $o^f$ )             | 0.023, liquid assets distribution                      |
| <b>Fiscal/Monetary Policy Parameters</b> |                                                        |
| Tax progressivity ( $\tau$ )             | 0.2, <a href="#">Tran and Zakariyya (2023)</a>         |
| Consumption tax ( $\tau^c$ )             | 0.1, <a href="#">Tran and Zakariyya (2023)</a>         |
| Profit tax ( $\tau^f$ )                  | 0.3, ABS                                               |
| <b>Open Economy Parameters</b>           |                                                        |
| Home bias parameter ( $\gamma_{hb}$ )    | 0.25, <a href="#">Gibbs et al. (2018)</a>              |
| Import/export elasticity ( $\eta^h$ )    | 0.8, <a href="#">Gibbs et al. (2018)</a>               |
| Country risk premium ( $\psi$ )          | 0.0001, <a href="#">Schmitt-Grohé and Uribe (2003)</a> |

The idiosyncratic earnings process follows an AR(1) with mixture-of-normals innovations to match moments from Australian administrative tax data (PLIDA), including standard deviation, skewness, kurtosis, and persistence of earnings changes at 1-year and 5-year horizons. Labour market participation and unemployment risk are calibrated to match moments from the Household Income and Labour Dynamics in Australia (HILDA) survey across income percentiles. Household portfolio shares between liquid and illiquid assets are calibrated to match the wealth distribution from ABS national accounts data, accounting for the prevalence of offset accounts in Australia.

## B.11. Estimation results

**Table 6: Estimated Parameters in Domestic Block**

| Parameter                                           | Description                           | Prior  |       |         | Posterior      |
|-----------------------------------------------------|---------------------------------------|--------|-------|---------|----------------|
|                                                     |                                       | Shape  | Mean  | Std dev | Posterior mode |
| Capital utilization and investment adjustment costs |                                       |        |       |         |                |
| $\delta_2/\delta_1$                                 | Capital util. cost                    | Normal | 1.00  | 0.30    | 0.96           |
| $\delta_2^z/\delta_1^z$                             | Capital util. cost (resource)         | Normal | 1.00  | 0.30    | 2.37           |
| $\varepsilon_I$                                     | Investment adj. cost                  | Normal | 4.00  | 1.00    | 2.48           |
| $\varepsilon_I^z$                                   | Investment adj. cost (resource)       | Normal | 4.00  | 1.00    | 1.59           |
| Nominal rigidities                                  |                                       |        |       |         |                |
| $\kappa_p$                                          | Price PC slope (x 100)                | Gamma  | 10.00 | 3.00    | 2.61           |
| $\kappa_w$                                          | Wage PC slope (x 100)                 | Gamma  | 10.00 | 3.00    | 0.64           |
| $\chi_p$                                            | Price indexation                      | Beta   | 0.30  | 0.15    | 0.60           |
| $\chi_w$                                            | Wage indexation                       | Beta   | 0.30  | 0.15    | 0.40           |
| $\xi_{p^F}$                                         | Import price Calvo                    | Beta   | 0.50  | 0.20    | 0.92           |
| Monetary policy                                     |                                       |        |       |         |                |
| $\rho_r$                                            | Interest rate smoothing in TR         | Beta   | 0.85  | 0.02    | 0.79           |
| $\phi_\pi^s$                                        | TR inflation response (supply shocks) | Normal | 1.50  | 0.10    | 1.35           |
| $\phi_\pi^d$                                        | TR inflation response (demand shocks) | Normal | 1.50  | 0.10    | 1.78           |
| $\phi_u$                                            | TR unemployment response              | Normal | 0.20  | 0.03    | 0.22           |
| Fiscal policy                                       |                                       |        |       |         |                |
| $\gamma_{b,\tau}$                                   | FR debt response                      | Gamma  | 0.50  | 0.15    | 0.38           |
| $\gamma_{y,\tau}$                                   | FR GDP growth response                | Gamma  | 1.00  | 0.15    | 1.05           |

**Table 7: Estimated Volatility and Persistence of Domestic Shocks**

| Parameter                        | Description                       | Prior |      |         | Posterior      |
|----------------------------------|-----------------------------------|-------|------|---------|----------------|
|                                  |                                   | Shape | Mean | Std dev | Posterior mode |
| Policy (x 100)                   |                                   |       |      |         |                |
| $\sigma_g$                       | Government spending               | Gamma | 1.00 | 0.80    | 1.56           |
| $\sigma_{Tr}$                    | Government transfer               | Gamma | 1.00 | 0.80    | 0.87           |
| $\sigma_r$                       | Monetary policy                   | Gamma | 0.15 | 0.10    | 0.09           |
| Production (x 100)               |                                   |       |      |         |                |
| $\sigma_I$                       | Investment efficiency             | Gamma | 2.00 | 1.50    | 6.38           |
| $\sigma_{I_z}$                   | Investment efficiency (resources) | Gamma | 2.00 | 1.50    | 6.33           |
| $\sigma_a$                       | Productivity                      | Gamma | 1.00 | 0.80    | 0.71           |
| $\sigma_{a_z}$                   | Productivity (resources)          | Gamma | 1.00 | 0.80    | 0.71           |
| Price and wage inflation (x 100) |                                   |       |      |         |                |
| $\sigma_{\pi_n}$                 | Price cost-push                   | Gamma | 0.50 | 0.40    | 0.25           |
| $\sigma_{w_n}$                   | Wage markup                       | Gamma | 0.15 | 0.10    | 0.14           |
| Risk premium (x 100)             |                                   |       |      |         |                |
| $\sigma_\Psi$                    | UIP / exchange rate               | Gamma | 0.50 | 0.40    | 0.24           |
| $\sigma_\omega$                  | Liquidity premium                 | Gamma | 0.50 | 0.40    | 0.37           |
| Preference (x 100)               |                                   |       |      |         |                |
| $\sigma_{\gamma_f}$              | Export demand                     | Gamma | 0.50 | 0.40    | 4.85           |
| Shock persistence                |                                   |       |      |         |                |
| $\rho_g$                         | Government spending               | Beta  | 0.50 | 0.20    | 0.85           |
| $\rho_{Tr}$                      | Government transfer               | Beta  | 0.50 | 0.20    | 0.82           |
| $\rho_I$                         | Investment efficiency             | Beta  | 0.50 | 0.20    | 0.52           |
| $\rho_{I_z}$                     | Investment efficiency (resources) | Beta  | 0.50 | 0.20    | 0.67           |
| $\rho_a$                         | Productivity                      | Beta  | 0.50 | 0.20    | 0.93           |
| $\rho_{a_z}$                     | Productivity (resources)          | Beta  | 0.50 | 0.20    | 0.43           |
| $\rho_\Psi$                      | UIP / exchange rate               | Beta  | 0.50 | 0.08    | 0.95           |
| $\rho_\omega$                    | Liquidity premium                 | Beta  | 0.50 | 0.08    | 0.79           |
| $\rho_{\gamma_f}$                | Export demand                     | Beta  | 0.50 | 0.08    | 0.93           |

## B.12. Not identifiable parameters in the targeted Taylor rule

Using only model estimation with the targeted Taylor rule it's not possible to recover targeted Taylor rule coefficients and misclassification parameters. In the targeted Taylor rule with misclassification the coefficients in front of the supply- and demand-driven inflation are:

$$\pi_s : \quad \phi_s \omega_s + \phi_d (1 - \omega_s) \quad (69)$$

$$\pi_d : \quad \phi_s (1 - \omega_d) + \phi_d \omega_d \quad (70)$$

For any  $\phi'_d > \phi_d$ , there exist  $\omega'_s = \frac{\phi_d(1-\omega_s) + \phi_s \omega_s - \phi'_d}{\phi_s - \phi'_d}$  and  $\omega'_d = \frac{\phi_s(1-\omega_d) + \phi_d \omega_d - \phi_s}{\phi'_d - \phi_s}$  that are both larger than 0 (under  $\phi_d > \phi_s$ ) such that they deliver the same coefficients in the observed targeted Taylor rule:

$$\pi_s : \quad \phi_s \omega'_s + \phi'_d (1 - \omega'_s) \quad (71)$$

$$\pi_d : \quad \phi_s (1 - \omega'_d) + \phi'_d \omega'_d \quad (72)$$

## C. Appendix

This appendix reports additional decompositions of the welfare costs discussed in Section 5.

Figure 14 shows the contributions of various shocks to consumption and investment dynamics.

Figure 15 shows decomposition for various subperiods.

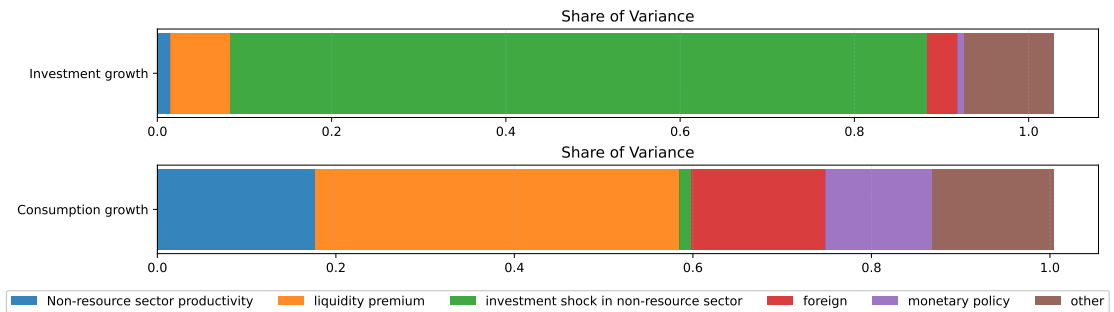


**Figure 14: Decomposition of contribution of various shocks to consumption and investment dynamics.**

### Welfare benefits across population from eliminating uncertainty

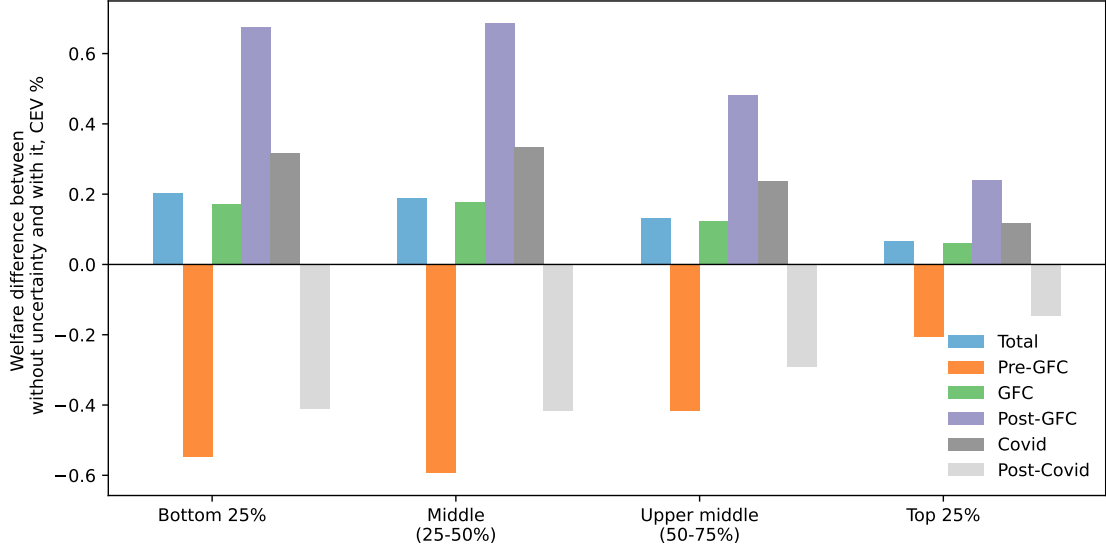


**Figure 15: Decomposition of total welfare costs across time periods.** Each bar shows welfare costs each group of households incurred over the specified period. The blue bars show total costs and are the same as blue bars in Figure 10. Pre-GFC period is from 1992Q1 to 2007Q2. GFC is from 2007Q3 to 2009Q2. Post-GFC is from 2009Q3 to 2020Q1. Covid is from 2020Q2 to 2020Q3. Post-Covid is from 2020Q4 to 2025Q2. Welfare is reported in consumption-equivalent units for each wealth group.

**Table 8: Simulation results evaluating welfare across the distribution.** The table shows welfare across the wealth distribution under the estimated targeted Taylor rule (first row), under the rule without shock-type uncertainty (second row), under the rule that reacts stronger to demand shocks (third row) and under the rule that reacts weaker to supply shocks (forth row). The numbers show welfare in consumption equivalent units in percent and multiplied by  $10^4$ .

|                                                 | Bottom 25% | Middle (25-50%) | Upper middle (50-75%) | Top 25% |
|-------------------------------------------------|------------|-----------------|-----------------------|---------|
| Shock-type uncertainty                          | -0.122     | -0.183          | -0.224                | -0.274  |
| Full information                                | -0.030     | -0.086          | -0.155                | -0.240  |
| Weaker response to supply shocks ( $\phi_s$ )   | -0.029     | -0.086          | -0.155                | -0.240  |
| Stronger response to demand shocks ( $\phi_d$ ) | -0.124     | -0.183          | -0.224                | -0.274  |