

"The Perceived Sources of Unexpected Inflation"

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The eternal quest for the sources of inflation

Motivation:

- Relevance of inflation beliefs and expectations uncontested ([Weber et al., 2022](#); [D'Acunto et al., 2023](#); [Coibion and Gorodnichenko, 2026](#))
- But: so far, limited evidence on effects of inflation *announcements*

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- Can inflation **announcements** - and the associated revision of expectations - help in the identification of supply and demand factors driving inflation?
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Results:

- $\text{corr}(\Delta^{\text{ann}} \mathbb{E}_t c_{t+24}, \pi_{t-1} - \mathbb{E}_t^{\text{Bbg}} \pi_{t-1}) > 0$ in **2016-2019**, but < 0 in **2020-2023**
- Under some assumptions, this shift can be **traced to changes in the relative prevalence of supply- and demand-side factors**, with supply-side factors $\uparrow$ importance

Big picture: disagreements on inflation contributors

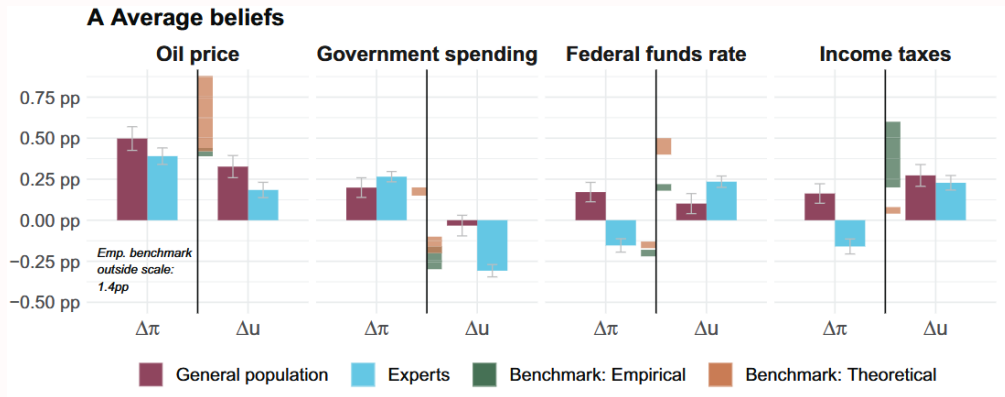


Figure: Household and expert beliefs on the effects of shocks on inflation and unemployment ([Andre et al. \(2022\)](#), Fig.2).

On inflation sources #1: the empirical evidence

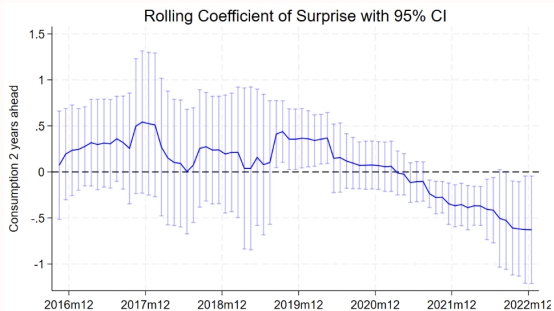


Figure: The response of consumption expectations to the CPI surprise, rolling 24-month window centered on the plotted date (Modi and Zaratiegui (2026), Fig.9).

Bottom lines:

1. $\text{corr}(\Delta\pi_t^{(2y, fwd)}, \pi_{t-1} - \mathbb{E}_t^{Bbg} \pi_{t-1}) > 0$

2. $\text{corr}(\Delta y_t^{(2y)}, \pi_{t-1} - \mathbb{E}_t^{Bbg} \pi_{t-1}) > 0$

3. $\text{corr}(\Delta^{\text{ann}} \mathbb{E}_t d_{t+24}^{\text{real}}, \pi_{t-1} - \mathbb{E}_t^{Bbg} \pi_{t-1})$
 > 0 in 2016-2019, < 0 in 2020-2023

On inflation sources #2: decomposing supply and demand factors

Mechanism: agents are imperfectly informed, and use information announcements (after firm price-setting) to update their beliefs as Bayesians ($\pi_t = a_\pi^d z_t^d + a_\pi^s z_t^s$)

$$\Delta^{\text{ann}} \mathbb{E}_h z_t^k = \frac{a_\pi^k \sigma_{kh}^2}{\sigma_{\pi h}^2} (\pi_{t-1} - \mathbb{E}_t^{Bbg} \pi_{t-1}), \quad S_d = \frac{(a_\pi^d)^2 \sigma_{dh}^2}{(a_\pi^d)^2 \sigma_{dh}^2 + (a_\pi^s)^2 \sigma_{sh}^2}.$$

Approximate shares	Before Covid	After Covid
Demand	80%	60%
Supply	20%	40%

- NB: a decomposition of **perceived inflation forecast-error variance share**, conditional on fixed coeffs.

Bottom line: the model attributes a larger share of inflation to supply factors post-Covid to rationalize the shift in $\text{corr}(\Delta^{\text{ann}} \mathbb{E}_t c_{t+24}, \pi_{t-1} - \mathbb{E}_t^{Bbg} \pi_{t-1})$

Remark #1: the intricacies of market clearing in NK models

$\Rightarrow$ *Production is demand-determined, and the wage clears the labour market*

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However, the **staggered information-setting enforces** that firms committed in stage 1 serve whatever demand arrives in stage 2. That is incentive-compatible only when ([Holden, 2025](#))

$$P_t(j) \geq MC_t \quad \Longleftrightarrow \quad \underbrace{\widehat{mc}_t}_{\text{Gaussian!}} + \underbrace{\sum_{h=0}^{k-1} \pi_{t-h}}_{\text{relative price erosion since last price reset}} - \underbrace{\tilde{p}_{t-k}^*}_{\text{Last reset price}} \leq \underbrace{\log \mu}_{\text{steady state markup}}$$

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⇒ Especially with **large** shocks (cf., 2020-2024), this is not trivial!

- $u_t^k \sim \mathcal{N}(0, \sigma_{k0}^2)$ has unbounded support
- $\theta = 0.9$ at monthly frequency, then $\mathbb{E}[k] = 10$ months. At 2022 inflation levels, $\sum_h \pi_{t-h} \approx 7.5\%$ against $\log \mu \approx 18\%$ for $\varepsilon = 6$, so roughly **40% of the markup is already gone**

Bottom line: the information setting in combination with Calvo pricing can imply an (unlikely to be met) restriction on the distribution of exogenous shocks

Remark #2: measurement in data and model

$B_t = 0$, $r_t \equiv i_t - \mathbb{E}_t \pi_{t+1}$. Then, iterate the Euler equation forward under $\lim_{j \rightarrow \infty} \mathbb{E}_t c_{t+j} = 0$,

$$\Rightarrow c_t = \underbrace{\sum_{j=0}^{\infty} \mathbb{E}_t z_{t+j}^d}_{\text{preference path}} - \frac{1}{\gamma} \underbrace{\sum_{j=0}^{\infty} \mathbb{E}_t r_{t+j}}_{\text{real rate path}}$$

$\Rightarrow$ the inflation announcement reaches consumption through the expected real rate path

Applying $\Delta^{\text{ann}} \mathbb{E}_h[\cdot] \equiv \mathbb{E}_h[\cdot | \pi_t = \bar{\pi}_t] - \mathbb{E}_h^{ba}[\cdot]$, and differencing the Euler equation once,

$$\Delta^{\text{ann}} \mathbb{E}_h c_{t+24} = \sum_{j \geq 0} \Delta^{\text{ann}} \mathbb{E}_h z_{t+24+j}^d - \frac{1}{\gamma} \sum_{j \geq 0} \Delta^{\text{ann}} \mathbb{E}_h r_{t+24+j}, \quad \mathbb{E}_t c_{t+1} - c_t = \frac{r_t}{\gamma} - z_t^d$$

Effect per unit shock		Demand	Adverse supply
Consumption level	a_c^k	1.571	-0.432
Real rate	$a_r^k = a_i^k - \rho_k a_\pi^k$	0.843	0.043
Expected consumption growth	$\mathbb{E}_t c_{t+1} - c_t = (\rho_k - 1) a_c^k$	-0.157	0.043

$\Rightarrow$ We should look at real returns, $\Delta^{\text{ann}} \mathbb{E} r$, not $\Delta y^{(2y), \text{nom}}$, and netting out inflation margins from **TIPS breakevens** is not innocuous because of inflation risk and liquidity premia

Remark #2: measurement in data and model

A second note on measurement: the sign of the dividend proxy.

With $Y_t = N_t$, $D_t = (1 - mc_t)Y_t$ and $\widehat{mc}_t = (\gamma + \psi)c_t$,

$$d_t = \left[1 - \frac{\gamma + \psi}{\bar{\mu} - 1}\right] c_t \quad \implies \quad \frac{d_t}{c_t} > 0 \iff \bar{\mu} > 1 + \gamma + \psi = 3$$

$\bar{\mu}$	1.1	1.2	1.5	2.0	3.0	paper uses
profit share	9%	17%	33%	50%	67%	
d_t/c_t	-19.0	-9.0	-3.0	-1.0	0.0	$\kappa = 0.26$

- Standard countercyclical-profit property of the *baseline* NK model (Bilbiie and Känzig, 2023)
- A *positive* dividend-consumption link requires a profit share above 2/3
- Flipping only the *sign* of κ turns 80% $\rightarrow$ 60% into 50% $\rightarrow$ 67%

Bottom line: any demand-led inflation can achieve $\text{corr}(\Delta^{\text{ann}} \mathbb{E}_t d_{t+24}^{\text{real}}, \pi_{t-1} - \mathbb{E}_t^{\text{Bbg}} \pi_{t-1}) < 0$
through this margin $\Rightarrow$ what about fiscal policy?

Remark #3: government debt and the perceived policy rule

The model sets $B_t = 0$. What if the model has some debt $\bar{B} > 0$? In general, for every shock, the model must satisfy

$$\frac{a_i^k}{a_\pi^k} = \phi_\pi + \underbrace{\phi_y \frac{\tilde{y}^k}{a_\pi^k}}_{\text{output gap loading positive for both shocks}} \implies \frac{\Delta y^{(2y)}}{\Delta \pi^{(2y, fwd)}} \geq \phi_\pi = 1.5 \quad \text{for any } \phi_y \geq 0$$

	$\Delta y^{(2y)} / \Delta \pi^{(2y, fwd)}$	real rate response per 15bp of inflation
M/Z model, $S_d = 0.8$	8.53	+113bp
M/Z model, $S_d = 0.6$	7.34	+95bp
passive money, active fiscal	0.97 – 1.16	≈ 0
Facts 1 and 2	20/15 = 1.33	+5bp

Bottom line: observed asset price movements say the *perceived* monetary rule is close to passive. Once it is passive, much closer model-data link on the real rate response

Fiscal and supply stories matter jointly after Covid!

Final Remarks

- Neat NK model with imperfect contemporaneous information, highlighting how demand and supply factors can be separated when the *arrival of new information* informs the covariance between consumption/output and inflation
 - The empirical evidence supports especially a *break in the covariance between surprises in inflation levels and revisions to consumption expectations* around Covid
- Three remarks:
 1. The information/timing structure must avoid incentive constraints (time-consistency)
(but this point applies to many NK model specifications!)
 2. Mapping model objects to asset prices needs *real* yields, and a dividend-consumption link supported by the model
 3. Comprehensive treatment of the post-Covid period cannot sideline deficits - supply-driven inflation interacts with the response of policy!

Thank you!

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Backup: a fiscal approach to the post-Covid period I

Let $b_t = B_t/P_t$ with steady state $\bar{b} > 0$ and $\bar{s} = (1 - \beta)\bar{b}$. Consider a one-time unbacked transfer, $\tilde{s}_0 = -F < 0$, with no future surplus response and no fiscal feedback on debt.

Substituting $i_t = \phi_\pi \pi_t$ into the Euler equation and the NKPC, the stable root of the resulting system solves

$$(1 - \beta\lambda)(1 - \lambda) = \frac{\kappa}{\gamma}(\lambda - \phi_\pi), \quad \kappa = \frac{(1 - \theta)(1 - \beta\theta)(\gamma + \psi)}{\theta} = 0.0232 \text{ monthly}$$

with a unique $\lambda \in (\phi_\pi, 1)$ for $\phi_\pi < 1$. On the stable path $\pi_{t+1} = \lambda\pi_t$,

$$c_t = \frac{\lambda - \phi_\pi}{\gamma(1 - \lambda)} \pi_t > 0, \quad i_t = \phi_\pi \pi_t > 0, \quad r_t = (\phi_\pi - \lambda) \pi_t < 0$$

Backup: a fiscal approach to the post-Covid period II

ϕ_π	λ	c_t/π_t	i_t/π_t	r_t/π_t
0.70	0.929	+3.24	+0.70	-0.229
0.75	0.937	+2.94	+0.75	-0.187
0.80	0.944	+2.60	+0.80	-0.144

Nominal yields and inflation rise together while the **real rate falls**, with no adverse supply shock. Solving the full system including the debt state, a stable equilibrium exists up to about $\phi_\pi \leq 0.8$.

Backup: why dividends fall when consumption rises

With $Y_t = N_t$, no capital, no fixed costs and full payout, real profits are $D_t = Y_t - \frac{W_t}{P_t} N_t = (1 - mc_t) Y_t$ with $\overline{mc} = \bar{\mu}^{-1}$. Since $\frac{\overline{mc}}{1 - \overline{mc}} = \frac{1}{\bar{\mu} - 1}$,

$$d_t = y_t - \frac{\widehat{mc}_t}{\bar{\mu} - 1}, \quad \widehat{mc}_t = (\gamma + \psi)c_t, \quad y_t = c_t$$

- Higher demand raises wages and MC against sticky product prices
- At a small steady state profit share, the margin effect dominates the sales effect a lot

⇒ **A positive dividend-consumption coefficient is a non-trivial assumption.**

Caveat: the elasticity is local around a small profit share. Investment, payout smoothing, fixed costs, entry, or alternative wage setting can change the magnitude and in principle the sign.