Why Are Some Recoveries Weak and Others Strong?

Paula Donaldson
UCSD

Johannes Wieland
UCSD, SF Fed & NBER

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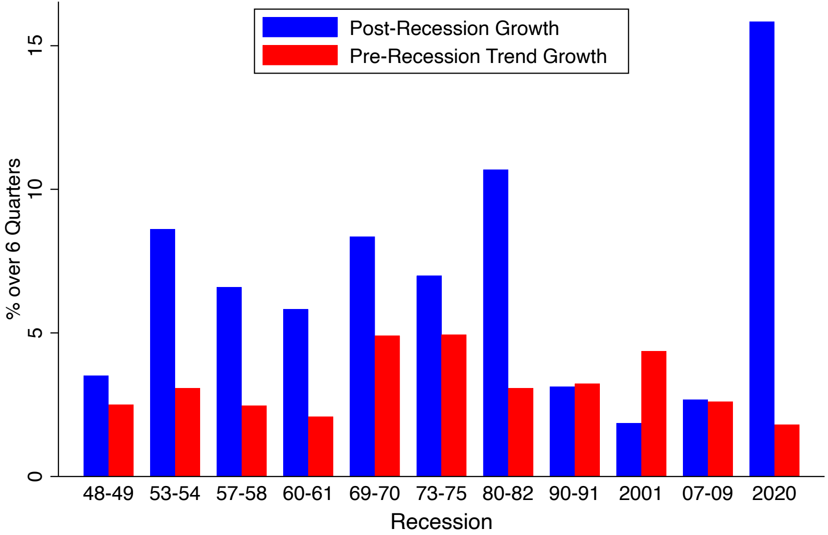
University of Chicago

Weak Recoveries in 1990-1, 2001, 2007-9 vs Strong Recoveries



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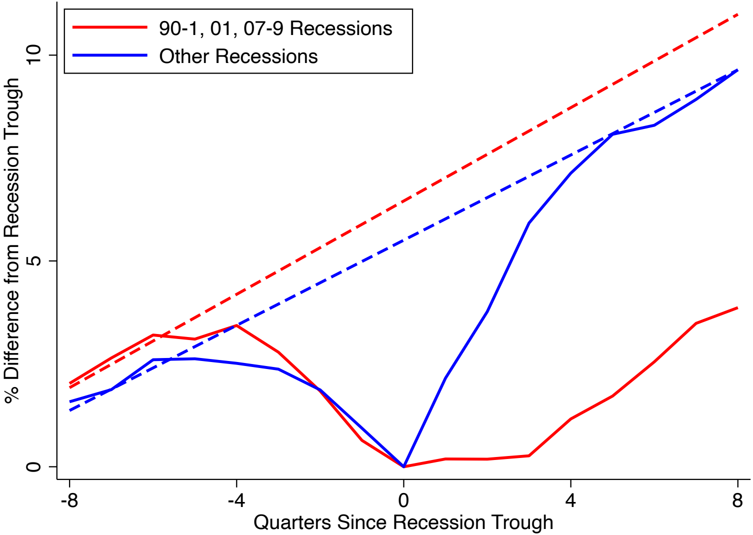

Possible Explanations for Weak vs Strong Recoveries

1. Bad luck. Gali, Smets, and Wouters (2012).
2. Investment boom-bust. Beaudry, Galicia, and Portier (2018); Rognlie, Shleifer, and Simsek (2018).
3. Credit boom-bust. Jordá, Schularick, and Taylor (2013).
4. Sectoral incidence. Beraja and Wolf (2022).
5. Changes in beliefs. Kozlowski, Veldkamp, and Venkateswaran (2019, 2020).
6. Secular decline in manufacturing. Leamer (2021).
7. Hysteresis. Reifschneider, Wascher, and Wilcox (2015); Benigno and Fornaro (2018); Garga and Singh (2021).

This paper

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- Main findings:
  - 1990-1, 2001, and 2007-9 recessions: recovery elasticity = 0.6 (95% CI 0 to 1.2)
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  - Difference due to within-industry changes in recovery elasticity.
  - Model can match recovery elasticities with intertemporal shocks for fast recoveries and boom-bust cycles for slow recoveries.

Outline

Outline

How We Estimate the Recovery Elasticity

- We estimate

$$\hat{y}_{i,T_j+h} - \hat{y}_{i,T_j} = \alpha_{j,h} + \beta_h(\hat{y}_{i,T_j} - \hat{y}_{i,P_j}) + \varepsilon_{i,j,h} \tag{1}$$

  - $\hat{y}_{it}$ is log p.c. output relative to trend in location i at time t.
  - P_j, T_j are the national [P]eak and [T]rough of recession j.
  - h is the horizon of the local projection.
  - $\alpha_{j,h}$ is a recession-horizon fixed effects.
- Interpretation: What does a relatively deeper recession $\hat{y}_{i,T_j} - \hat{y}_{i,P_j}$ predict for the subsequent recovery over h quarters $\hat{y}_{i,T_j+h} - \hat{y}_{i,T_j}$.
- Inclusion of $\alpha_{j,h}$ means we isolate within-recession variation.

Bartik Design to Address Identification Problem

- Challenges in estimating β_h:
  1. Causation may run both ways.
  2. Measurement error in the local recession depth or trend.
  3. Local recession not representative of national recession.
- Solution: Bartik instrument

$$\hat{y}^b_{i,T_j} - \hat{y}^b_{i,P_j} = \sum_{k=1}^{K} s_{i,k,P_j} \hat{g}_{-i,k,P_j,T_j}.$$

  - $k = 1, ..., K$ is sector.
  - s_{i,k,P_j} is sector k share in output of location i at business cycle peak P_j.
  - $\hat{g}_{-i,k,P_j,T_j}$ is the leave-one-out growth rate of sector k from P_j to T_j relative to trend.

Identifying Assumption for β_h

- Exposure to national recession must be uncorrelated with other State-specific shocks that affect local recovery dynamics $\varepsilon_{i,j,h}$ conditional on controls.

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- Examples when exclusion restriction fails:

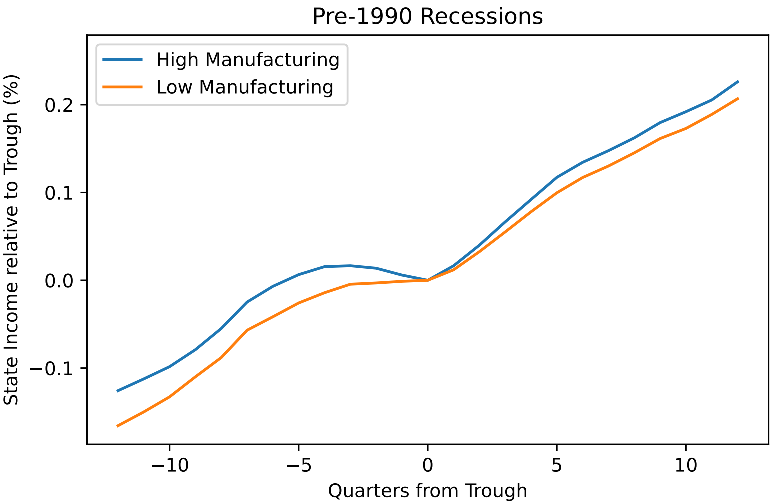
  1. Manufacturing trend changes in a recession (but not due to recession itself).
  2. Measurement error in local trends correlated with recession exposure.
  3. Regional shocks correlated with recession exposure.

Data Sources

- Quarterly BEA State personal income by industry, 1948Q1-today.
- Quarterly BLS State employment, 1948Q1-today.
- Quarterly BEA Real GDP, 2005Q1-today.
- All data converted to per-capita using Census State population estimates.
- Exclude government sector, agriculture and mining, and FIRE (earnings only).
- NBER recession dates combining 1980 and 1981-2 recession.
  - Trend calculated using peak-to-peak growth.

Outline

Illustration of the Empirical Design



Great Recession COVID 2001

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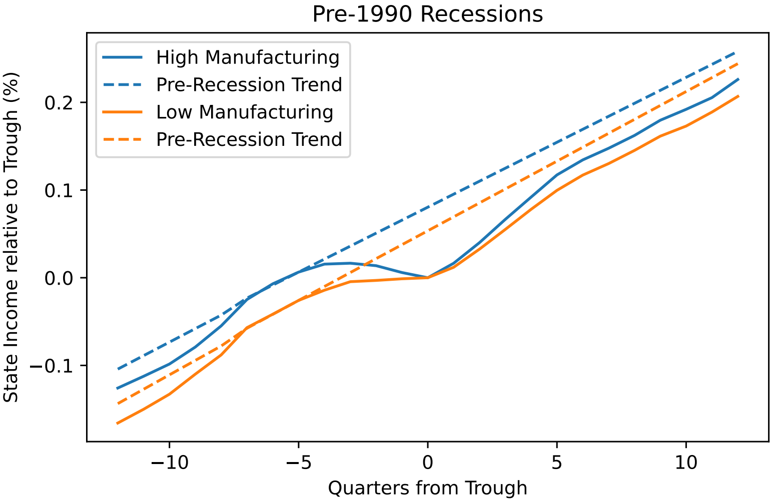

▸ Great Recession ▸ COVID ▸ 2001

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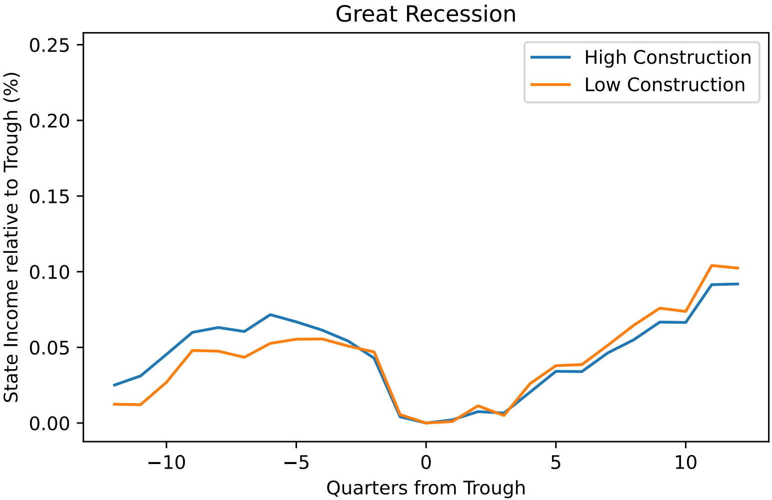

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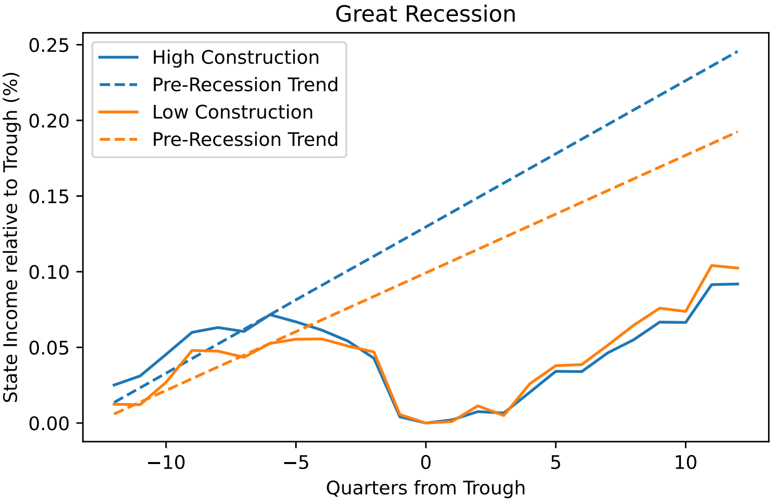
ILLUSTRATION OF THE EMPIRICAL DESIGN



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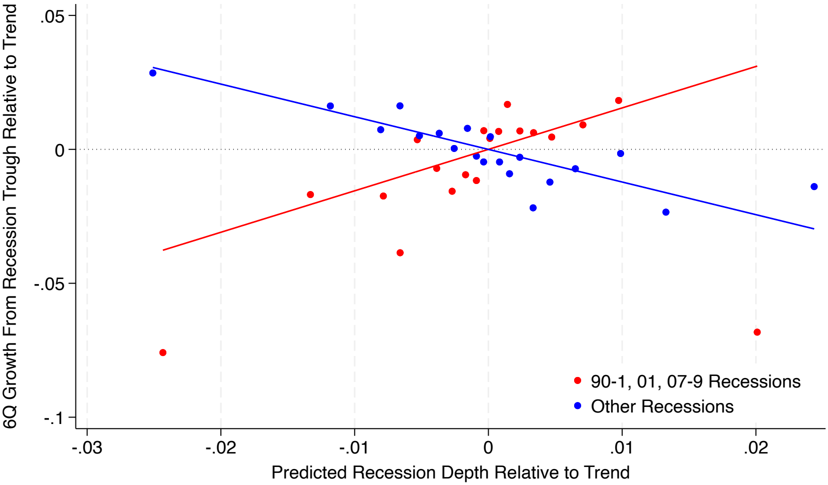
Outline

Reduced Form Relationship Positive in Slow Recoveries



First Stage | Reduced Form By Recession

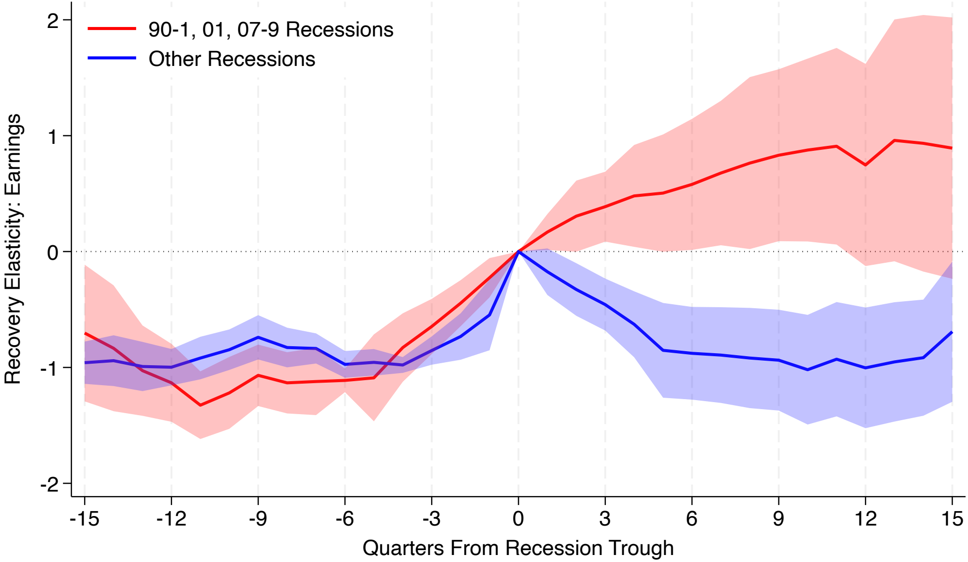
Recovery Elasticity 6 Quarters after Recession Trough

6Q Recovery Elasticity:	Included Income	All Income	Employment	GDP
	(1)	(2)	(3)	(4)
Coeff. on Local Recession Depth:				
90-1, 01, 07-9 Recessions	0.58^{**}	0.59^{*}	0.55^{***}	0.83
	(0.29)	(0.30)	(0.17)	(0.72)
Other Recessions	-0.88^{***}	-1.54^{***}	-1.03^{***}	-0.91^{**}
	(0.20)	(0.49)	(0.21)	(0.44)
Recession FE	Yes	Yes	Yes	Yes
P-value of Equality	0.000	0.003	0.000	0.015
F-Statistic 90-1, 2001, 07-9	18.2	14.2	24.1	6.8
F-Statistic Other Rec.	32.7	13.3	22.6	10.1
State Clusters	51	51	51	51
R^2	0.38	-0.92	0.32	0.51
Observations	555	555	552	102

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

OLS First Stage

Recovery Elasticity Very Peristent



Decomposition of Recovery Elasticities

- Goldsmith-Pinkham, Sorkin, Swift (2021) decomposition:

$$\beta = \sum_{k=1}^{K} \alpha_k \beta_k$$

  - β_k is the recovery elasticity implied by industry share s_{i,k,P_j}.
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- Is the change in β coming from changes in α_k or β_k? Which industry k?

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- Is the change in β coming from changes in α_k or β_k? Which industry k?
- Decomposition only exact for Bartik instrument with national growth rates.

Rotemberg Weights and Treatment Effects by Industry

Group	90-1, 2001, 07-9 Recessions			Other Recessions		
	α_k	β_k	se(β_k)	α_k	β_k	se(β_k)
Constr. & Manuf.	0.36	0.29	0.43	0.52	−0.53	0.18
Other Services	0.56	0.62	0.18	0.40	−1.02	0.25
Trans. & Util.	0.05	0.35	0.29	0.01	−3.06	1.16
Wholesale & Retail	0.02	0.54	0.43	0.07	−0.28	0.28

▸ 90-1, 2001, 07-09 Breakdown ▸ Other Recessions Breakdown ▸ Manufacturing ▸ Durability ▸ Recessions

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- Differences in within-industry recovery elasticities account for the change in the aggregate recovery elasticity.

▸ 90-1, 2001, 07-09 Breakdown ▸ Other Recessions Breakdown ▸ Manufacturing ▸ Durability ▸ Recessions

Robustness

1. Control for Earnings Shares
2. Additional Controls
3. Exclude States
4. Exclude Recessions

Outline

Model Overview

- Households.
  - Consume nondurable and durable goods. ▸ Details
  - Durable adjustment subject to Calvo friction. ▸ Details
  - Provide consumption insurance.
- Two regions.
  - Durable and nondurable produced in each region. ▸ Details
  - Different production shares $\Rightarrow$ differential exposure to aggregate shock. ▸ Details
  - Labor union in each region with Calvo wage setting. ▸ Details
- Monetary Policy.
  - Fixed real rate.
- Aggregate TFP growth.

Shocks

- Intertemporal shock: Monetary Policy

$$r_t = \rho_{r1} r_{t-1} + \rho_{r2} r_{t-2} + e_t^r$$

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- Boom-bust: Fake news shock to taste for durables.

1. Learn that ψ_t will exogenously increase at $t = s$. Then, follows AR(1) process.
2. At $t = z < s$, learn that ψ_t will not increase.

Shocks

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- Households update information set with iid probability θ.

Matching Data and Model

- Simulate recessions from the model.
- Estimate the parameters of the shock processes. ▸ Parameters
  - Same regression in the model as in the data.

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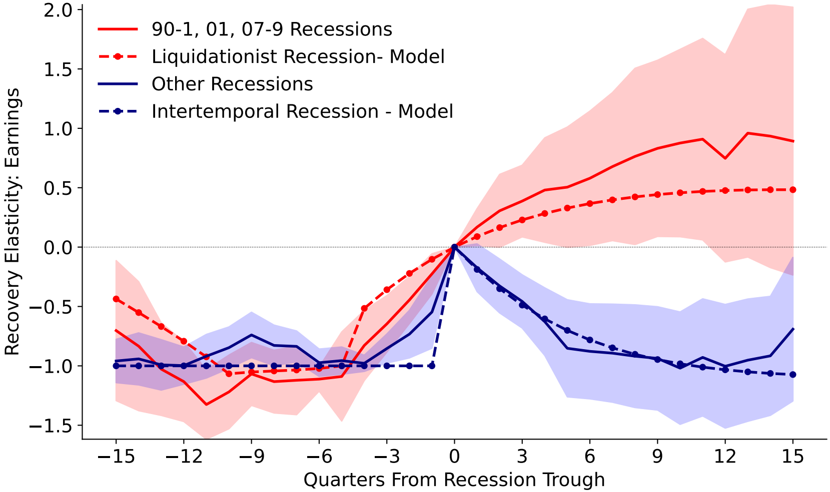
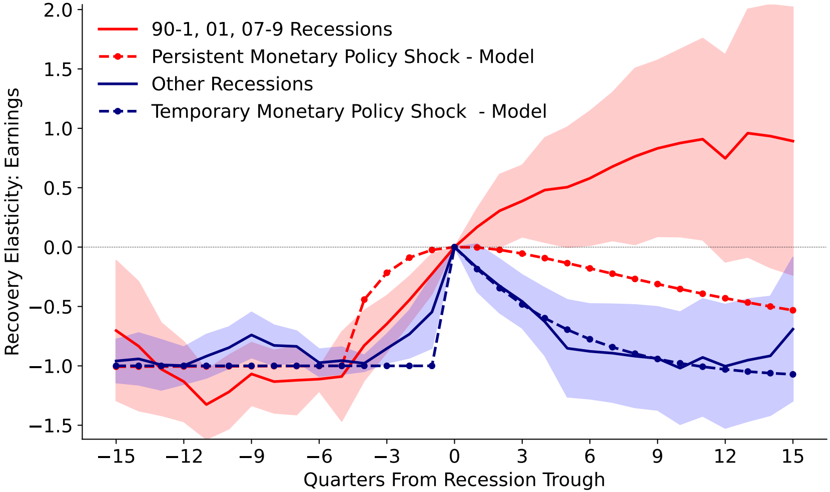
- Simulate recessions from the model.
- Estimate the parameters of the shock processes. ▸ Parameters
  - Same regression in the model as in the data.
- We fix all other parameters at standard values. ▸ Parameters
  - Relatively low durable demand elasticity.
  - Relatively high durable supply elasticity.

Boom-bust Cycles vs Intertemporal Recessions



▸ Serial ▸ Derivation

TRANSITORY VS PERSISTENT MONETARY POLICY CONTRACTION



Serial | Flexible Shock | Derivation

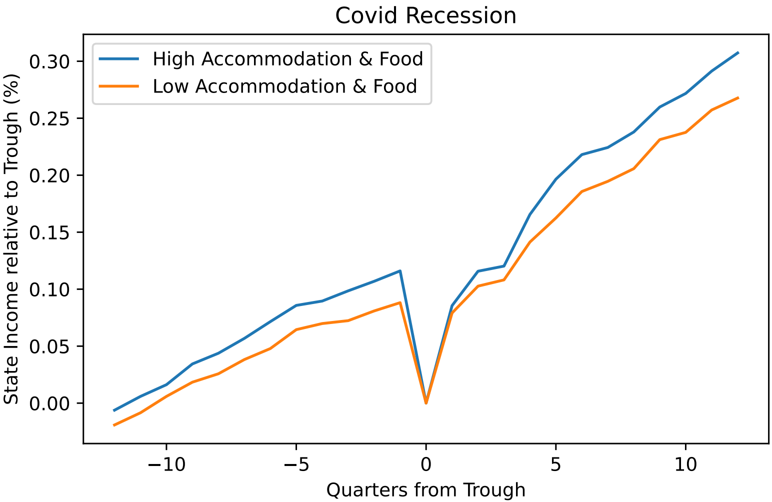
Outline

Conclusion

- Cross-sectional estimates of recovery elasticities.
  - ≈ 0.6 for the weak 1990-1, 2001, and 2007-9 recoveries.
  - ≈ -0.9 for the other recoveries.
  - Change in recovery elasticities driven by changes in within-industry recovery elasticities.
- Two-region NK model with durable good:
  - Matches estimates of recovery elasticities with boom-bust cycles and intertemporal recessions.
  - Persistent intertemporal shocks not consistent with significant positive recovery elasticity.

$\Rightarrow$ Cross-sectional estimates and model help explain why some recoveries are slow and others are fast.

Illustration of the Empirical Design



pre-1990 Great Recession 2001

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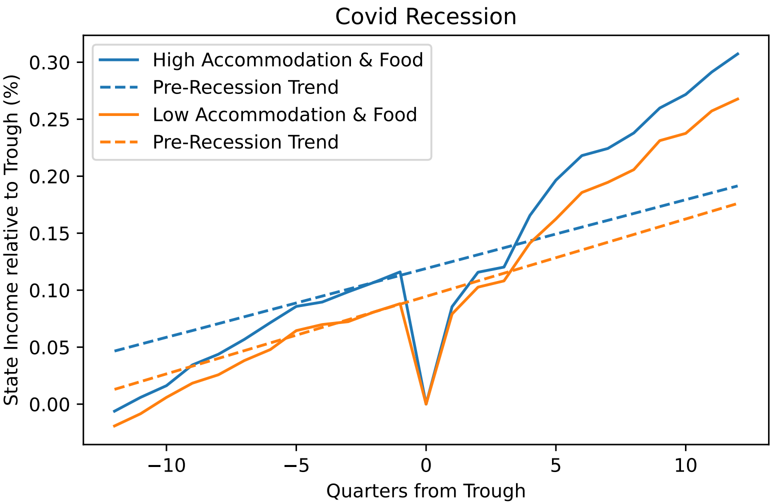

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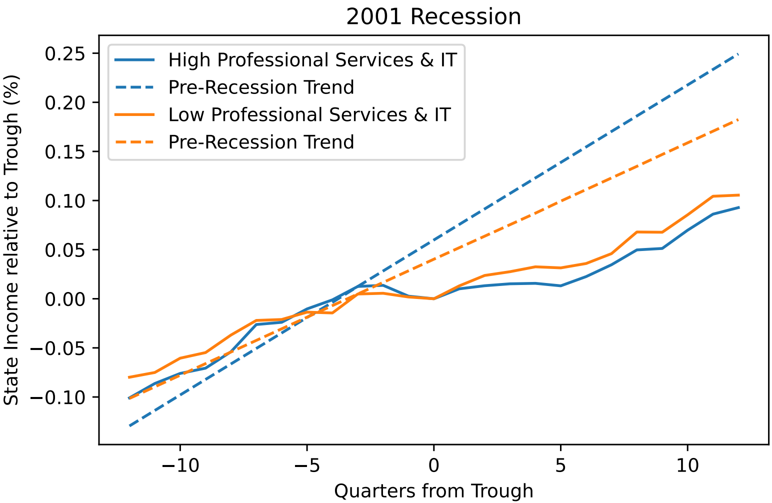

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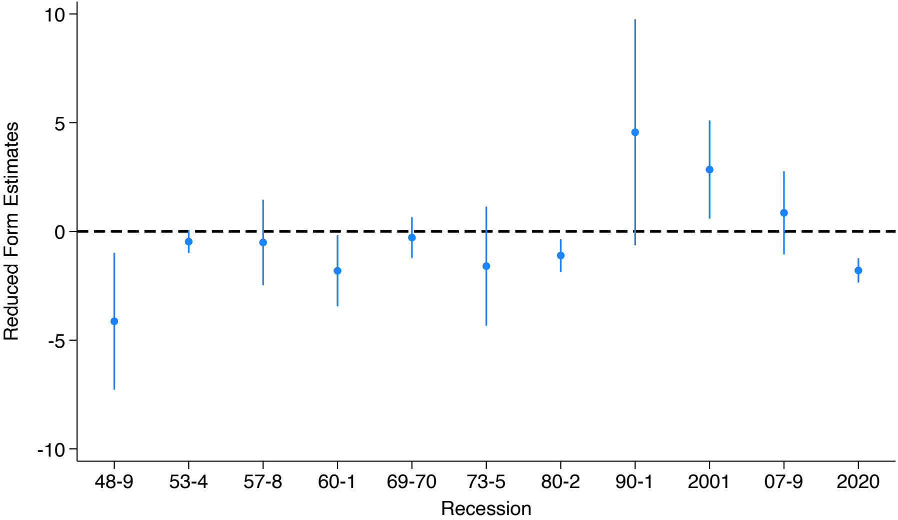
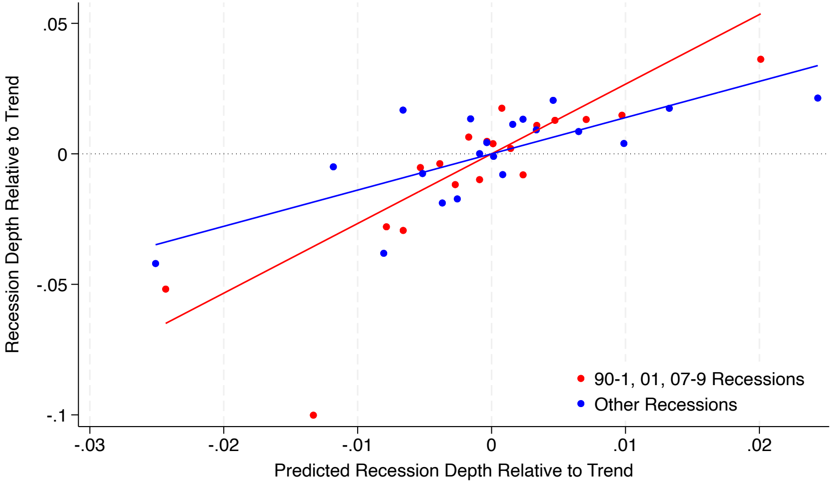


Reduced Form By Group

First Stage Similar Across Recessions



Reduced Form By Group

First Stage of Local Recession Depth on Predicted Recession Depth

Local Recession Depth:	Included Earnings	All Earnings	Employment	GDP
	(1)	(2)	(3)	(4)
Coeff. on Predicted Recession Depth:				
90-1, 01, 07-9 Recessions	2.67***	2.17***	1.47***	2.04**
	(0.63)	(0.58)	(0.30)	(0.78)
Other Recessions	1.39***	0.69***	0.75***	0.72***
	(0.24)	(0.19)	(0.16)	(0.23)
Recession FE	Yes	Yes	Yes	Yes
P-value of Equality	0.081	0.017	0.041	0.100
State Clusters	51	51	51	51
R^2	0.44	0.35	0.66	0.28
Observations	555	555	552	102

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

▸ IV

OLS Recovery Elasticity 6 Quarters after Recession Trough

6Q Recovery Elasticity:	Included Earnings	All Earnings	Employment	GDP
	(1)	(2)	(3)	(4)
Coeff. on Local Recession Depth:				
90-1, 01, 07-9 Recessions	0.44***	0.42***	0.41***	0.048
	(0.076)	(0.100)	(0.064)	(0.16)
Other Recessions	0.074	0.44***	0.020	−0.58***
	(0.082)	(0.13)	(0.10)	(0.15)
Recession FE	Yes	Yes	Yes	Yes
P-value of Equality	0.000	0.931	0.001	0.001
State Clusters	51	51	51	51
R^2	0.71	0.45	0.66	0.69
Observations	555	555	552	102

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▸ IV

Highest Rotemberg Weights for the 1990-1, 2001, and 2007-9 Recessions

Recession	Industry	α_k	β_k	se(β_k)	$g_k - E_k(g_k)$
2007-9	Construction	0.33	0.58	0.41	−0.16
2007-9	Health	0.15	0.64	0.30	0.08
2001	Health	0.12	0.95	0.32	0.08
2007-9	Education	0.07	0.16	0.40	0.09
2001	Information	0.07	1.29	0.43	−0.06
2001	Durable Manufacturing	0.06	0.63	1.00	−0.04
2001	Professional Services	0.05	2.48	0.64	−0.03
1990-1	Transportation Utilities	0.04	0.87	0.17	0.02
2007-9	Admin	0.02	0.17	0.42	−0.05
1990-1	Nondurable Manufacturing	−0.02	−0.06	0.95	0.02

Back

Highest Rotemberg Weights for Other Recessions

Recession	Industry	α_k	β_k	se(β_k)	$g_k - E_k(g_k)$
2020	Accommodation Food	0.23	−1.00	0.28	−0.48
1953-4	Manufacturing	0.15	−0.33	0.30	−0.08
1969-70	Durable Manufacturing	0.12	−0.27	0.31	−0.11
1957-8	Manufacturing	0.06	−0.29	0.28	−0.04
1980-2	Construction	0.05	1.74	0.98	−0.12
2020	Entertainment	0.05	−1.21	0.28	−0.47
1953-4	Wholesale and Retail Trade	0.05	−0.10	0.25	0.05
1973-5	Durable Manufacturing	0.05	−0.21	0.58	−0.03
1973-5	Construction	−0.04	−0.23	0.96	−0.06
1960-1	Durable Manufacturing	0.04	−2.33	1.25	−0.08

Back

Rotemberg Weights and Treatment Effects by Manufacturing

Group	90-1, 2001, 07-9 Recessions			Other Recessions		
	α_k	β_k	se(β_k)	α_k	β_k	se(β_k)
Manufacturing	0.05	−1.84	1.50	0.52	−0.75	0.19
Nonmanufacturing	0.95	0.61	0.21	0.48	−0.71	0.25

Back

Rotemberg Weights and Treatment Effects by Durability

Group	90-1, 2001, 07-9 Recessions			Other Recessions		
	α_k	β_k	se(β_k)	α_k	β_k	se(β_k)
Durable	0.36	0.29	0.43	0.52	-0.53	0.18
Nondurable	0.64	0.60	0.17	0.48	-0.96	0.22

Back

Rotemberg Weights and Treatment Effects by Recession

Group	90-1, 2001, 07-9 Recession			Other Recession		
	α_k	β_k	se(β_k)	α_k	β_k	se(β_k)
1948-10				0.04	−2.22	1.06
1953-04				0.21	−0.26	0.29
1957-07				0.09	−0.19	0.29
1960-04				0.04	−2.28	1.18
1969-10				0.15	−0.22	0.32
1973-10				0.04	−0.23	0.68
1980-01				0.09	−0.85	0.57
1990-07	0.02	3.73	1.30			
2001-01	0.31	0.92	0.27			
2007-10	0.66	0.17	0.29			
2019-10				0.32	−1.06	0.28

Back

Recovery Elasticity 6 Quarters after Recession Trough

	90-1, 2001, 07-9 Recession		Other Recession			
	β_1	S.E.	β_2	S.E.	P(Equal)	N
(1) Baseline	0.58^{**}	0.29	-0.88^{***}	0.20	0	555
Control for Earnings Share:						
(2) Manufacturing	0.53^{**}	0.24	-0.72^{*}	0.40	0.0017	555
(3) Construction	0.55^{*}	0.32	-0.48^{**}	0.21	0.0017	555
(4) Trans. Serv. & Utilities	0.49^{**}	0.23	-0.91^{***}	0.28	0	555
(5) Wholesale & Retail	0.70^{**}	0.32	-1.63^{***}	0.60	0	555
(6) IT & Prof Serv.	0.66^{**}	0.27	-0.88^{***}	0.20	0	555
(7) Recreation Serv.	0.71^{*}	0.38	-0.77^{***}	0.27	0.0028	555
(8) Government	0.61^{***}	0.21	-0.85^{***}	0.24	0	555
(9) FIRE	0.57^{*}	0.31	-0.86^{***}	0.18	0	555
(10) Agr. & Mining	0.51^{*}	0.30	-1.13^{***}	0.28	0	555
(11) Assets	0.68^{**}	0.34	-0.88^{***}	0.20	0	555

$^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

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	90-1, 2001, 07-9 Recession		Other Recession			
	β_1	S.E.	β_2	S.E.	P(Equal)	N
(1) Baseline	0.58^{**}	0.29	-0.88^{***}	0.20	0	555
Additional Controls:						
(12) Region × Recession F.E.	0.81	0.56	-0.75^{***}	0.17	0.0046	555
(13) Division × Recession F.E.	1.03	0.75	-0.83^{***}	0.22	0.012	555
(14) Quadratic Trend × Rec. F.E.	0.62^{**}	0.24	-0.72^{**}	0.34	0	555
(15) State F.E.	0.50	0.32	-0.86^{**}	0.37	0	555
Exclude States:						
(16) Excl. D.C.	0.78^{***}	0.27	-0.88^{***}	0.23	0	544
(17) Excl. AK, ND, WY	0.41	0.26	-0.80^{***}	0.17	0	525

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Back

Recovery Elasticity 6 Quarters after Recession Trough

	90-1, 2001, 07-9 Recession		Other Recession			
	β_1	S.E.	β_2	S.E.	P(Equal)	N
(1) Baseline	0.58^{**}	0.29	-0.88^{***}	0.20	0	555
Exclude Recession:						
(18) 1948-9	0.58^{**}	0.29	-0.80^{***}	0.22	0	506
(19) 1953-4	0.58^{**}	0.29	-1.06^{***}	0.24	0	506
(20) 1957-8	0.58^{**}	0.29	-0.96^{***}	0.24	0	506
(21) 1960-1	0.58^{**}	0.29	-0.79^{***}	0.19	0	504
(22) 1969-70	0.58^{**}	0.29	-1.01^{***}	0.24	0	504
(23) 1973-5	0.58^{**}	0.29	-0.84^{***}	0.17	0	504
(24) 1980-2	0.58^{**}	0.29	-0.82^{***}	0.19	0	504
(25) 1990-1	0.51^{*}	0.28	-0.88^{***}	0.20	0	504
(26) 2001	0.43	0.36	-0.88^{***}	0.20	0.0015	504
(27) 2007-9	1.13^{***}	0.33	-0.88^{***}	0.20	0	504
(28) 2020	0.58^{**}	0.29	-0.76^{***}	0.25	0	504

$^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

Households

- Utility function:

$$\mathrm{E}_{i,0} \sum_{t=0}^{\infty} \beta^t \left[\frac{{C_{i,t}}^{1-\sigma}}{1-\sigma} + \psi_t \varepsilon_{\psi t} \frac{{D_{i,t}}^{1-\sigma_d}}{1-\sigma_d} - \varphi_t \frac{{L_t}^{1+\nu}}{1+\nu} \right]$$

- Constraints:

$$A_{i,t} = (1+i_{t-1})A_{i,t-1} + W_t L_t - P_t C_{i,t} - P_t^x X_{i,t} - \iota P_t D_t$$
$$D_{i,t} = (1-\delta) D_{i,t-1} + X_{i,t}$$
$$X_{i,t} = \chi \delta D_{i,t-1} + I_{i,t}$$

- BGP: $\varphi_t = (C_t)^{-\sigma} Z_t$ and $\psi_t = \bar{\psi} Z_t^{\sigma-\sigma^d}$
- L_t chosen by union.

Back

Household FOCs: Nondurables and saving

- Consumption insurance: $C_{i,t} = C_{j,t}$
- Standard FOCs:

$$\lambda_t = \beta \frac{(1 + i_t)}{\Pi_{t+1}} \lambda_{t+1}$$
$$\lambda_t = C_t^{-\sigma}$$

▸ Back

Household FOCs: Durable

- Calvo Friction: can only re-optimize durable consumption with probability θ^d.
- Durable problem:

$$\max_{D_{i,t}} E_t \sum_{s=0}^{\infty} (\beta\theta^d)^s \left[\psi_{t+s}\varepsilon_{\psi t+s} \frac{((1-(1-\chi)\delta)^s D_{i,t})^{1-\sigma_d}}{1-\sigma_d} - \lambda_{t+s}\iota(1-(1-\chi)\delta)^s D_{i,t} \right]$$

$$-\lambda_t p_t^x D_{i,t} + \sum_{s=0}^{\infty} \beta^s {\theta^d}^{s-1}(1-\theta^d)(1-(1-\chi)\delta)^s \lambda_{t+s} p_{t+s}^x D_{i,t}$$

- FOC:

$$D_t^* = \left(\frac{\Omega_{1,t}}{\Omega_{2,t}}\right)^{\frac{1}{\sigma_d}}$$

$$\Omega_{1,t} = \psi_t \varepsilon_{\psi t+s} + \beta\theta^d (1-(1-\chi)\delta)^{1-\sigma_d}\Omega_{1,t+1}$$

$$\Omega_{2,t} = \lambda_t \left(p_t^x + \iota - \frac{(1-(1-\chi)\delta)}{(1+i_t)\Pi_{t+1}^{-1}} p_t^x (cg_{t+1} - 1) \right) + \beta\theta^d (1-(1-\chi)\delta)\Omega_{2,t+1}$$

where $cg_{t+1} = 1 + \frac{p_{t+1}^x}{p_t^x}$. Back

Household FOCs: Durable

- Aggregation:

$$D_t = \int_0^1 D_{i,t} di$$

$$X_t = \int_0^1 X_{i,t} di$$

$$X_t = (1-\theta^d)\left[D_t^* - (1-(1-\chi)\delta)D_{t-1}\right] + \chi\delta D_{t-1}$$

Back

Regional Demand

- Regional demand for nondurables:

$$ND_t = \left[\gamma_c ND_{1t}^{\frac{\eta_c - 1}{\eta_c}} + (1-\gamma_c) ND_{2t}^{\frac{\eta_c - 1}{\eta_c}}\right]^{\frac{\eta_c}{\eta_c - 1}}$$

- Regional demand for durables:

$$X_t = \left[\gamma_x X_{1t}^{\frac{\eta_x - 1}{\eta_x}} + (1-\gamma_x) X_{2t}^{\frac{\eta_x - 1}{\eta_x}}\right]^{\frac{\eta_x}{\eta_x - 1}}$$

- Implied demand schedules:

$$ND_{1t} = \gamma_c ND_t \left(\frac{P_{1t}}{P_t}\right)^{-\eta_c} \qquad X_{1t} = \gamma_x X_t \left(\frac{P^x_{1t}}{P^x_t}\right)^{-\eta_x}$$

$$ND_{2t} = (1-\gamma_c) ND_t \left(\frac{P_{2t}}{P_t}\right)^{-\eta_c} \qquad X_{2t} = (1-\gamma_x) X_t \left(\frac{P^x_{2t}}{P^x_t}\right)^{-\eta_x}$$

Back

Regional Production

- Perfect competition in regional nondurable production:

$$\max \quad \pi_t = P_{rt} Y_{rt} - W_{rt} L_{rt} \qquad \text{s.t.} \quad Y_{rt} = Z_t Z_r L_{rt}$$

- FOC:

$$P_{rt} = \frac{W_{rt}}{Z_t}$$

- Perfect competition and DRS in regional durable production:

$$X_{irt} = Z_r^x M_{irt} \left(\frac{X_{rt}}{\bar{X}_r} \right)^{-\zeta}$$

- FOC:

$$P_{rt}^x = \frac{P_{rt}}{Z_r^x} \left(\frac{X_{rt}}{\bar{X}_r} \right)^{\zeta}$$

▸ Back

Wage Stickiness

- Regional labor supply preferences:

$$L_t = \left[\gamma_\ell L_{1t}^{\frac{\eta_\ell - 1}{\eta_\ell}} + (1 - \gamma_\ell) L_{2t}^{\frac{\eta_\ell - 1}{\eta_\ell}} \right]^{\frac{\eta_\ell}{\eta_\ell - 1}}$$

- Implied labor demand:

$$L_{rt}^d = \left[\int_0^1 L_{rt}^d(j)^{\frac{\varepsilon^w - 1}{\varepsilon^w}} dj \right]^{\frac{\varepsilon^w}{\varepsilon^w - 1}}$$

- Regional wage setting:

$$\max_{W_{rt}^*(j)} \sum_{s=0}^{\infty} (\beta \theta^w)^s \left[U_{c_{t+s}} \frac{W_{rt+s|t}^*(j)}{P_{t+s}} L_{rt+s|t}^d(j) - U_{L_{r,t+s}} L_{rt+s|t}^d(j) \right]$$

Back

Wage Stickiness

- FOC:

$$w^*_{rt} = \frac{\varepsilon^w}{\varepsilon^w - 1} \frac{F_{1rt}}{F_{2rt}}$$

$$F_{1rt} = \gamma_\ell^{-\frac{1}{\eta_\ell}} \varphi_t L_t^{\nu - \frac{1}{\eta_\ell}} L_{rt}^{\frac{1}{\eta_\ell}} L^d_{rt} w_{rt}^{\varepsilon^w} + \beta \theta^w \Pi_{t+1}^{\varepsilon^w} F_{1r,t+1}$$

$$F_{2rt} = \lambda_t L^d_{rt} w_{rt}^{\varepsilon^w} + \beta \theta^w \Pi_{t+1}^{\varepsilon^w - 1} F_{2r,t+1}$$

- Aggregation:

$$w_{rt} = \left[(1 - \theta^w) {w^*_{rt}}^{1-\varepsilon^w} + \theta^w \left(w_{rt-1} \Pi_t^{-1} \right)^{1-\varepsilon^w} \right]^{\frac{1}{1-\varepsilon^w}}$$

$$w_t = \left[\gamma_\ell w_{1t}^{1-\eta_\ell} + (1 - \gamma_\ell) w_{2t}^{1-\eta_\ell} \right]^{\frac{1}{1-\eta_\ell}}$$

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ESTIMATED PATAMETERS

		Value
Intertemporal vs. Liquidationist		
Persistence of Monetary Policy Shock	ρ_r	.905
Persistence of Taste Shock	ρ_ψ	.967
Fake News Date	s	12
Second Wave of News Date	z	5
Tight Monetary Policy		
Persistence of Monetary Policy Shock - Pre 90's	ρ_r	.904
Persistence of Monetary Policy Shock - Post 90's	ρ_r	.9999

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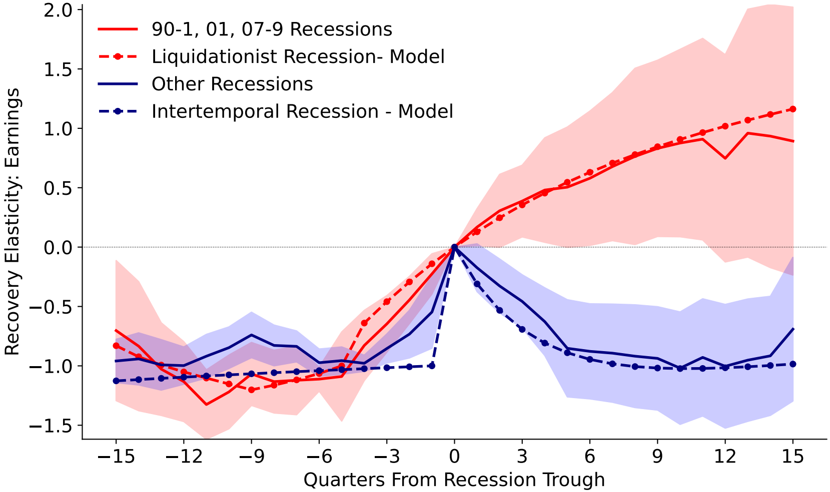
Calibrated Parameters

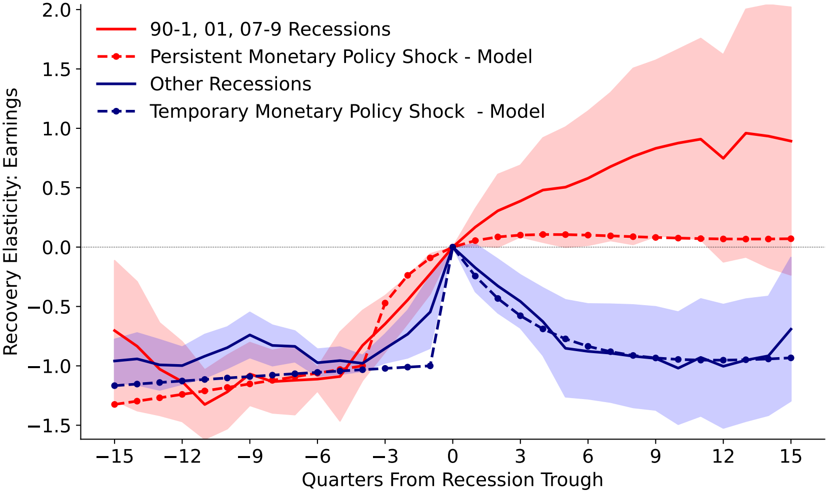
Parameters		Value
$1/\sigma$	Nondurable EIS	.25
$1/\sigma^d$	Durable EIS	.25
$\bar{\psi}$	Taste for Durables	6.3
ζ	Inverse Price Elasticity of Durable Supply	.1
ι	Operating cost	0.005
χ	Maintenance cost	0.17
δ	Depreciation rate	0.017
$\frac{\beta}{(1+g_z)}$	Effective Discount factor	0.99
$\bar{g}$	Productivity Growth	.005
Y/Z	Output to TFP Ratio	1
ν	Inverse Frisch elasticity	1
ϕ_L	Taylor Rule Coefficient - Output	0
η_c	Elasticity of Substitution - Nondurables	5
η_x	Elasticity of Substitution - Durables	7
η_ℓ	Elasticity of Substitution - Labor Supply	5
ε_w	Elasticity of Substitution - Labor Demand	7
θ	Degree of Information Stickiness	.93
θ^d	Calvo Parameter - Durable Consumption	[illegible]

Boom-bust Cycles vs Intertemporal Recessions



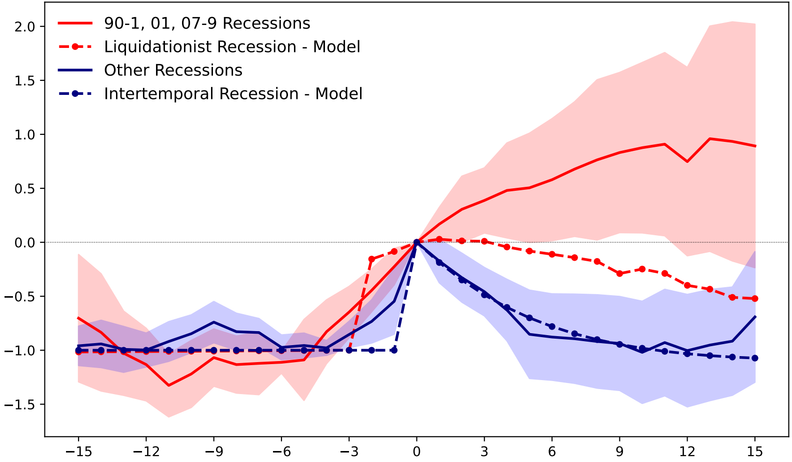
One-by-one

Transitory vs Persistent Monetary Policy Contraction



▸ One-by-one ▸ Flexible Shock

Transitory vs Persistent Monetary Policy Contraction



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Why does a Persistent Intertemporal Shock Not Work?

- In nondurable version of the model, recovery elasticity is:

$$\frac{\Delta \hat{y}_{1,T+1} - \Delta \hat{y}_{2,T+1}}{\hat{y}_{1T} - \hat{y}_{2T}} \approx \underbrace{-4\xi s_1^c(1-s_1^c)\frac{(\hat{\pi}_{1,T+1} - \hat{\pi}_{2,T+1})}{(\hat{y}_{1T} - \hat{y}_{2T})}}_{\text{Regional Convergence}} + \underbrace{\frac{\Delta \hat{y}_{T+1}}{\hat{y}_T}}_{\text{Agg. Recovery Elasticity}}$$

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- With 2% trend growth and a 5% recession, the aggregate recovery elasticity can be positive:

$$\frac{\Delta\hat{y}_{T+1}}{\hat{y}_T} \leq \frac{0.02/4}{0.05} = 0.1$$

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- If $4s_1^c(1-s_1^c) \approx 1$ and $\xi = 2$, then cross-sectional recovery elasticity is negative if:

$$\frac{(\hat{\pi}_{1,T+1} - \hat{\pi}_{2,T+1})}{(\hat{y}_{1T} - \hat{y}_{2T})} \geq 0.05$$

- Vs HHNS (2022) estimates of 0.17. Back

Why does a Boom-Bust Match?

- Define $\mu_{rt} \equiv \tilde{y}_{rt} - \hat{y}_{rt}$ as the difference between the measured output gap and the true output gap.

- In nondurable version of the model, recovery elasticity is:

$$\frac{\Delta\tilde{y}_{1,T+1} - \Delta\tilde{y}_{2,T+1}}{\tilde{y}_{1T} - \tilde{y}_{2T}} \approx -4\xi s_1^c(1-s_1^c)\frac{(\hat{\pi}_{1,T+1} - \hat{\pi}_{2,T+1})}{(\tilde{y}_{1T} - \tilde{y}_{2T})} + \frac{\Delta\hat{y}_{T+1}}{\tilde{y}_T} + \underbrace{\frac{\Delta\mu_{1,T+1} - \Delta\mu_{2,T+1}}{\tilde{y}_{1T} - \tilde{y}_{2T}}}_{\text{Mismeasured Rel. Trend}}$$

  - Flatter Phillips curve in mismeasured space.
  - Adds mismeasured pre-trend.

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