Capacity Walls in Production Networks: Inflation after COVID

Lukasz A. Drozd
Philadelphia Fed

Marina M. Tavares
International Monetary Fund

Summer Workshop on Macro & Finance 2026
July 1, 2026

The views expressed herein are those of the authors and do not necessarily represent those of the Federal Reserve System, the Federal Reserve Bank of Philadelphia, or the International Monetary Fund.

Post-COVID Inflation Puzzle

Canonical Theory (NKPC)

$$\Pi_t \;=\; \beta\,\mathbb{E}_t\Pi_{t+1} \;+\; \kappa\,x_t \;+\; \varepsilon_t$$

Key drivers of inflation:

- expected inflation $\mathbb{E}_t\Pi_{t+1}$
- slack-to-cost PT $\kappa\,x_t$

Post-COVID Inflation Puzzle

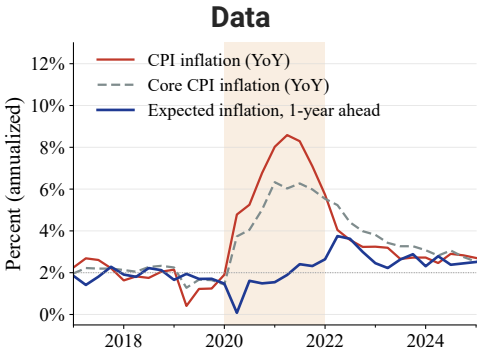
Canonical Theory (NKPC)

$$\Pi_t \;=\; \beta\,\mathbb{E}_t\Pi_{t+1} \;+\; \kappa\,x_t \;+\; \varepsilon_t$$

Key drivers of inflation:

- expected inflation $\mathbb{E}_t\Pi_{t+1}$
- slack-to-cost PT $\kappa\,x_t$

Data



Post-COVID Inflation Puzzle

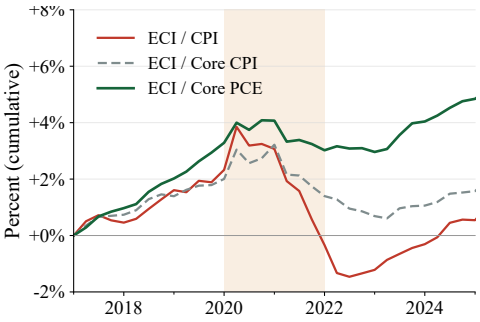
Canonical Theory (NKPC)

$$\Pi_t \;=\; \beta\,\mathbb{E}_t\Pi_{t+1} \;+\; \kappa\,x_t \;+\; \varepsilon_t$$

Key drivers of inflation:

- expected inflation $\mathbb{E}_t\Pi_{t+1}$
- slack-to-cost PT $\kappa\,x_t$

Data



Post-COVID Inflation Puzzle

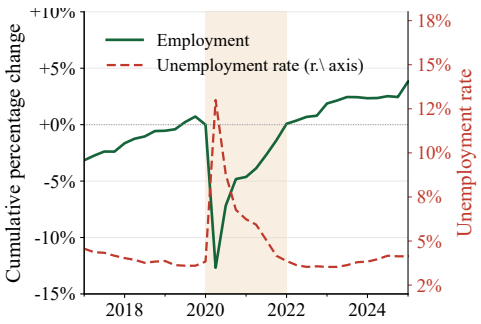
Canonical Theory (NKPC)

$$\Pi_t \;=\; \beta\,\mathbb{E}_t\Pi_{t+1} \;+\; \kappa\,x_t \;+\; \varepsilon_t$$

Key drivers of inflation:

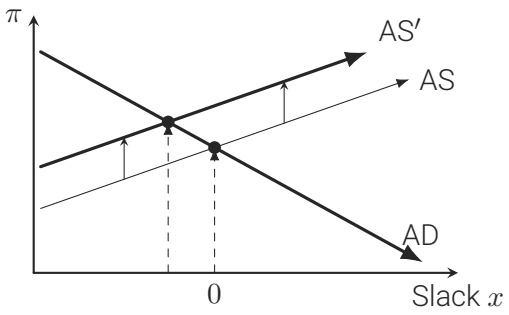
- expected inflation $\mathbb{E}_t\Pi_{t+1}$
- slack-to-cost PT $\kappa\,x_t$

Data



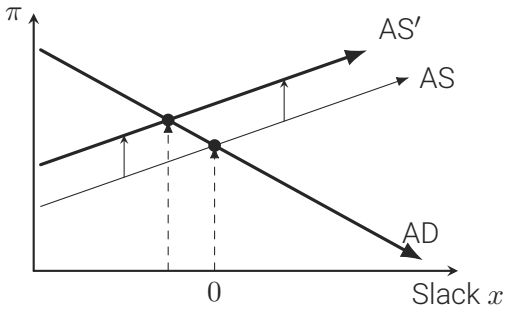
Candidate Explanations

1. Labor market mismatch
2. Rise of market power
   ("greedflation")
3. O-ring supply disruptions
4. Capacity rebuilding costs
   (after destruction of organizational capital)



Candidate Explanations

1. ~~Labor market mismatch~~
2. **Rise of market power**
   ("greedflation")
3. **O-ring supply disruptions**
4. **Capacity rebuilding costs**
   (after destruction of organizational capital)



Motivation

Hiring workers is costly (≈ 16–22 wks. wages) ← Linckh et al. (2025), Muehlemann et al. (2018)

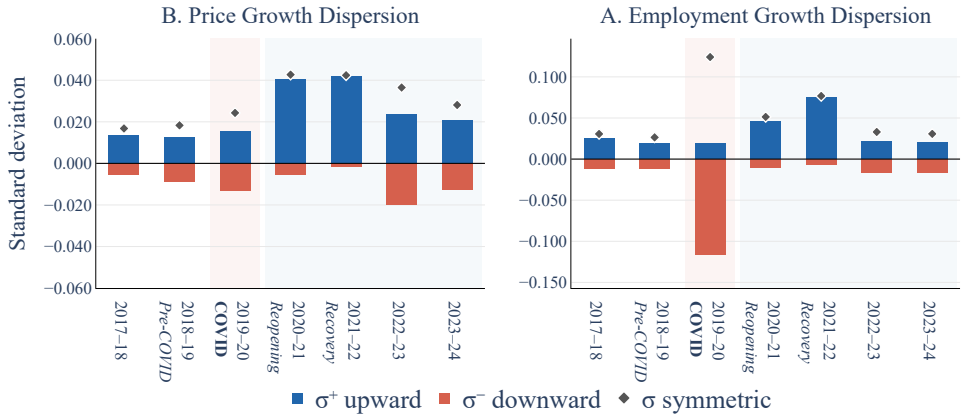
- 80% of costs are nonwage costs

  (recruitment, training, disruption/adaptation)

Hiring costs estimated to be convex in:

- local labor market tightness (10–12% for 1×SD) ← Linckh et al. (2025)
- own hiring intensity (elasticity $\eta = 1.3$)← Muehlemann et al. (2016)

Cross-Sectional Inflation Dispersion Expanded



Within-sector dispersion of annual inflation across NAICS industries widened sharply post-COVID—consistent with a supply-side shock geometry, not a uniform demand pull.

What We Do

- Provide a microfounded connection to the COVID shock
- Reduced-form causal evidence of a clear link
- Structural nonlinear model disciplined by labor-economics evidence

Related Literature

- Comin, Johnson & Jones (2023) — multisector NK; exogenous capacity constraints
- Ferrante, Graves & Iacoviello (2023) — services→goods rotation; convex reallocation costs
- Benigno & Eggertsson (2023) — nonlinear PC; steepens past high V/U threshold
- Harding, Lindé & Trabandt (2023) — nonlinear PC via Kimball kinked demand
- Blanco et al. (2024) — nonlinear PC via endogenous menu-cost repricing frequency
- Beaudry et al. (2025) — fragility of the generic post-COVID PC nonlinearity
- Cerrato & Gitti (2025) — cross-city post-COVID PC steepening (aggregate)
- Gitti (2026) — regional PC kinked in V/U; operates through new-hire wages
- Rubbo (2024b) — supply-driven inflation dispersion; we reinterpret post-2021

Reduced-form Evidence

Organizing Framework

(1) $i = 1, \ldots, I$ industries producing $j = 1, \ldots, J$ commodities:

$$Y_i = z_i K_i^{1-\alpha_i} \left(\eta_i^{\frac{1}{\rho}} N_i^{\frac{\rho-1}{\rho}} + (1-\eta_i)^{\frac{1}{\rho}} m_i^{\frac{\rho-1}{\rho}} \right)^{\frac{\alpha_i \rho}{\rho-1}}, \quad \tilde{Y}_j = \left(\sum_i \theta_{ij}^{\frac{1}{\rho_Y}} Y_i^{\frac{\rho_Y - 1}{\rho_Y}} \right)^{\frac{\rho_Y}{\rho_Y - 1}}$$

$Z_i := z_i K_i \Rightarrow$ predetermined, investment irreversible & sunk

(3) Nested CES aggregation:

$$m_i = \left[\sum_j (\zeta_{ij} \omega_{ij})^{\frac{1}{\rho_m}} \tilde{m}_{ij}^{\frac{\rho_m - 1}{\rho_m}} + \sum_j \left((1-\zeta_{ij}) \omega_{ij} \right)^{\frac{1}{\rho_m}} \left(\tilde{m}_{ij}^{\text{IMP}} \right)^{\frac{\rho_m - 1}{\rho_m}} \right]^{\frac{\rho_m}{\rho_m - 1}}$$

(4) Cost minimization: $\mathcal{C}(Y_i) = \min_{N_i, m_i, \tilde{m}_{i*}} \{ W_i N_i + p_i m_i \}$ s.t. the above

(5) Markup: profit-margin residual $M_i \equiv P_i Y_i / \mathcal{C}_i(Y_i)$

Core Identity

$$\Delta \log P = \underbrace{\Delta \log M}_{\Delta\text{MARGIN}} + \underbrace{\operatorname{diag}(b)\Delta \log W - \Delta \log(Y/N)}_{\Delta\text{ULC}} + \underbrace{A\,\Delta \log P}_{\Delta\text{MAT}} + \underbrace{A^{\text{IMP}}\,\Delta \log P^{\text{IMP}}}_{\Delta\text{IMP}}$$

where $A = \operatorname{diag}(d)\,(\zeta \odot \Omega)^{\top}\,\Theta^{\top}, \quad b = \rho + (1-\rho)s^{N}, \quad d = (1-s^{N})(1-\rho)$

Inputs:

- I-O linkages: BEA detail-level SUT
- Wages & employment: QCEW NAIC-6, cross-walked to SUT
- Import prices: BLS IPP NAIC-3,4,5, cross-walked to SUT
- Import shares: Census NAICS-6, cross-walked to SUT
- $\rho = 0.39 \Rightarrow$ regression of FOC for cost min. using KLEMS

Core Identity (Unrolled: Network)

$$\Delta \log P \;=\; \underbrace{L\,\Delta \log M}_{L\cdot\Delta\mathrm{MARGIN}} \;+\; \underbrace{L\left[\mathrm{diag}(b)\Delta \log W - \Delta \log(Y/N)\right]}_{L\cdot\Delta\mathrm{ULC}} \;+\; \underbrace{L\,A^{\mathrm{IMP}}\,\Delta \log P^{\mathrm{IMP}}}_{L\cdot\Delta\mathrm{IMP}}$$

where $L = (I - A)^{-1}$ *unrolls the network*; $\kappa \equiv L^{\top}\Theta c$ = industry *Domar weights*.

Applied to aggregate PCE-weighted inflation:

$$\Pi \;=\; (\Theta c)^{\top}\Delta \log P \;=\; \kappa^{\top}\big(\Delta\mathrm{MARGIN} + \Delta\mathrm{ULC} + \Delta\mathrm{IMP}\big)$$

- MAT vanishes: upstream input costs flow back into upstream Margin / ULC / Imports
- Attributes every dollar of inflation to its *primitive* upstream origin

Network Decomposition of U.S. Inflation

	Cumulative		
	2017–19	2019–21	2021–23
GO inflation	+4.4	+7.1	+9.7
N-GO inflation	**+2.7**	**+5.2**	**+6.7**
Margins	+0.2 (9%)	+3.3 (63%)	+0.2 (3%)
ULC	+2.3 (85%)	+1.6 (31%)	+6.1 (91%)
+ Wages	+4.3	+7.9	+4.5
− Productivity	−2.0	−6.3	+1.6
Imports	+0.1 (2%)	+0.2 (4%)	+0.2 (2%)

Reading: Upstream *margins* carry 63% in Act I; upstream *ULC* takes over in Act II (91%).

Core Identity

$$\Delta \log P = \underbrace{\Delta \log M}_{\Delta\text{MARGIN}} + \underbrace{\text{diag}(b)\Delta \log W - \Delta \log(Y/N)}_{\Delta\text{ULC}} + \underbrace{A\,\Delta \log P}_{\Delta\text{MAT}} + \underbrace{A^{\text{IMP}}\,\Delta \log P^{\text{IMP}}}_{\Delta\text{IMP}}$$

where $A = \text{diag}(d)\,(\zeta \odot \Omega)^{\top}\,\Theta^{\top}, \quad b = \rho + (1-\rho)s^{N}, \quad d = (1-s^{N})(1-\rho)$

Inputs:

- I-O linkages: BEA detail-level SUT
- Wages & employment: QCEW NAIC-6, cross-walked to SUT
- Import prices: BLS IPP NAIC-3,4,5, cross-walked to SUT
- Import shares: Census NAICS-6, cross-walked to SUT
- $\rho = 0.39 \Rightarrow$ regression of FOC for cost min. using KLEMS

Regression Design

Stacked-panel DiD:

$$y_{i,w} \;=\; \gamma_i \;+\; \theta_w \;+\; \sum_{w} \beta_w \, X_i \cdot \mathbf{1}\{w\} \;+\; \varepsilon_{i,w}$$

- γ_i industry FE (absorbs level of X_i); θ_w window FE
- Windows: pre-COVID (2017–19, omitted), Act I (2019–21), Act II (2021–23)
- WLS with 2017 industry value-added weights; SE clustered on industry

Exposure X_i (predetermined; JEM ← Oude Hengel et al. (2021)):

- Occupation score: $\text{exposure}_o = \dfrac{1}{5}\sum_{c=1}^{5} \text{JEM}_{o,c}$

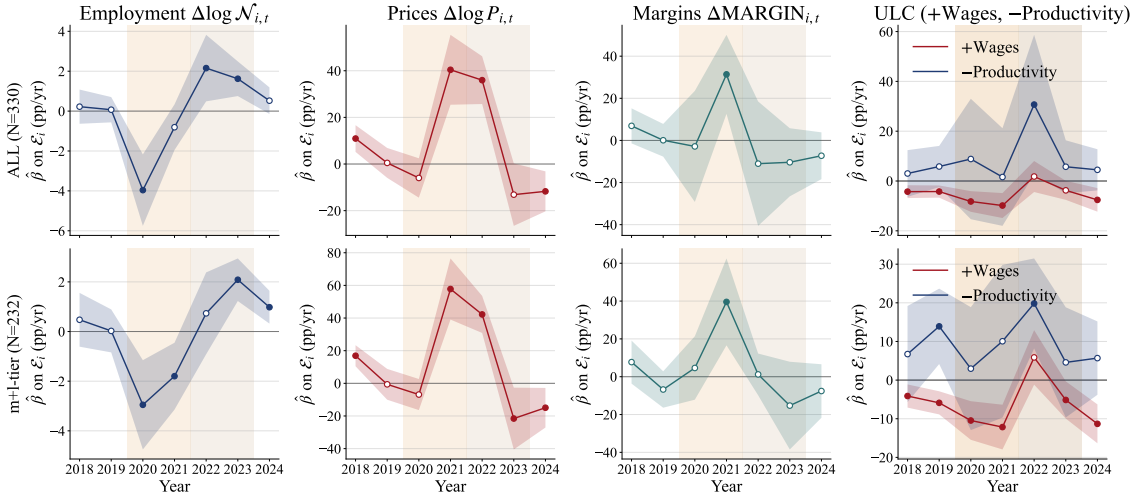
  (Nature of contacts, Contaminated workspaces, Location, Social distance, Face Covering)
- Own exposure: $E_i = \sum_o (\text{emp. share})_{i,o} \cdot \text{exposure}_o$
- Supply-chain exposure: $\mathcal{E}_i = (A + \delta A^2 + \delta^2 A^3 + \cdots)\, E,\ \delta = 0.5$

Fact 1: Exposure $\Rightarrow$ Employment Contraction $+$ Inflation

	Act I $\hat{\beta}_{\text{Act I}}$		Act II $\hat{\beta}_{\text{Act II}}$	
Outcome	ALL	m+l-tier	ALL	m+l-tier
$\Delta \log N_i$ (on E_i)	-1.73	-3.37^{***}	$+0.43$	$+0.42$
$\Delta \log \mathcal{N}_i$	-2.53^{***}	-2.62^{***}	$+1.74^{***}$	$+1.16^{**}$
$\Delta \log P_i$	$+12.08^{**}$	$+19.02^{***}$	$+6.10$	$+1.94$
ΔMARGIN_i	$+11.83$	$\mathbf{+24.81^{***}}$	-16.84	-9.32
ΔMARGIN_i (prod. ctrl)	$\mathbf{+12.51^{***}}$	$\mathbf{+20.89^{***}}$	-2.49	-7.06
ΔULC_i	-4.60	-11.93	$+19.97^{*}$	$+8.53$
ΔMAT_i	$+4.60^{***}$	$+5.80^{***}$	$+2.73^{***}$	$+2.63^{***}$
$A \cdot \Delta\text{MARGIN}_i$	$+3.09^{***}$	$+4.12^{***}$	-0.93	-0.40

Reading: Exposure $\Rightarrow$ supply-chain employment contraction ($\Delta \log \mathcal{N}$) $+$ inflation ($\Delta \log P$).
Early inflation driven by *margins* (m+l, control ULC).

Fact 1: Exposure ⇒ Employment Contraction + Inflation



Fact 1: Materials Channel — Margins First, ULC Later

The materials-channel exposure gradient partitions by identity into four supplier-side terms:

$$(A \cdot g^P)_{i,w} = (A \cdot \text{Margin})_{i,w} + (A \cdot \text{ULC})_{i,w} + (A \cdot \text{Imports})_{i,w} + (A^2 \cdot g^P)_{i,w}$$

	Act I ($\mathcal{E}_i \cdot D_w^{\text{shock}}$)		Act II ($\mathcal{E}_i \cdot D_w^{\text{rec}}$)	
Decomposition term	$\hat{\beta}$	(t)	$\hat{\beta}$	(t)
A·Margin (supplier markups)	$\mathbf{+3.09^{***}}$	$\mathbf{(+4.18)}$	-0.93	(-1.05)
A·ULC (supplier wages)	-0.60	(-0.93)	$\mathbf{+2.05^{**}}$	$\mathbf{(+2.51)}$
A·Imports (supplier imports)	$+0.09^{**}$	$(+2.17)$	-0.00	(-0.16)
$A^2 \cdot g^P$ (supplier of supplier)	$+1.26^{***}$	$(+6.33)$	$+0.57^{***}$	$(+5.37)$
MAT total ($A \cdot g^P$, identity sum)	$+3.84^{***}$	$(+4.92)$	$+1.68^{***}$	$(+4.13)$

Reading: Act I: exposure gradient rides *supplier margins*; Act II: transitions to *supplier ULC*.

Fact 1 (cont'd): Exposure Dispersion $\Rightarrow$ Inflation Dispersion

Cross-section of BEA-66 sectors: $\Delta\sigma_s^+ = \alpha + b\,\sigma(\mathcal{E}_i)_s + \varepsilon_s$

Subsample	$\hat{\beta}$	R^2	Obs. (sectors)
ALL	$+83.67^{***}$	0.478	38
m+l-tier	$+102.98^{***}$	0.354	30

Reading: Not only the *level* but also the cross-industry *dispersion* of exposure predicts inflation.

Fact 2: Not a Pure Demand-Pull Recovery

Recovery velocity (same network operator on employment growth):

$$\mathcal{V}_w \;\equiv\; \left(A + \delta A^2 + \delta^2 A^3 + \cdots\right) \bar{\mathbf{g}}_w^N,$$

where $\bar{\mathbf{g}}_w^N$ is per-year industry employment growth over window w.

Augmented regression ($\mathcal{E}$ and $\mathcal{V}$ interacted with windows):

$$\Delta_w \log Outcome_i \;=\; \alpha_i + \theta_w + \textstyle\sum_w \beta_w \, \mathcal{E}_i \cdot \mathbf{1}\{w\} + \sum_w \gamma_w \, \mathcal{V}_i \cdot \mathbf{1}\{w\} + \varepsilon_{i,w}$$

Discriminating test: the wall predicts $\hat{\gamma}_{\text{Act I}} < 0$ (faster recovery $\Rightarrow$ less inflation). A pure demand-pull story predicts the opposite sign.

Fact 2: Not a Pure Demand-Pull Recovery

	$\hat{\beta}^{\mathcal{V}_{\text{Act I}}}_{\text{Act I}}$	$\hat{\beta}^{\mathcal{V}_{\text{Act II}}}_{\text{Act II}}$
$\Delta \log P_i$	$\mathbf{-1.15}^{*}$	-0.51
ΔMARGIN_i	$\mathbf{-2.22}^{*}$	$+1.72$
ΔMAT_i	$\mathbf{-0.44}^{***}$	$+0.00$
$A \cdot \Delta\text{MARGIN}_i$	$\mathbf{-0.33}^{***}$	-0.25

Reading: The Act I recovery-velocity coefficient $\hat{\gamma}^{\mathcal{V}}_{\text{Act I}}$ is *negative and significant* — faster supplier-network recovery predicts *less* inflation, conditional on exposure. A pure demand-pull story predicts the opposite sign. The post-recovery placebo $\hat{\gamma}^{\mathcal{V}}_{\text{Act II}}$ is small and insignificant, as expected once the rebuilding constraints ease.

Model

Setup

Perfect foresight with anchored inflation expectations (2019–2050)

- $t = 0 \Rightarrow$ 2019 steady state
- $t = 1 \Rightarrow$ 2020 COVID shock (exposed employment decline)

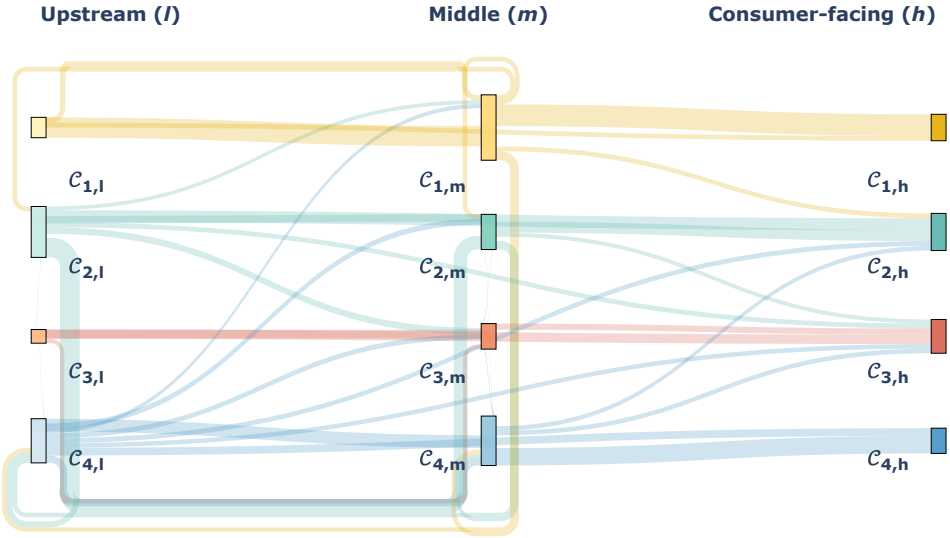
$\vdots$

Use business cycle accounting ← Chari, Kehoe & McGrattan (2007)

Production network with elasticity $\rho = 0.39$

- 4 chains that maximize within-chain trade; 3 tiers by finalness (70% PCE direct)
- 2 nodes hit / safe $\Rightarrow$ employment-collapse spread in 2020

Production Chains



Production and Aggregation

Output of node (i, j):

$$Y_{ij,t} = \exp(a^{e}_{i,t})\, Z_{ij}\, V_{ij,t}^{\,1-\alpha_i}, \qquad V_{ij,t} = \left[\eta_{ij}^{1/\rho}\, N_{ij,t}^{(\rho-1)/\rho} + (1-\eta_{ij})^{1/\rho}\, m_{ij,t}^{(\rho-1)/\rho}\right]^{\rho/(\rho-1)}$$

Materials bundle $m_{ij,t}$:

$$m_{ij,t} = \left[\sum_{k=1}^{12} \omega_{i,k}^{1/\rho}\, m_{ij,k,t}^{(\rho-1)/\rho} + (\omega_i^{\mathrm{EXO}})^{1/\rho}\, (m_{ij,t}^{\mathrm{EXO}})^{(\rho-1)/\rho}\right]^{\rho/(\rho-1)}$$

Tier-level aggregation output:

$$Y_{i,t} = \left[\sum_{j\in\{H,S\}} s_{ij}^{1/\rho}\, Y_{ij,t}^{(\rho-1)/\rho}\right]^{\rho/(\rho-1)}$$

Cost Wall (CW)

Convex workforce-rebuilding cost:

$$\mathcal{W}_{ij,t} = \gamma_i \left(dN^{+}_{ij,t}\right)^2, \qquad dN^{+}_{ij,t} = \max\left\{ \frac{N_{ij,t} - N^{\mathrm{CW}}_{ij,t}}{N^{ss}_{ij}},\, 0 \right\}$$

Binding level $N^{\mathrm{CW}}_{ij,t}$ — lagged employment, with a 2021 "warm-pool":

$$N^{\mathrm{CW}}_{ij,t} = \begin{cases} N_{ij,1} + \psi \cdot \max\left\{0,\, N^{ss}_{ij} - N_{ij,1}\right\}, & t = 2 \text{ (2021)}, \\ N_{ij,t-1}, & \text{otherwise.} \end{cases}$$

Effective cost of labor: $w^{e}_{ij,t} = \tilde{w}_{ij}\, W_t \left(1 + \mathcal{W}_{ij,t}\right) \exp\left(\mathbf{1}_{\{t=1\}} \tau^{e}_{ij}\right)$.

Sticky Prices (Rotemberg w/ downward rigidity)

Pricing FOC for node (i, j) (symmetric monop. competition, demand elasticity ε_i):

$$\begin{aligned}\Pi_{ij,t}\big[\,\bar{\phi}_i(\Pi_{ij,t}-\bar{\Pi})+\lambda_i(\Pi_{ij,t}-\bar{\Pi})^-\big] \;=\; \varepsilon_i\Big(MC_{ij,t}-\tfrac{\varepsilon_i-1}{\varepsilon_i}+\mu^e_{i,t}+\mathbf{1}_{\{t=1\}}\bar{\mu}^e_i\Big)\\ +\,\beta\,\mathbb{E}_t\Big[\Pi_{ij,t+1}\big[\bar{\phi}_i(\Pi_{ij,t+1}-\bar{\Pi})+\lambda_i(\Pi_{ij,t+1}-\bar{\Pi})^-\big]\tfrac{Y_{ij,t+1}}{Y_{ij,t}}\Big]\end{aligned}$$

where

- $\Pi_{ij,t}\equiv P_{ij,t}/P_{ij,t-1}$ and $(\cdot)^-\equiv\min\{0,\cdot\}$
- $\bar{\phi}_i$: symmetric Rotemberg adjustment cost (slope of the NKPC)
- λ_i: downward rigidity

Two markup wedges: $\bar{\mu}^e_i$ (2020 collapse only) and $\mu^e_{i,t}$ (recovery residual, 2021–2024).

Sticky Wages

Sticky base-wage rule (reduced-form wage Phillips curve):

$$\frac{W_t}{W_{t-1}} = \bar{\Pi}\left(\frac{N_t}{N^{ss}}\right)^{\phi_w}\left(\prod_{k=1}^{n}\frac{\Pi_{t-k}}{\bar{\Pi}}\right)^{\iota_w}$$

where

- ϕ_w is employment slope
- ι_w is cumulative-inflation indexation.

Inflation expectations — convex combination (adaptive + anchored):

$$\Pi^e_{t+1|t} = \nu_{\text{fwd}}\,\Pi^{\text{model}}_{t+1} + \nu_{\text{past}}\,\Pi_t + \nu_{\text{target}}\,\bar{\Pi}, \qquad \nu_{\text{fwd}} + \nu_{\text{past}} + \nu_{\text{target}} = 1$$

Anchored expectations: $\nu_{\text{target}} = .75, \nu_{\text{past}} = .25$

Market Clearing

Tier market clearing (output = final demand + intermediate demand from all 24 nodes):

$$Y_{k,t} \;=\; D_{k,t}(\mathcal{Y}_t) \;+\; \sum_{i=1}^{12} \sum_{j \in \{H,S\}} \omega_{i,k} \left(\frac{P_{k,t}}{p^m_{i,t}} \right)^{-\rho} m_{ij,t}$$

Final demand (wedge $\xi^e_{k,t}$ + MPC term, off in saturated mode):

$$D_{k,t}(\mathcal{Y}_t) \;=\; D^{ss}_k \, \exp\!\Big(\xi^e_{k,t} + \mathrm{MPC} \cdot \big(\log \mathcal{Y}_t - \log \mathcal{Y}^{\mathrm{data}}_t \big) \Big)$$

where

$$\mathcal{Y}_t \;=\; \sum_{k=1}^{12} \frac{D^{ss}_k}{Y^{ss}_k} \, Y_{k,t}.$$

Calibration

Calibration

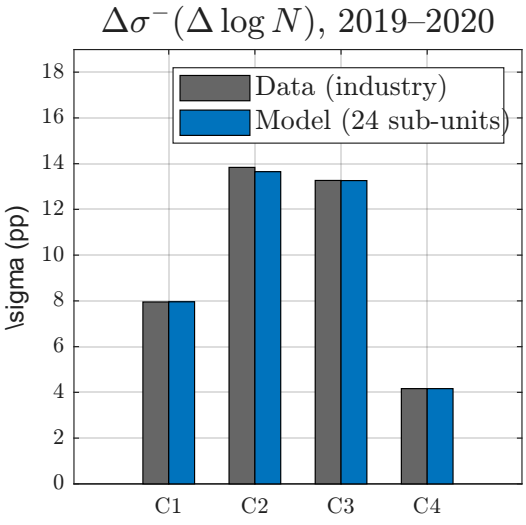
New Keynesian block:

- $\bar{\phi}_{c,h} \in [0.6, 4.7]$, $\bar{\phi}_{ml} = 2.86$ — Pasten et al. (2020) via $(1 - f_m^i)^{12}$
- $\lambda_{c,h} \in [9, 30]$, $\lambda_{ml} = 9$ downward rigidity
- $\phi_w = 0.15$ wage Phillips slope; $\iota_w = 0.20$ 4-yr indexation; $\iota_a = 0.05$ LS anchor
- $\psi = 0.20$ warm-pool share (2021 zero-cost refill)
- α_i, η_{ij}, $\tilde{w}_{ij}$, $\omega_{i,k}^{\text{DOM}}$, ω_i^{IMP}, D_k^{ss}/Y_k^{ss} — BEA 2017 SUT.

Saturating wedges ($a_{i,t}^e$, $\xi_{k,t}^e$, $\bar{\tau}_i^e$, $\Delta\tau_c^e$, $\bar{\mu}_i^e$, x_{ij}^e, $\mu_{i,t}^e$):

- match tier-level N, Y, P and $\sigma^-(\Delta \log N)$ in 2020

Hit/Safe Spread Calibration



CW Calibration: c_{wall}

table →

Change in average cost of hire ← Linckh et al. (2025), Domash and Summers (2022)

$$Q_0 = C(H)/H = 22/52 \Rightarrow Q_1 = C(H)/H = (1 + 3 \times .12) \times 22/52 = 30/52$$

$V/U \approx 2\times$ normal times + no evidence of mismatch ← Forsythe et al. (2022)

Marginal cost of hire ← Muehlemann and Pfeifer (2016)

$$C(H) = H^{\eta} \;\Rightarrow\; C'(H) = \eta\, C(H)/H,\; \eta = 1.3$$

Implied change in user cost of worker, 2021–23

$$c_{\text{wall}} = \underbrace{0.8}_{\text{“skilled” share}} \times \underbrace{\eta}_{\text{avg}\to\text{marg}} \left[\underbrace{\left(\frac{q_1}{q_0}\right)^{\eta-1} \left(r + \delta(q_1)\right) Q_1}_{\text{tight-market cost}} - \underbrace{\left(r + \delta(q_0)\right) Q_0}_{\text{normal-times cost}} \right]$$

CW Calibration: γ_i

Tier slope γ_i — pinned by the per-tier CW target c^{wall}:

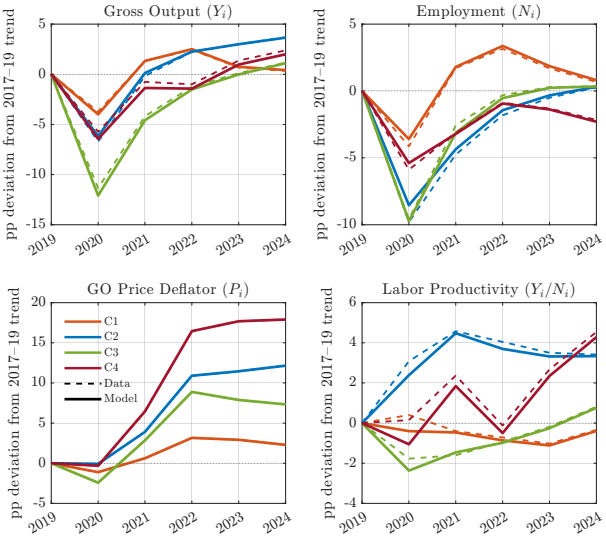
$$\gamma_i = \frac{c^{\text{wall}}}{\overline{(dN^+)^2}_i}, \qquad \overline{(dN^+)^2}_i = \frac{\sum_{t\in\mathcal{T}} \left(dN^+_{i,t}\right)^2 \mathbf{1}\{dN^+_{i,t} > 0\}}{\sum_{t\in\mathcal{T}} \mathbf{1}\{dN^+_{i,t} > 0\}}, \quad \mathcal{T} = \{2021, 2022\}$$

where

- γ_i is set so the CW-implied labor wedge *equals* c^{wall} on average across tiers in 2021–22.
- Heterogeneity in γ_i comes from variation in tier rebuilding intensity $\overline{(dN^+)^2}_i$

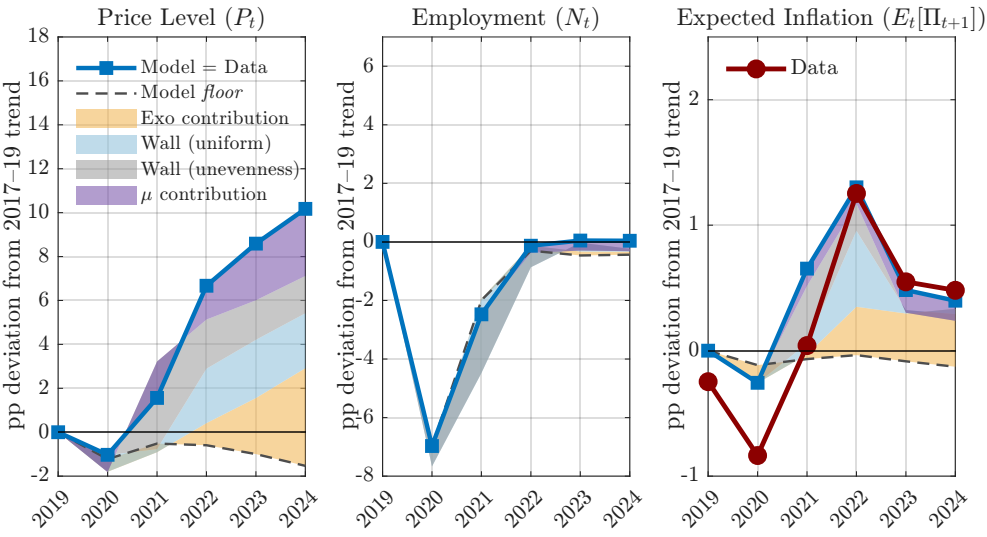
During the rebuild, every chain faces the same marginal cost $c^{\text{wall}} \approx 0.13$

Saturation Wedges Match Sectoral Patterns Exactly

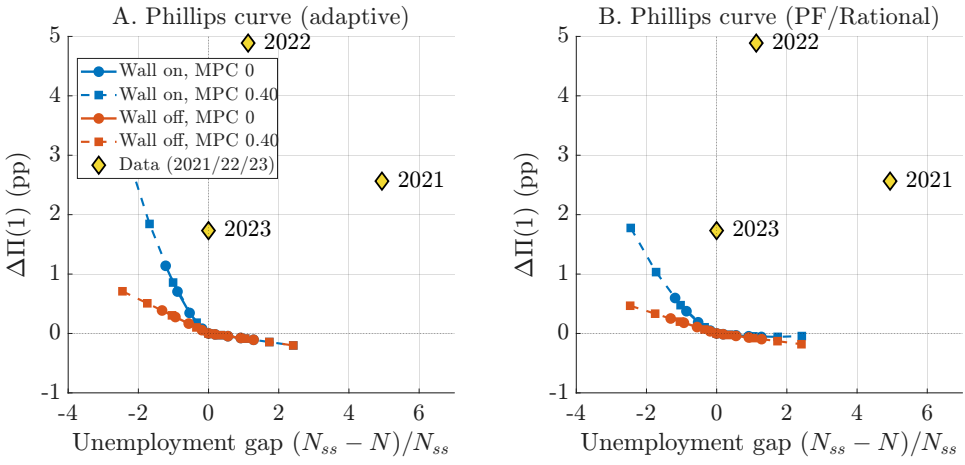


Results

Inflation Sources Decomposition

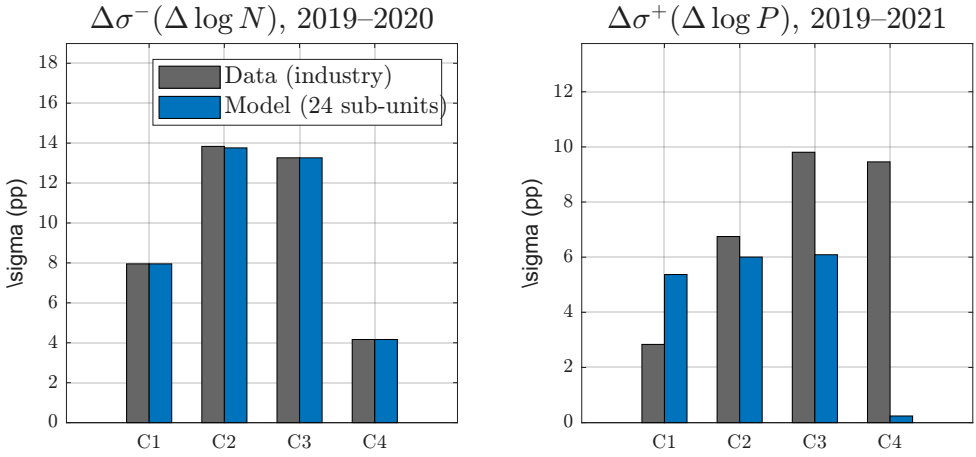


Phillips Curve Steepening



Setup: model's response to uniform i.i.d. demand shock from steady state.

Within-Chain Price Dispersion



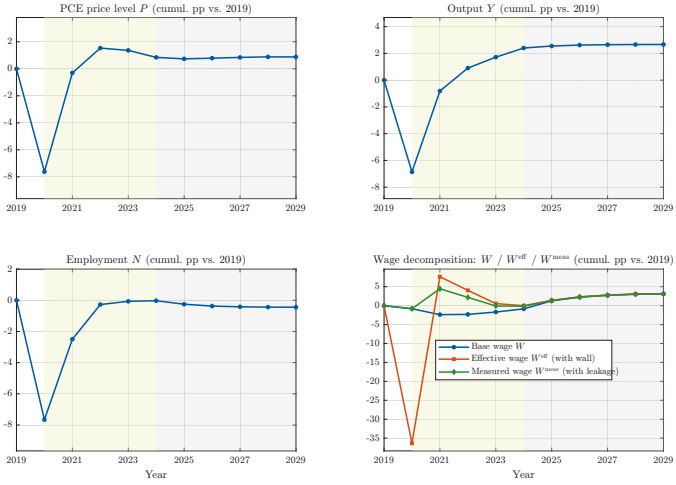
Reading: Model matches the data pattern of *excess* within-chain price-growth dispersion.

Conclusions

- Convex costs of **rebuilding depleted workforces** (the *capacity wall*) turned a sectoral supply shock into economy-wide inflation via input–output linkages.
- **Essentially all above-trend inflation in 2021**, roughly **70% at the 2022 peak**.
- Most of the force comes from the **unevenness** of workforce destruction — not its aggregate size — by inflation's peak in 2022.
- Rationalizes the apparent post-COVID **Phillips-curve steepening** without appealing to a global nonlinearity.
- Main shortfall is **persistence**; optimal monetary policy response analyzed in companion work: Drozd and Tavares (2026): *"Spending the Anchor: Monetary Policy Response to Covid Recession."*

Appendix

Long-Horizon Model Dynamics



Beyond 2024: all wedges revert; model converges back to nominal anchor by 2050 via ι_a. Mild below-trend inflation 2025–29 reflects sticky-price disinflation after the wall releases.

Cost Wall Calibration — Details

	Symbol	Value	Source
Avg → marginal (convexity)	η	1.30	$C(H) = H^{1.3}$; Muehlemann & Pfeifer (2016)
"Skilled" share	κ	0.80	
Normal quit rate (monthly)	q_0	0.0225	JOLTS 2017–19 avg
Peak quit rate (monthly)	q_1	0.0300	JOLTS recovery peak
Quit ratio	q_1/q_0	1.33	
Convexity factor	$(q_1/q_0)^{\eta-1}$	1.09	
Annual hazard, normal	$\lambda(q_0) = 12[-\log(1-q_0)]$	0.273	
Annual hazard, peak	$\lambda(q_1)$	0.366	
Real cost of equity	r	0.06	real equity premium
Cost of hire, normal	$Q_0 = 22/52$	0.423	Linckh et al. (2025), 22 wk
Tightness premium (3 SD)	$1 + 3 \times .12$	1.36	Linckh, 12%/SD
Cost of hire, tight	$Q_1 = 30/52$	0.577	
Normal-times cost	$(r + \lambda_0)\, Q_0$	0.141	
Tight-market cost	$(q_1/q_0)^{\eta-1}(r + \lambda_1)\, Q_1$	0.268	
Implied cost wall	$c_{\text{wall}} = \eta\kappa$ [tight − normal]	**0.13**	

← back