

Recovering from COVID

James H. Stock, Harvard University
Mark W. Watson, Princeton University

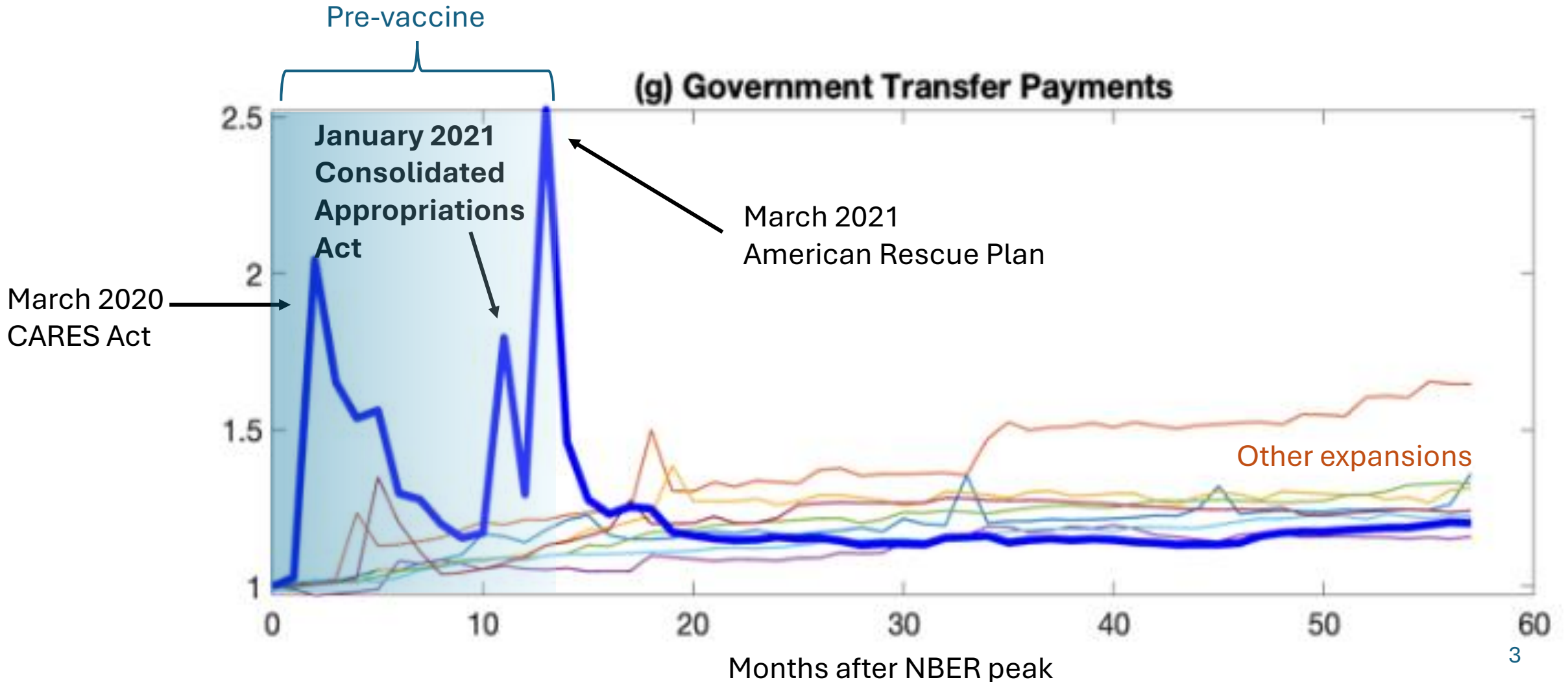
March 28, 2025

The COVID Business Cycle: Anomalies

1. Recession was deepest, shortest on record
2. Unprecedented sectoral shift

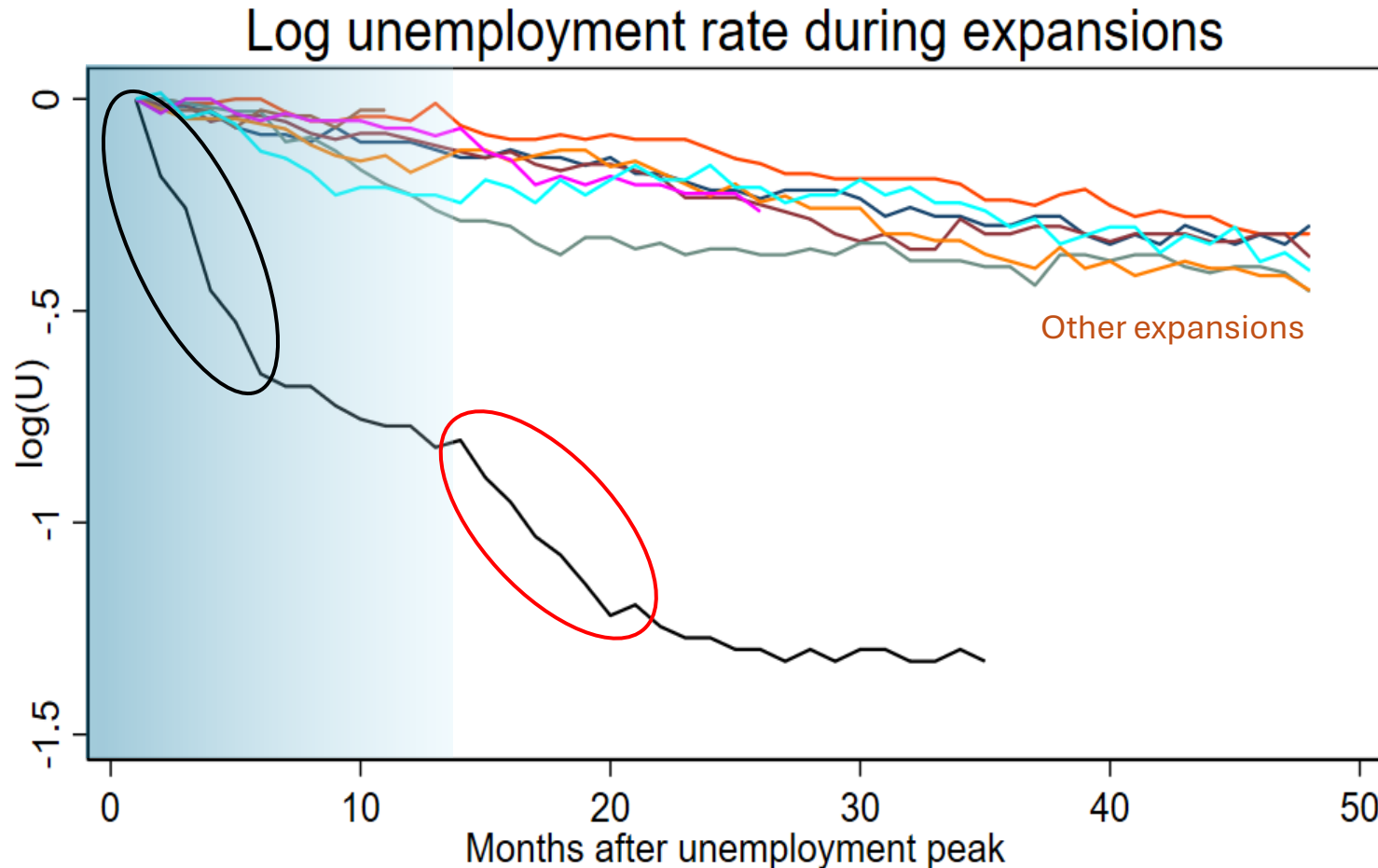
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The COVID Business Cycle: Anomalies

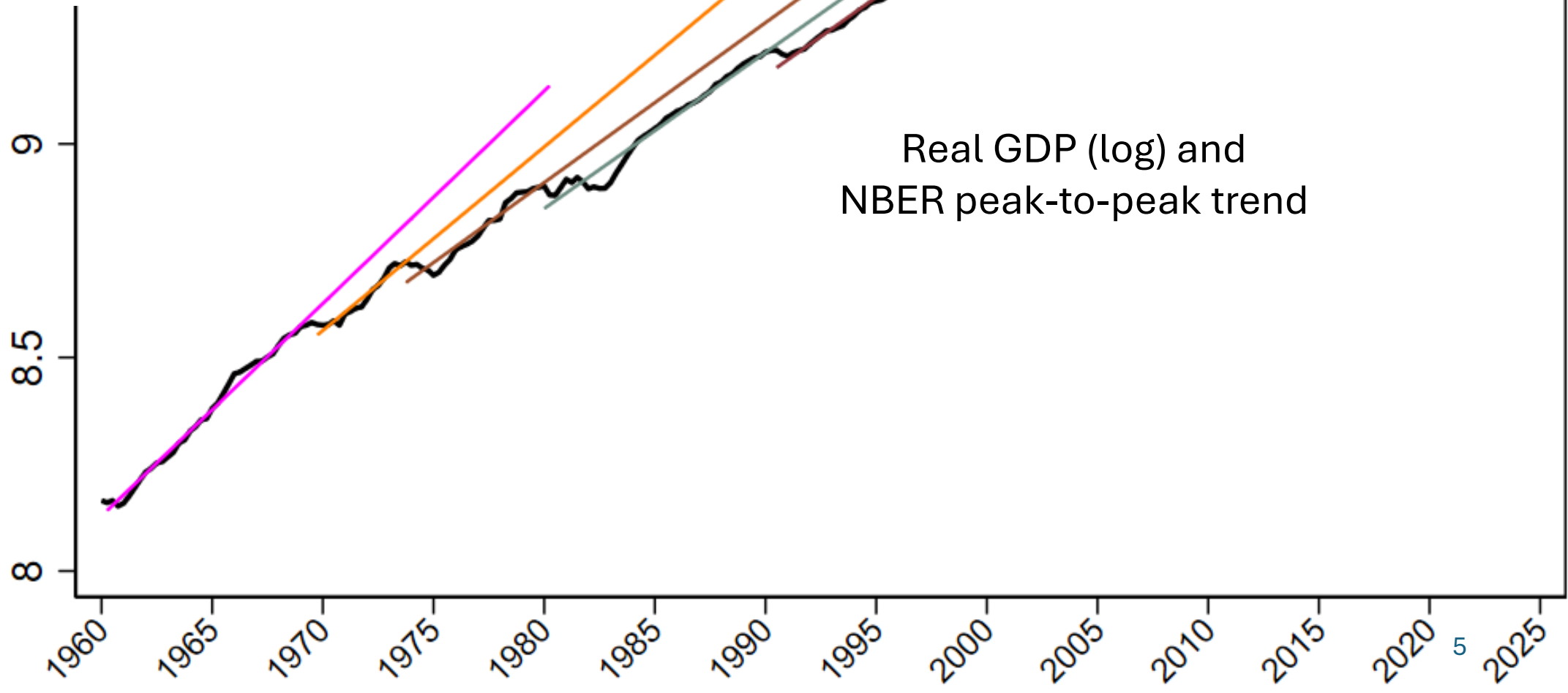
1. Recession was deepest, shortest on record
2. Unprecedented sectoral shift
3. Exceptionally aggressive fiscal policy
4. **Exceptionally fast recovery, in two stages**



Note: Set to zero at series-specific peak following NBER peak. See Hall & Kudlyak (2021, 2022abc)

The COVID Business Cycle: Anomalies

1. Recession was deepest, shortest on record
2. Unprecedented sectoral shift
3. Exceptionally aggressive fiscal policy
4. Exceptionally fast recovery
5. Trend-reverting



Questions

1. Was this time different? Yes
2. Is there a simple quantitative model that captures the anomalies? Yes
3. Are macro dynamics back to normal? Seems so
4. What are the underlying economics accounting for these anomalies?
 - Epi-ec models + COVID fatigue + vaccines
 - Temporary layoffs & PPP
 - Fiscal policy
 - Other factors: WFH technology, new business formation
5. Any broader lessons?

Empirical framework: Dynamic Factor Model (DFM) with a COVID factor

DFM:
$$Y_t = \Lambda F_t + u_t$$

Y = observable series
 F = conventional factors
 C = COVID factor

Factor IRFs:
$$F_t = \Theta_{FF}(L) \varepsilon_t^F$$

Y decomposition:
$$Y_t = \Theta_{YF}(L) \varepsilon_t^F + u_t$$

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- **COVID shock**
 - Unexpected economic manifestation of/reaction to risk of severe illness or death from COVID

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- COVID shock
 - Unexpected economic manifestation of/reaction to risk of severe illness or death from COVID
- **Identification of COVID shock**
 - i. $C = 0$ pre-COVID
 - ii. F shocks have no within-month effect on C_t
 - Biological & administrative delays ~4-6 weeks
 - Large epi-ec literature with feedback on deaths; see Atkeson-Kissler (*BPEA* 2024)
 - Anxiety, perceptions, and economic activity; Fetzer et al. (2021)
 - iii. Λ, F, Θ_{FF} time-invariant (testable)

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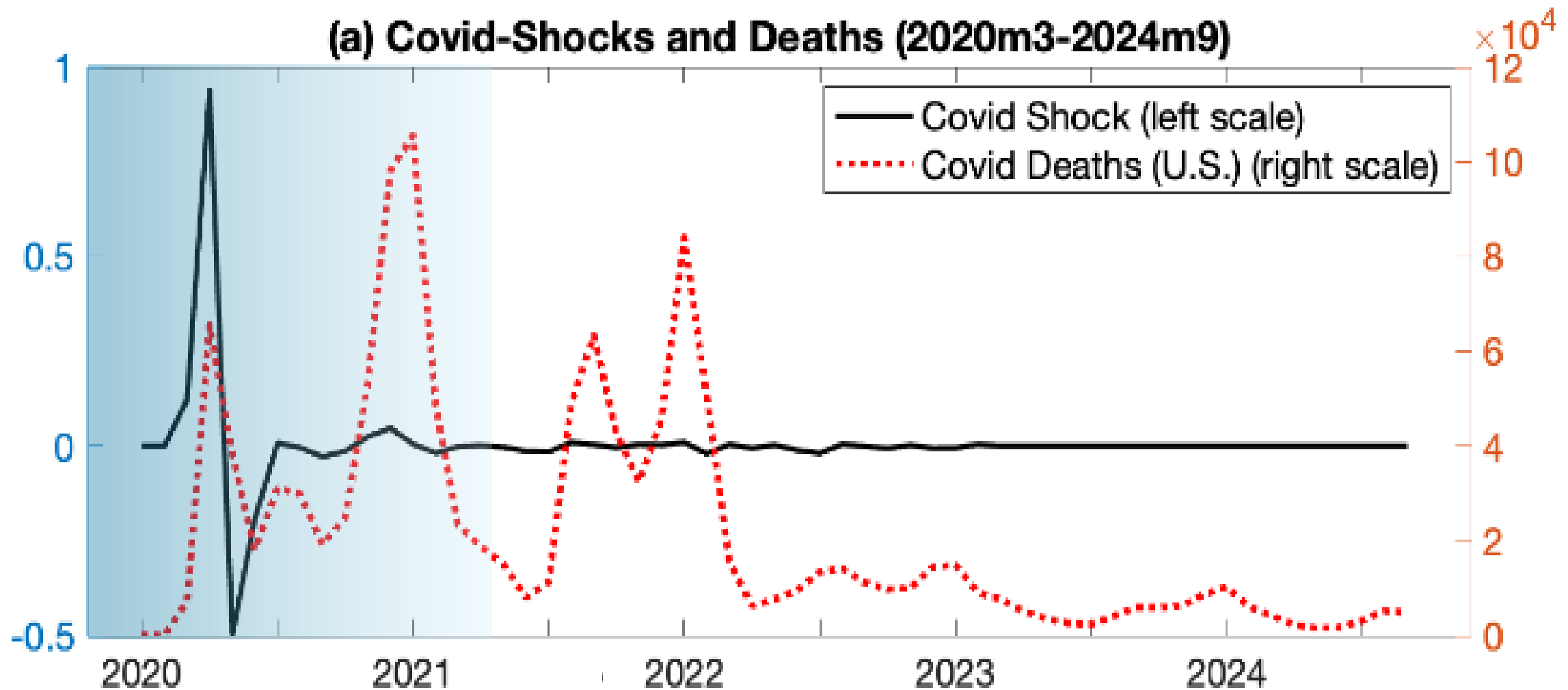
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 - Unexpected economic manifestation of/reaction to risk of severe illness or death from COVID
- Identification of COVID shock
- **Identify space of F shocks – but not individual shocks**
 - We'll see that fiscal shocks are in this space

Estimation

- Monthly, 128 real activity indicators (77 used for estimation), 1970m1-2024m9
- 2-step estimation, hold F coefficients and dynamics fixed over COVID (will test)

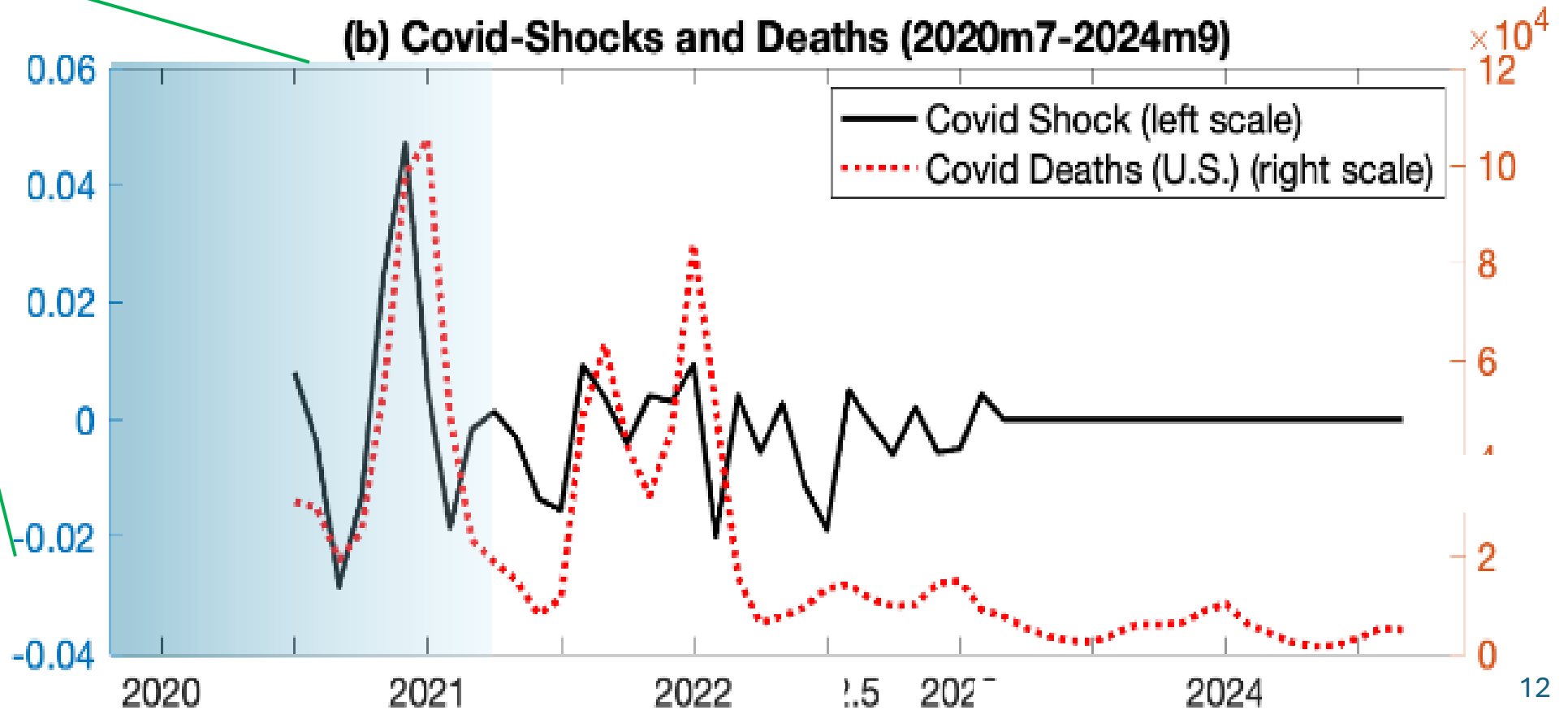
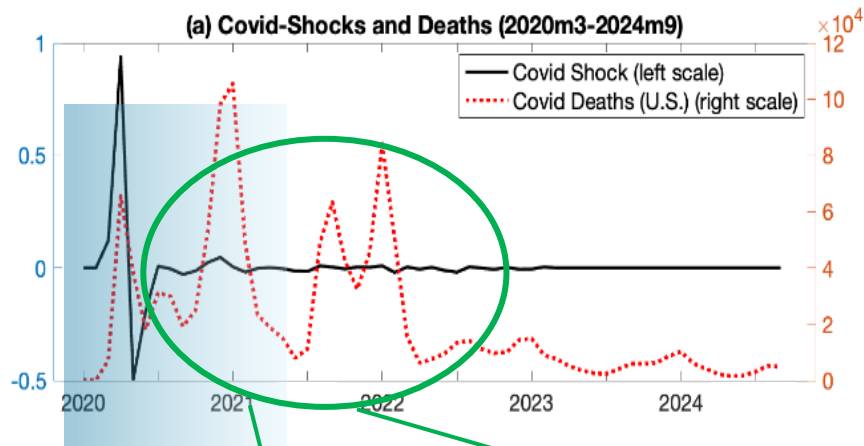
(a) Covid-Shocks and Deaths (2020m3-2024m9)



The COVID Shock & Deaths

Deaths/shock effect declines with COVID fatigue, vaccine

- Droste & Stock (2021), Atkeson & Kissler (*BPEA* 2024)

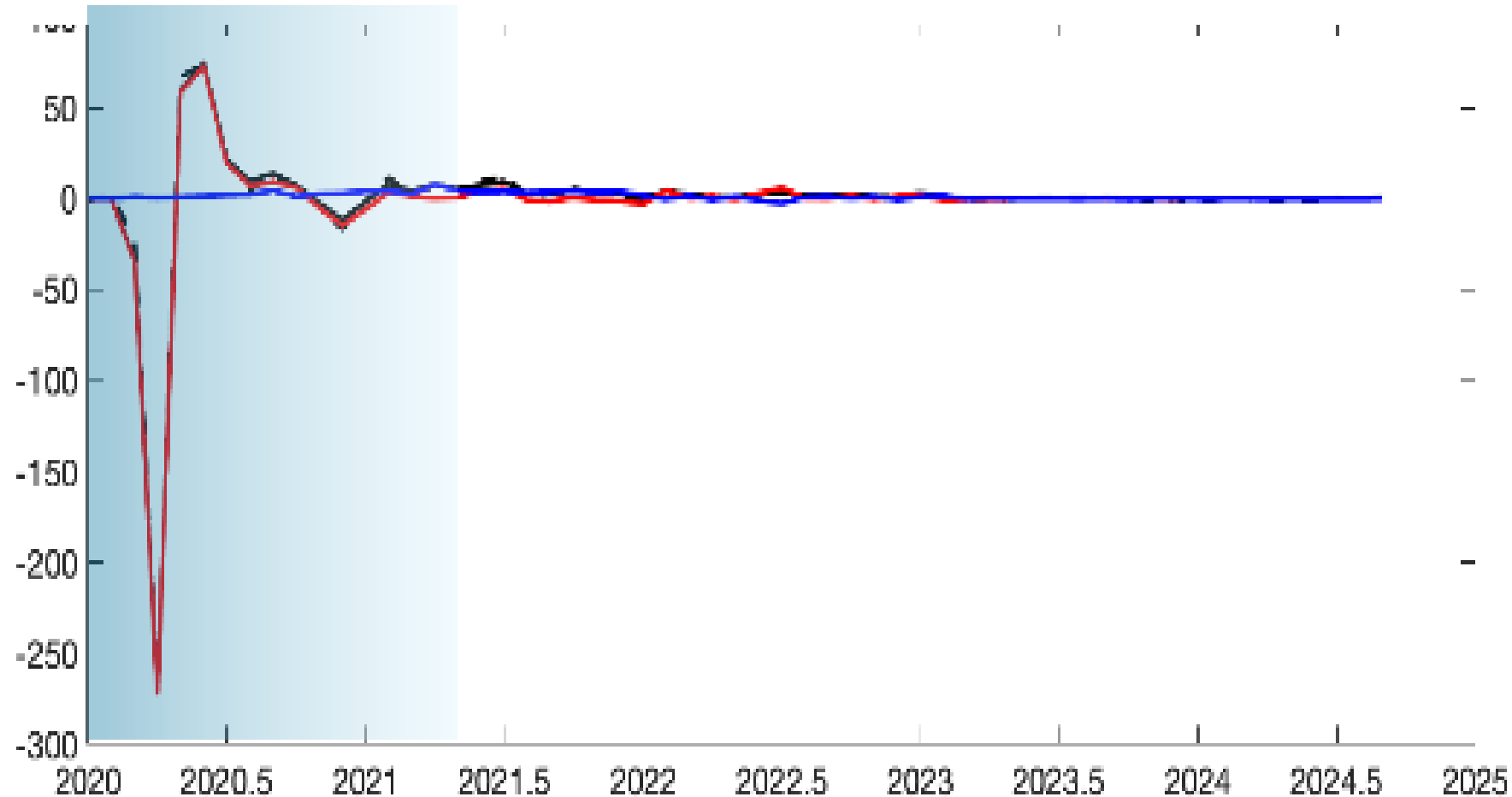


Historical shock decompositions into C and F Shocks

Employment: Accommodations and food services

$$Y_t = \Theta_{YF}(L)\varepsilon_t^F + \Theta_{YC}(L)\varepsilon_t^C + u_t$$

- C-shock component
- F-shock component
- F+C component
- - - Actual

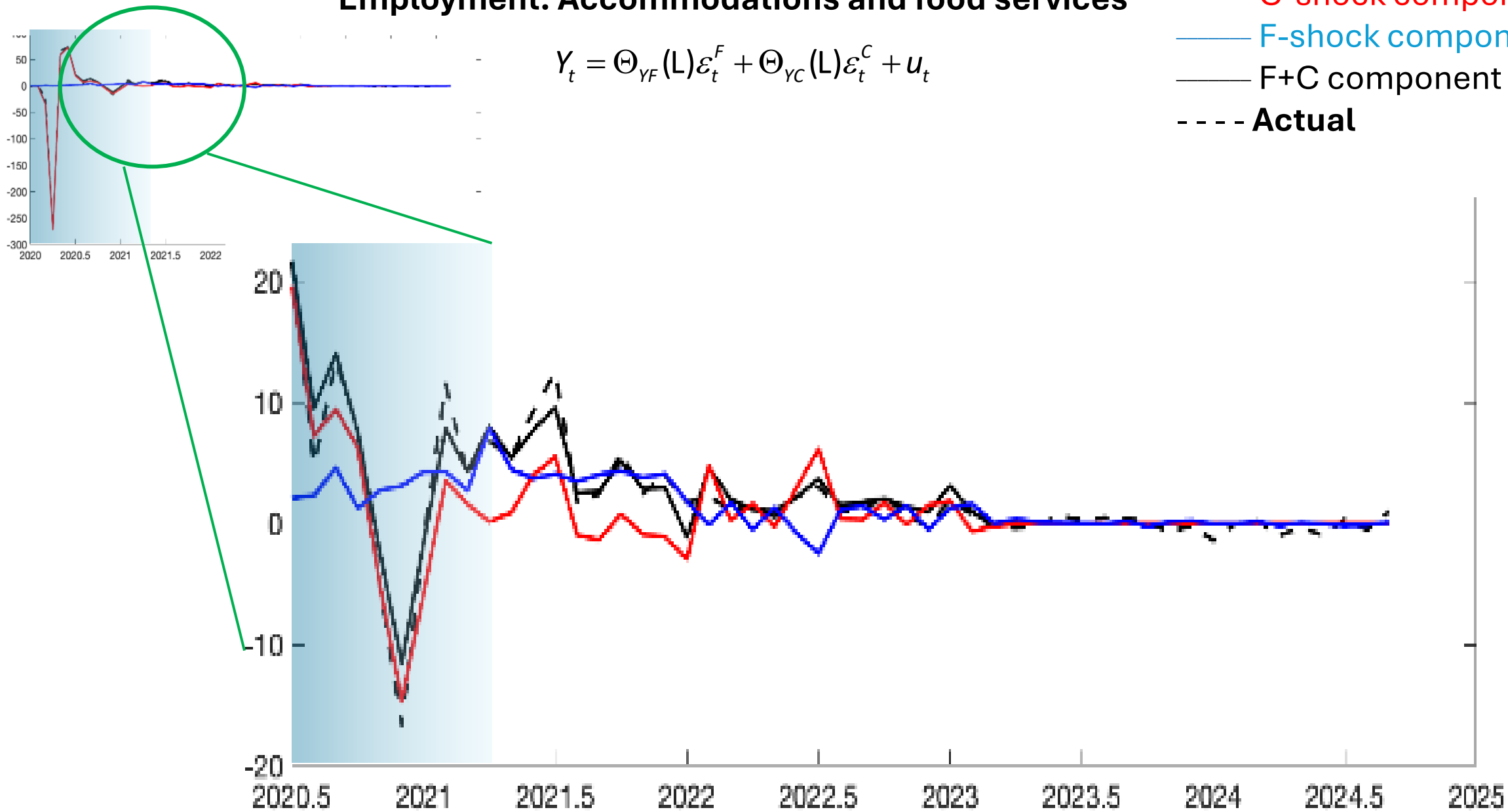


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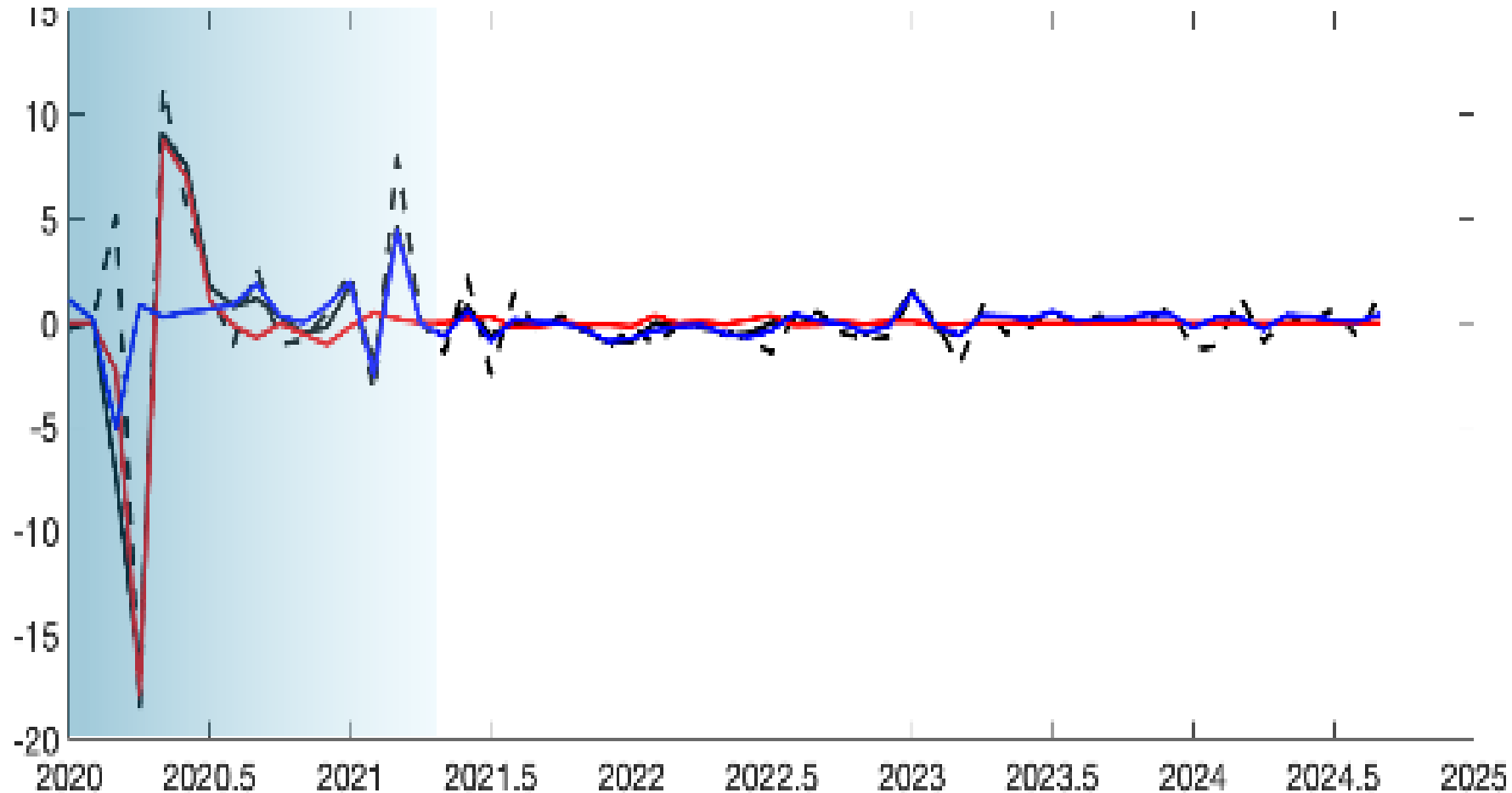


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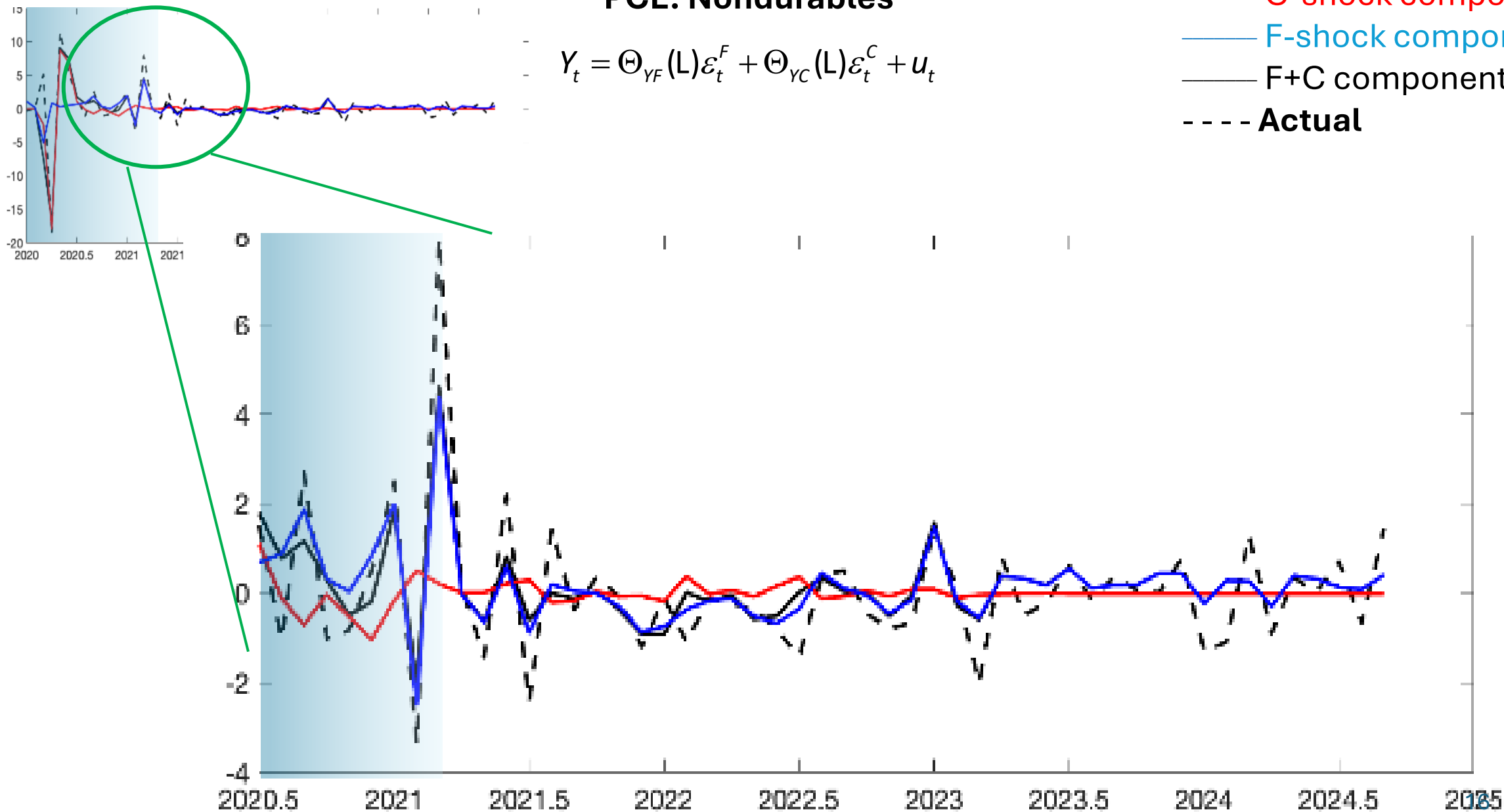


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Many structural changes.

Macro manifestations?

1. Macrodynamics

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2. Long-term sectoral shifts?

- Levels (shares)? 
- Change in overall growth rate?

Deviation from 2007:IV-2019:IV trend, logs

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GDP	0.024	0.55
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Employment – Manufacturing	0.039	0.41
Employment – Acc. & food services	-0.085	-1.96

Digging into recovery dynamics: the 5 anomalies

- i. Speed & depth of contraction
 - ii. Sectoral shift
 - iii. Exceptionally large transfers
 - iv. **Speed of recovery**
 - v. **Trend reversion**
- } well-explained by epi-ec literature, NPIs, self-protection

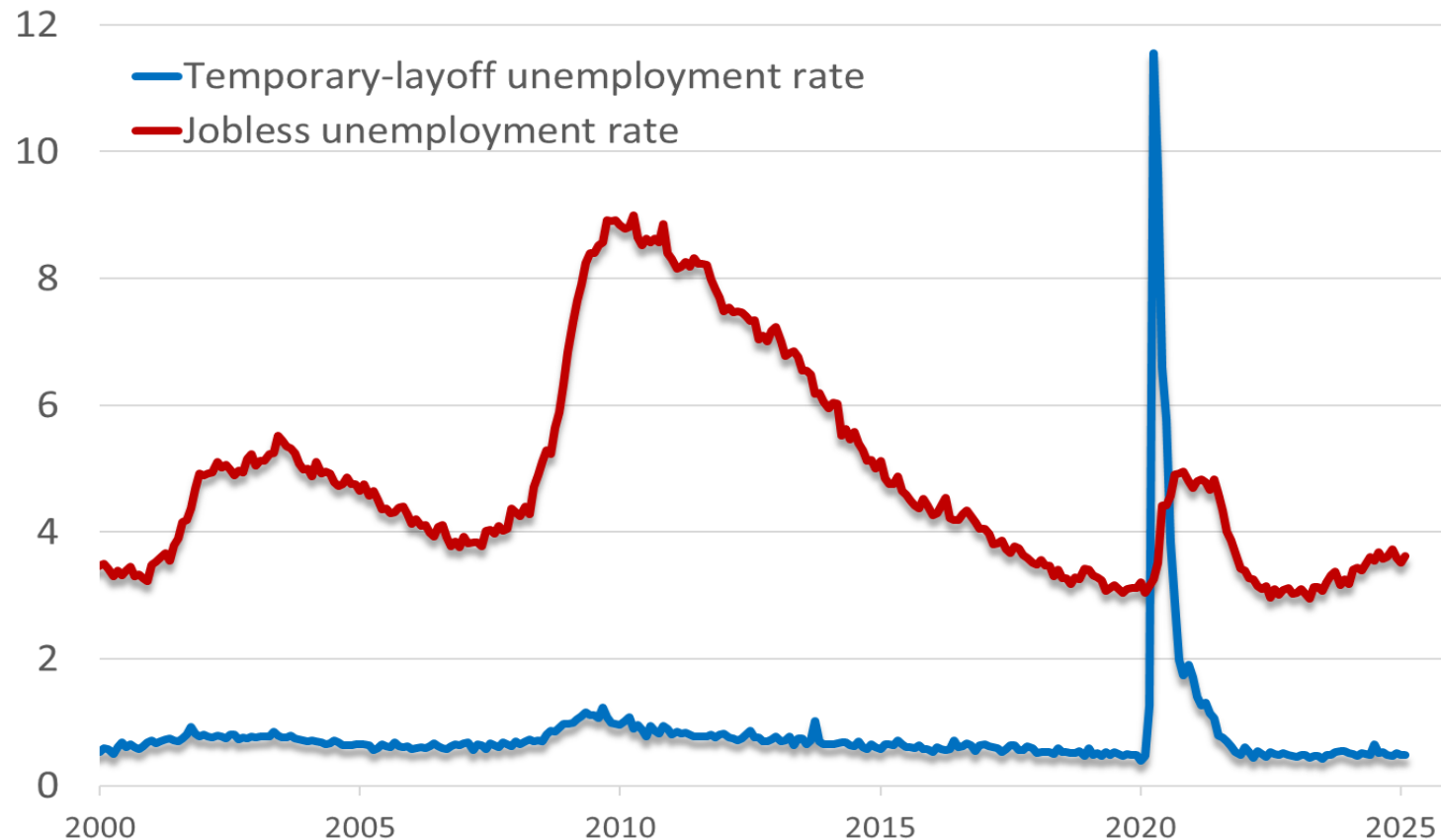
Any lessons?

Potential explanations for the fast recovery & trend stationarity

1. Prevalence of temporary layoffs

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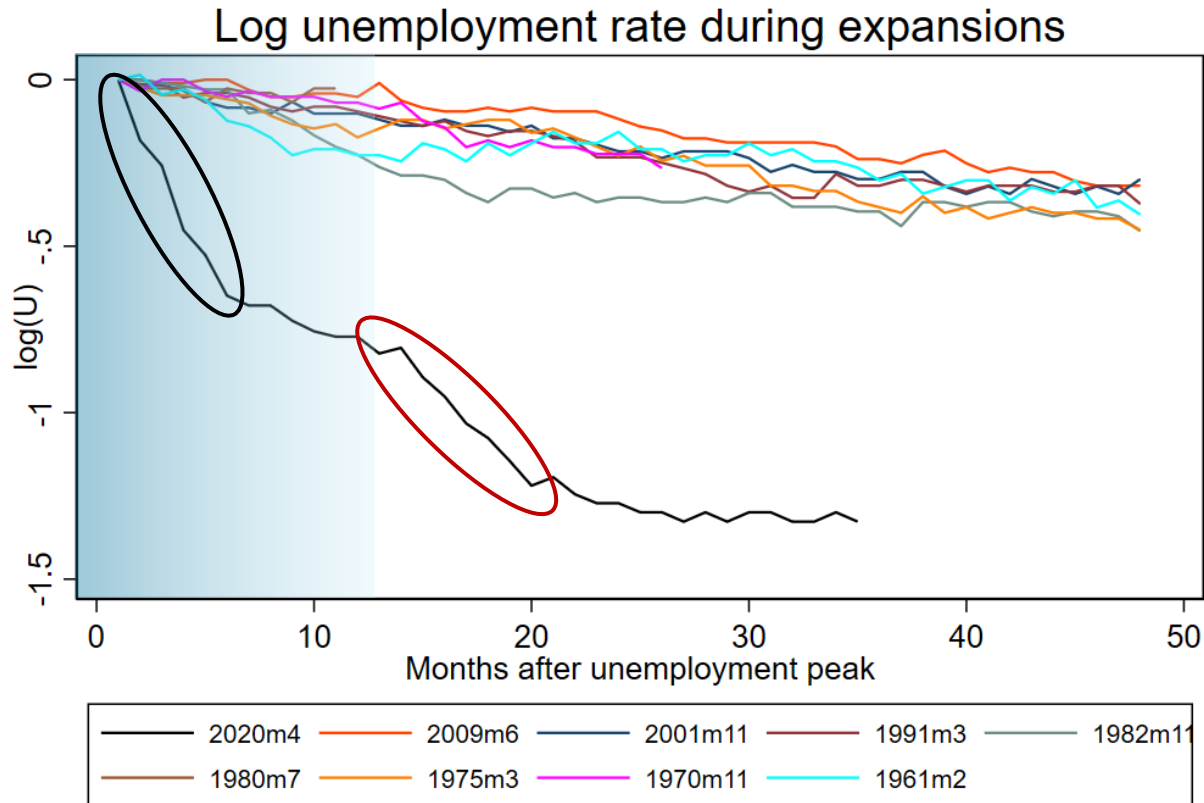
Hall and Kudlyak (2022): The Unemployed With and Without Jobs



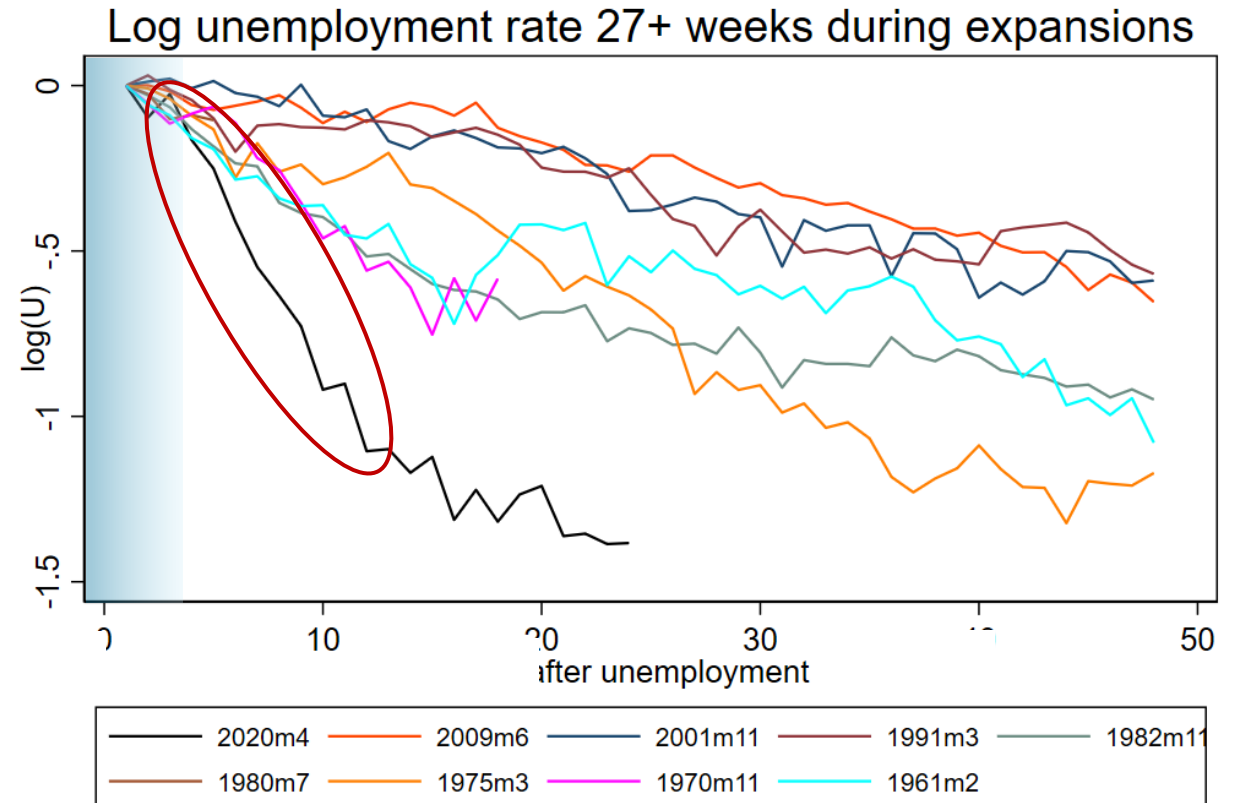
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Set to zero at series peak within NBER-dated expansions. See Hall & Kudlyak (2021, 2022abc).

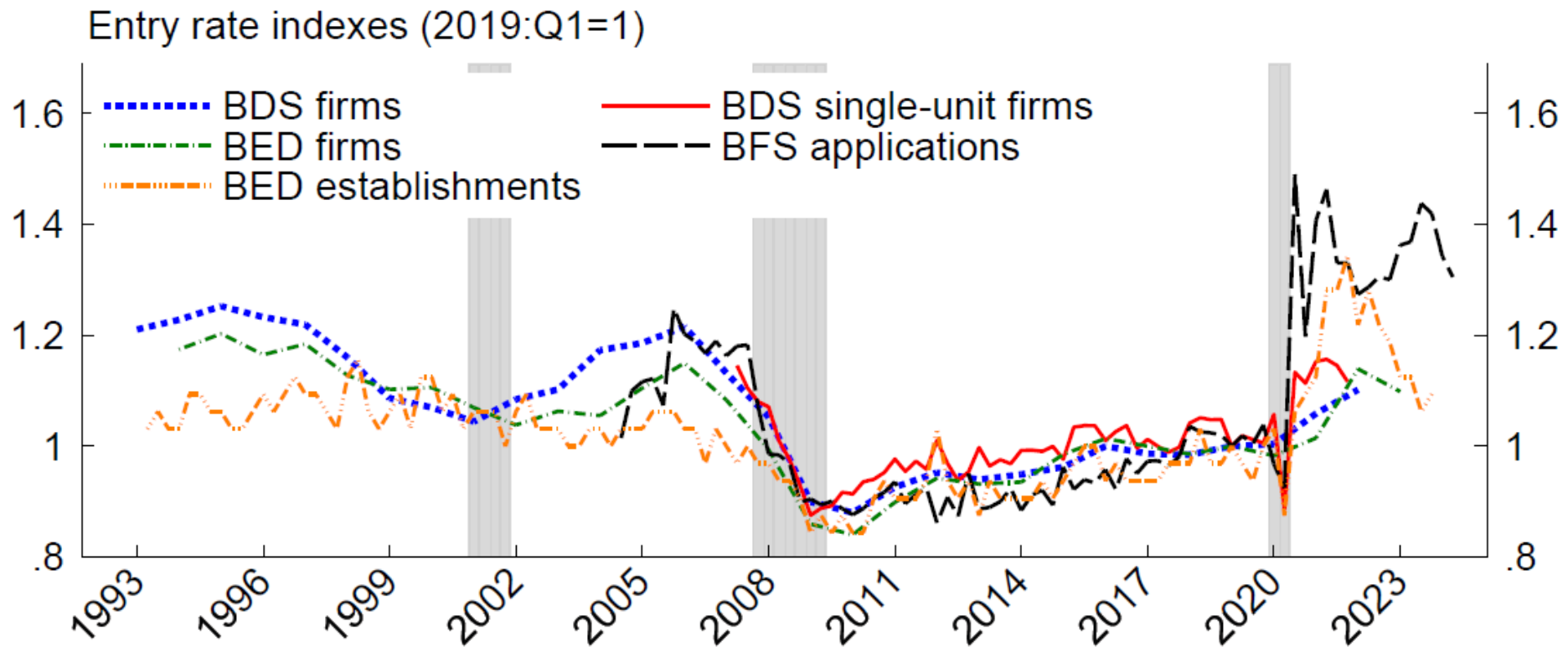


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Note: Unemployment rate 27+ peaked March 2021

Potential explanations for the fast recovery & trend stationarity

1. Prevalence of temporary layoffs
2. **Surge in new business formation**
 - Decker-Haltiwanger (*BPEA* 2023, update 2024)
 - Availability of new WFH technology (Zoom)

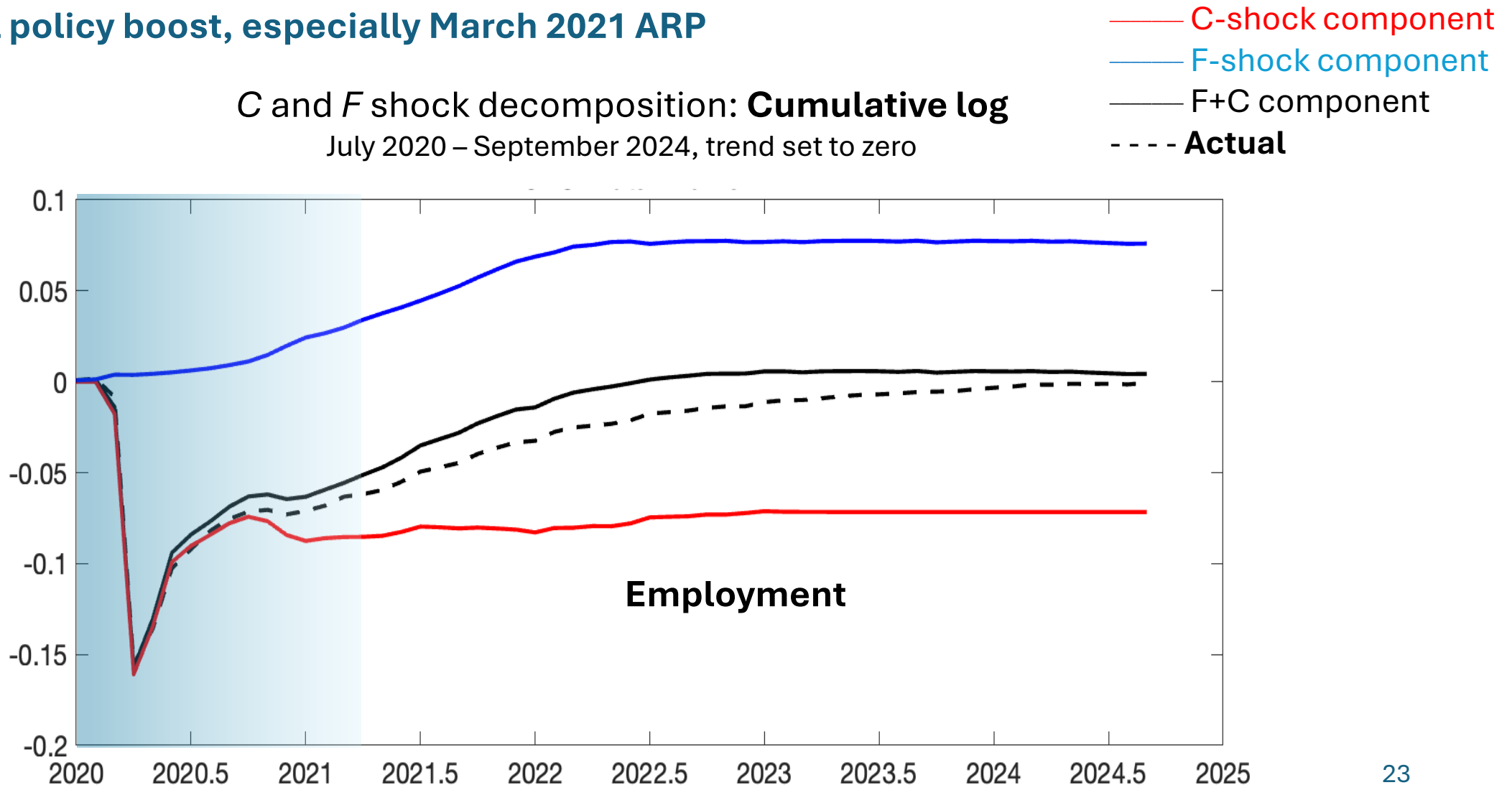


Source: Decker &
Haltiwanger (2024)

Note: BDS and BED annual firm births are age-0 firms as of March. BFS applications are likely employers (HBA). All series expressed as rates except BFS. Quarterly series are seasonally adjusted. Gray bars indicate NBER recession dates (2001:Q1-Q4, 2007:Q4-2009:Q2, 2020:Q1-Q2).
Source: Business Dynamics Statistics, Business Employment Dynamics, Business Formation Statistics.

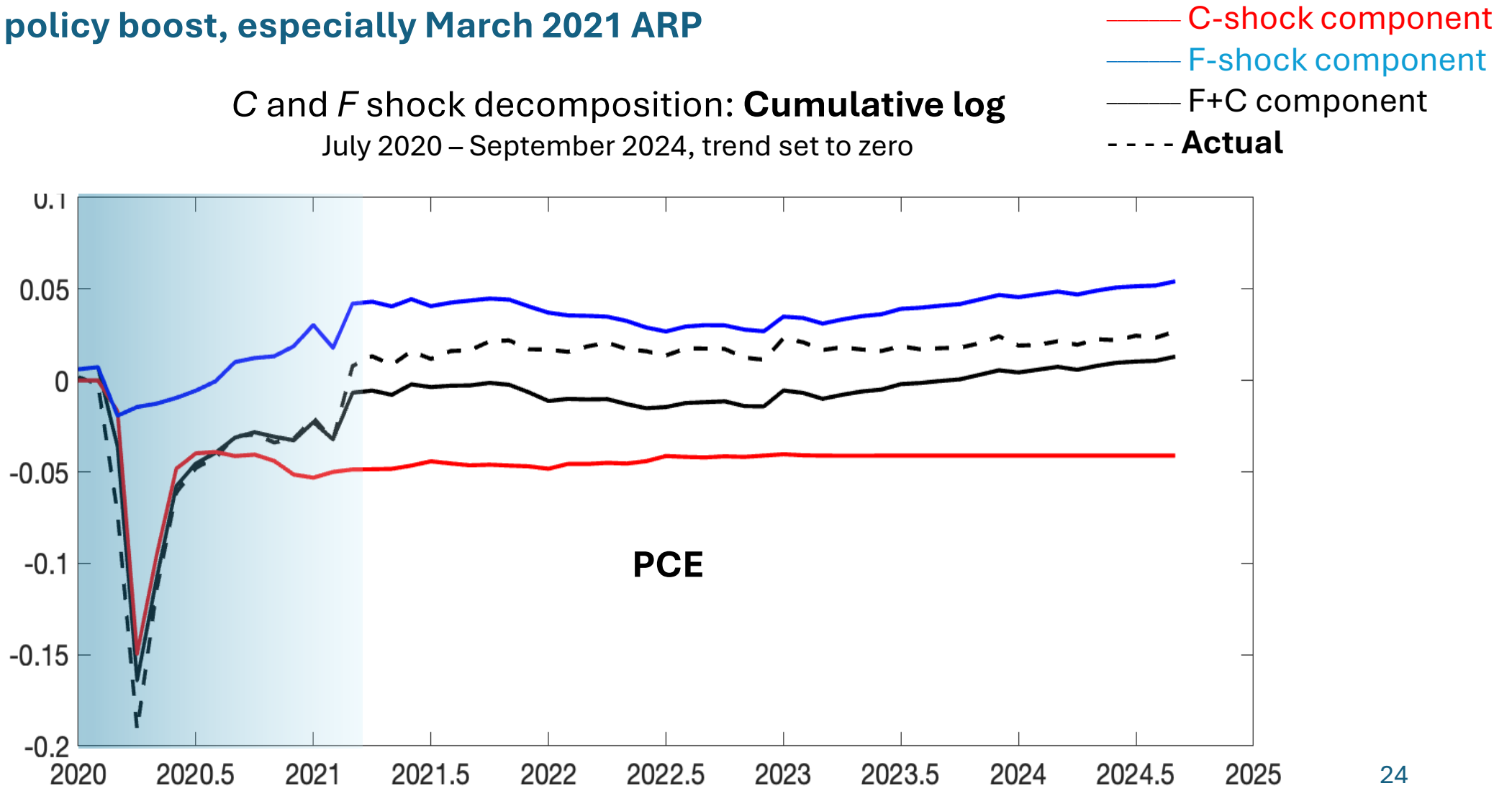
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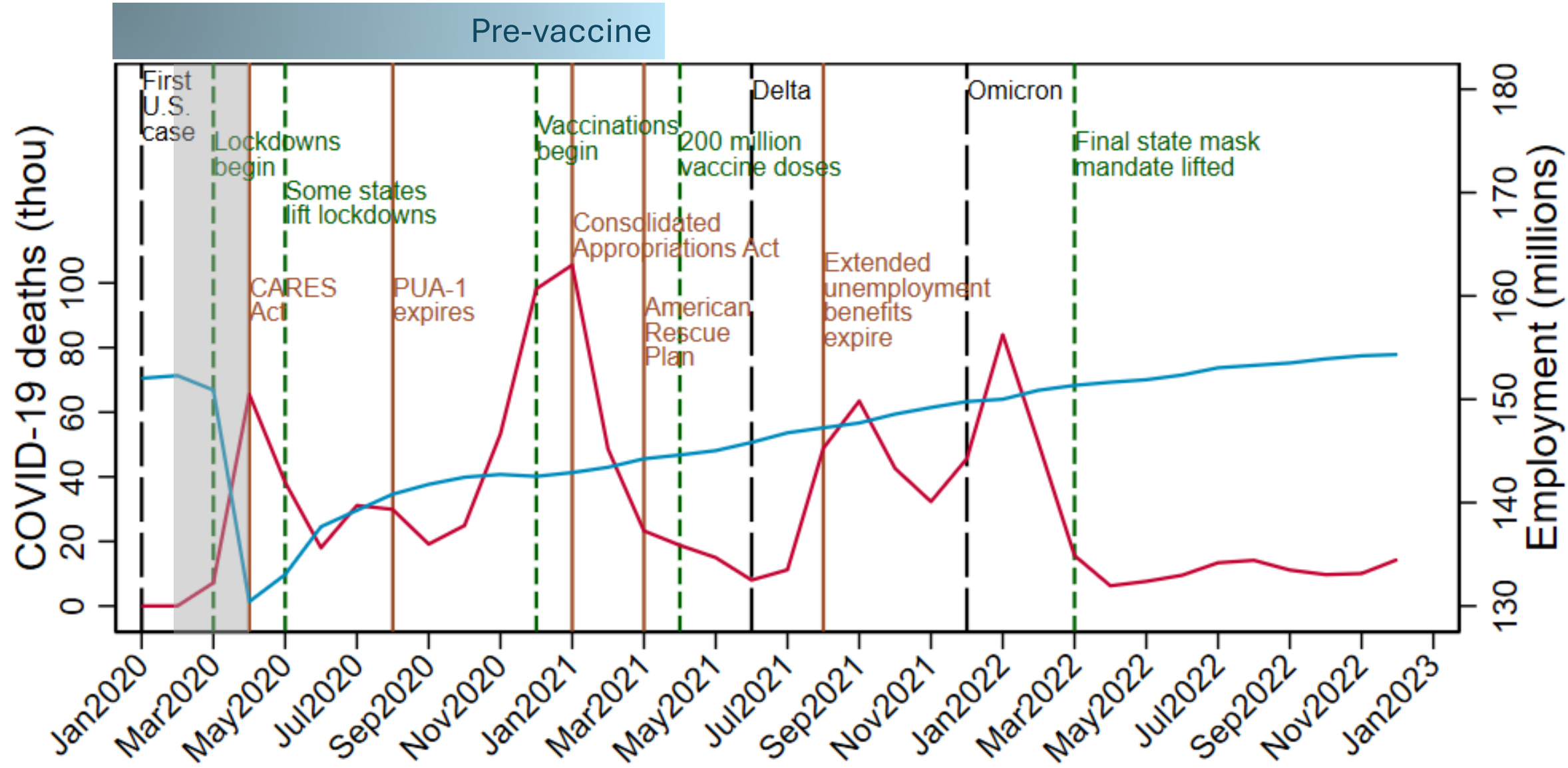


Lessons?

1. Resilience and flexibility + back to normal macrodynamics
2. Fast recovery I: Temporary layoffs
 - Most of the rehiring was natural response to re-openings, NPIs, adjusted work arrangements
 - PPP rehiring effect: ~3% (0-5%) boost in rehiring at eligible firms (~1-2pp aggregate effect)
3. Fast recovery II: March – Sept. 2021
 - Fiscal stimulus
4. Trend reversion
 - ~1/3 to 1/2 of the trend reversion is attributed to conventional shocks i.e. fiscal stimulus

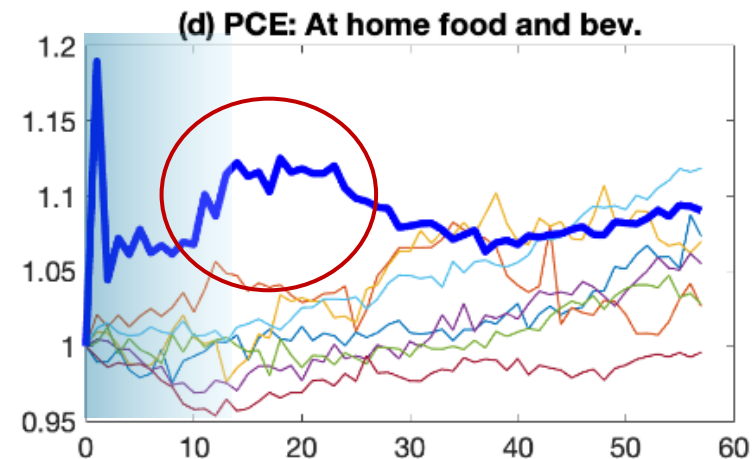
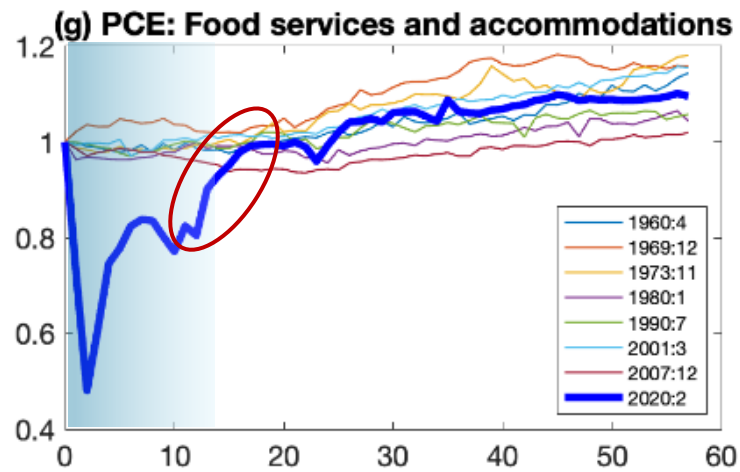
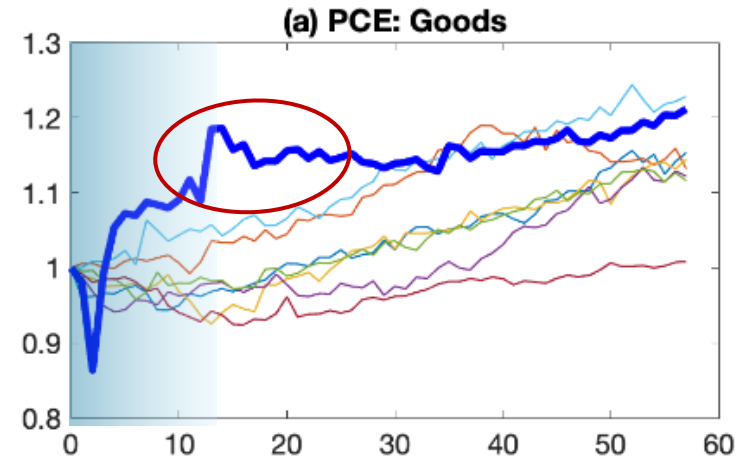
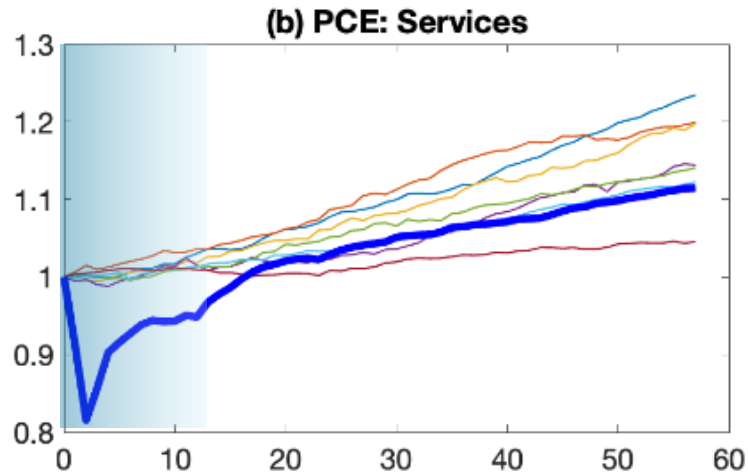
Bonus Slides

COVID Timeline



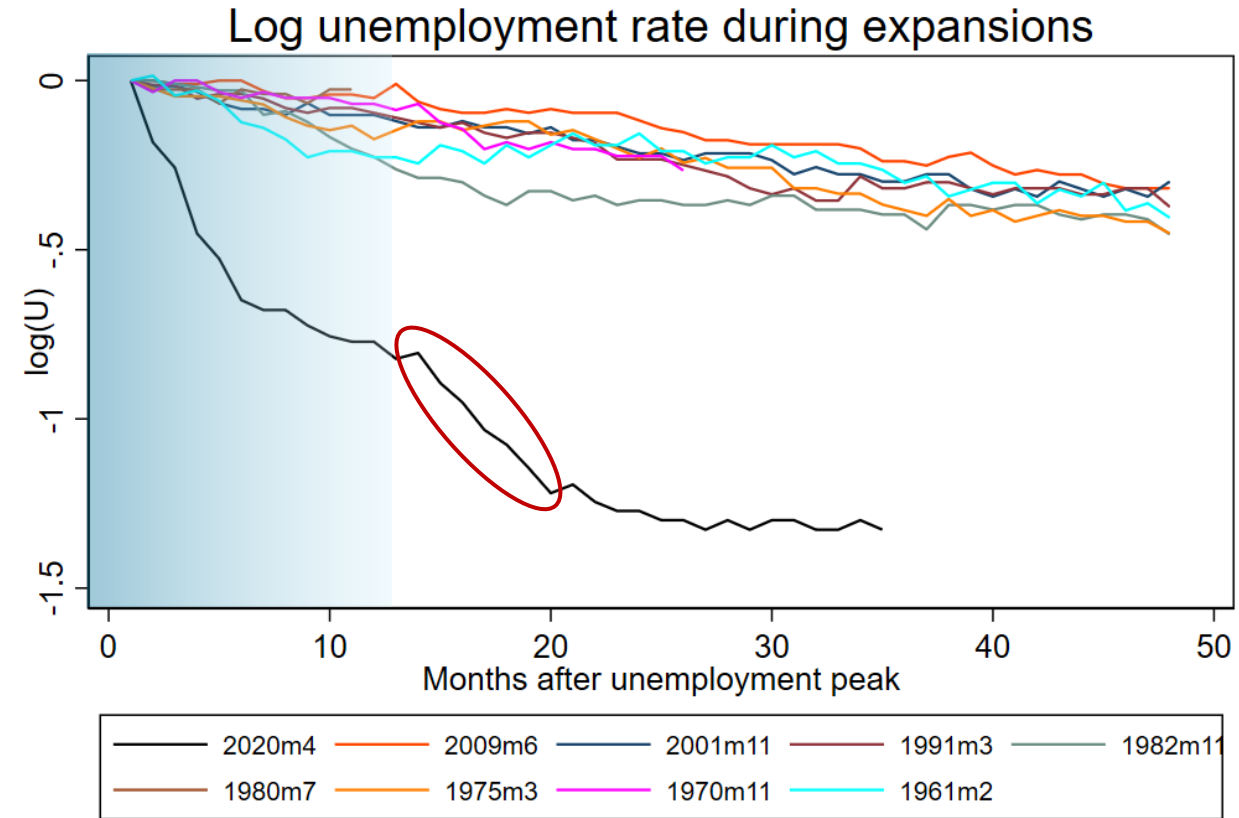
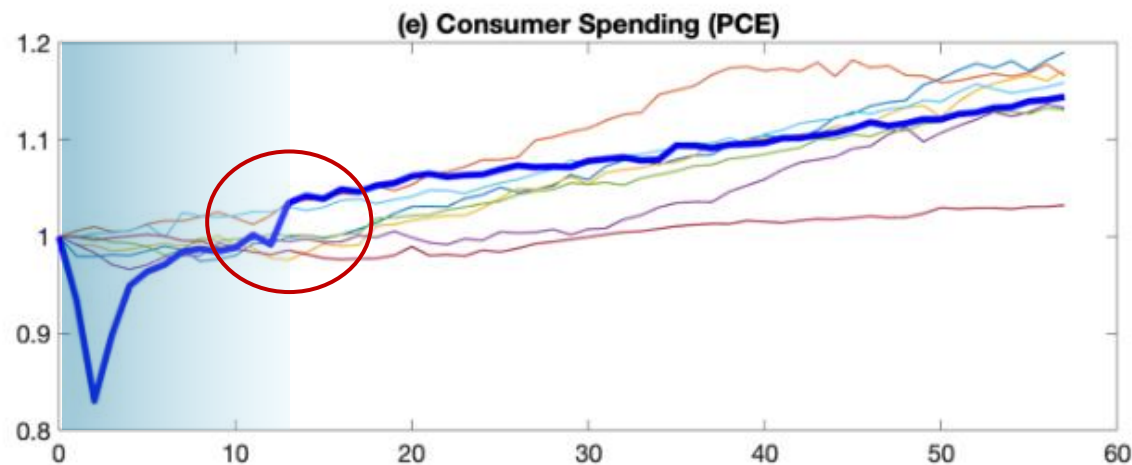
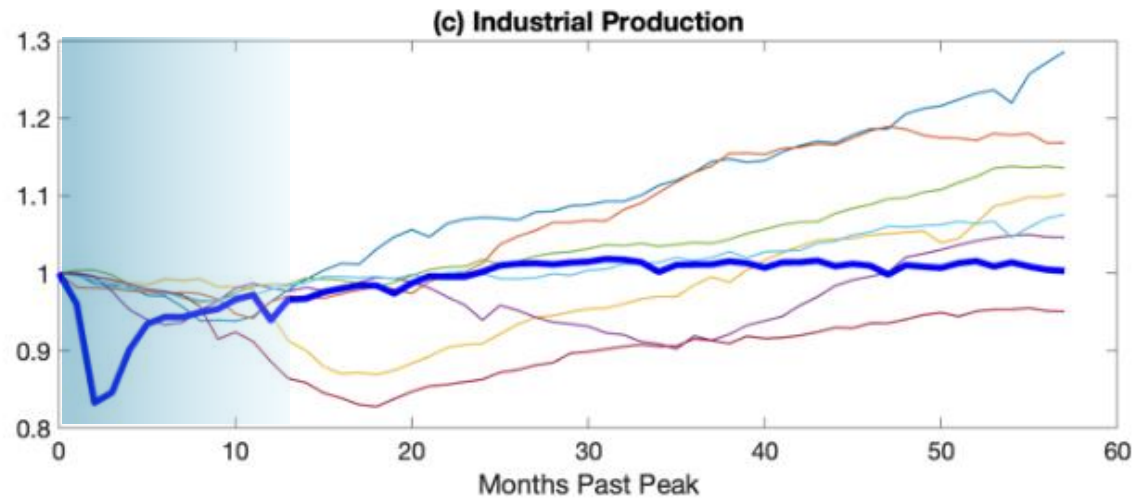
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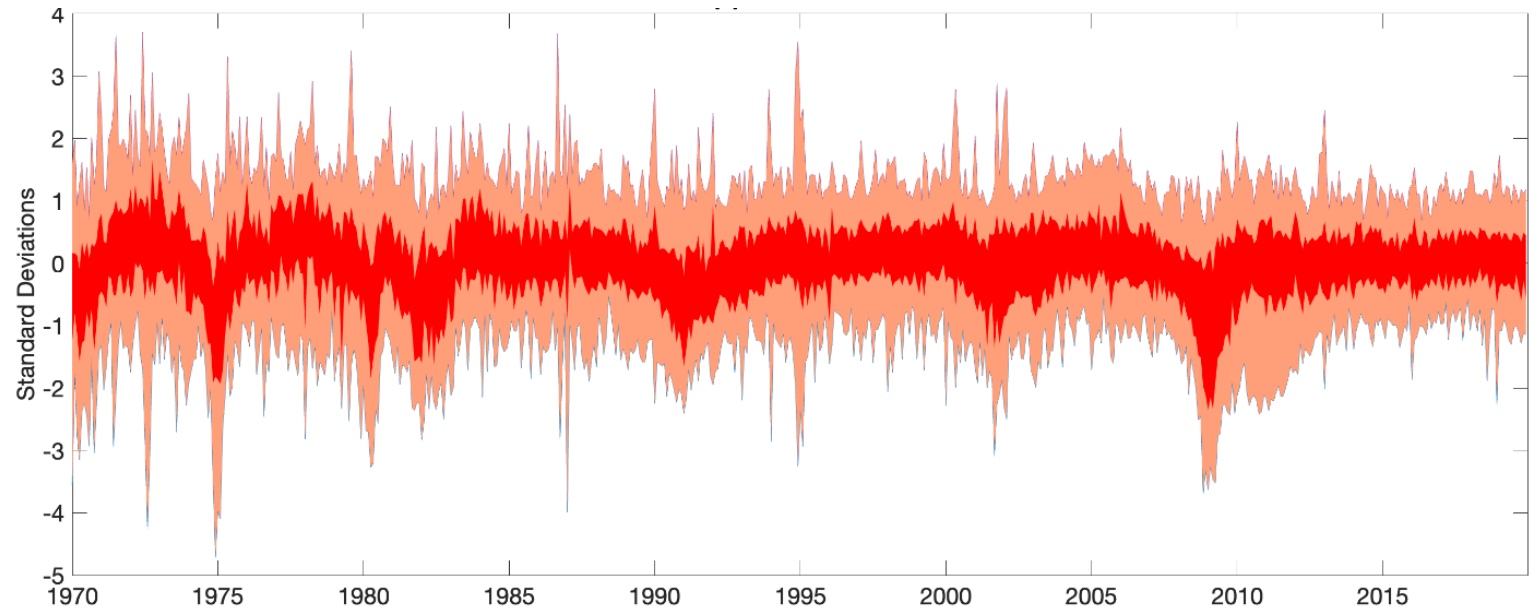
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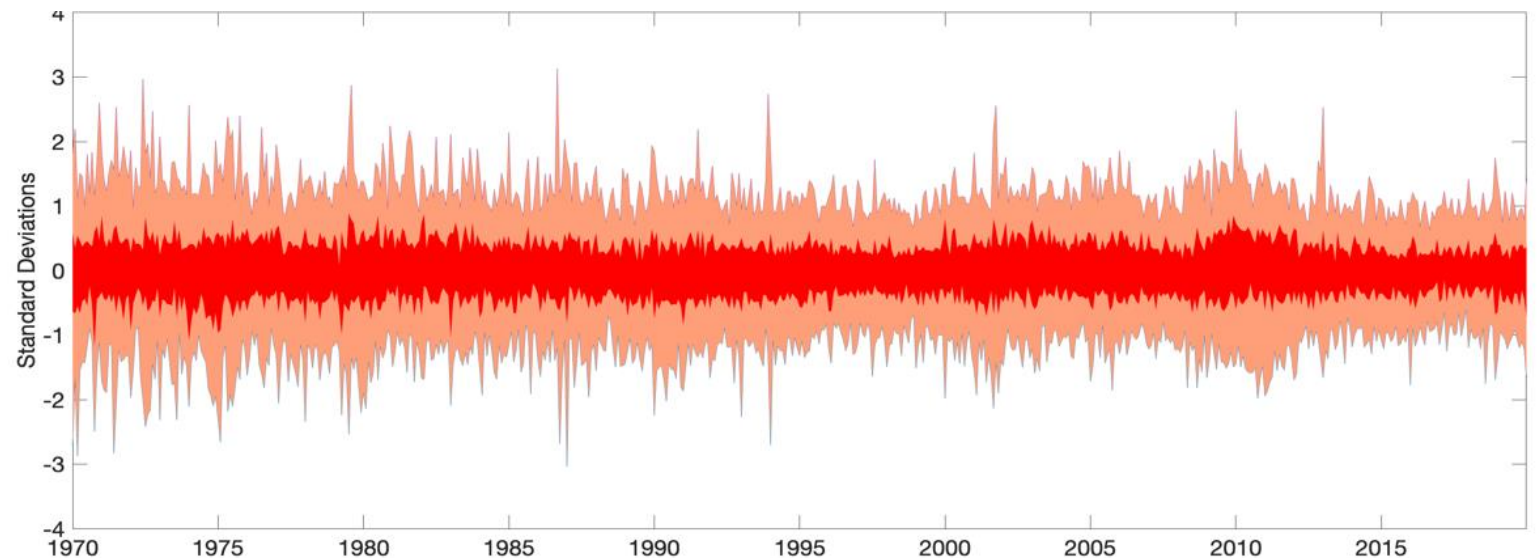
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Pre-COVID Cross-Sectional 5%, 25%, 75%, 95% Quantiles of 128 monthly time series

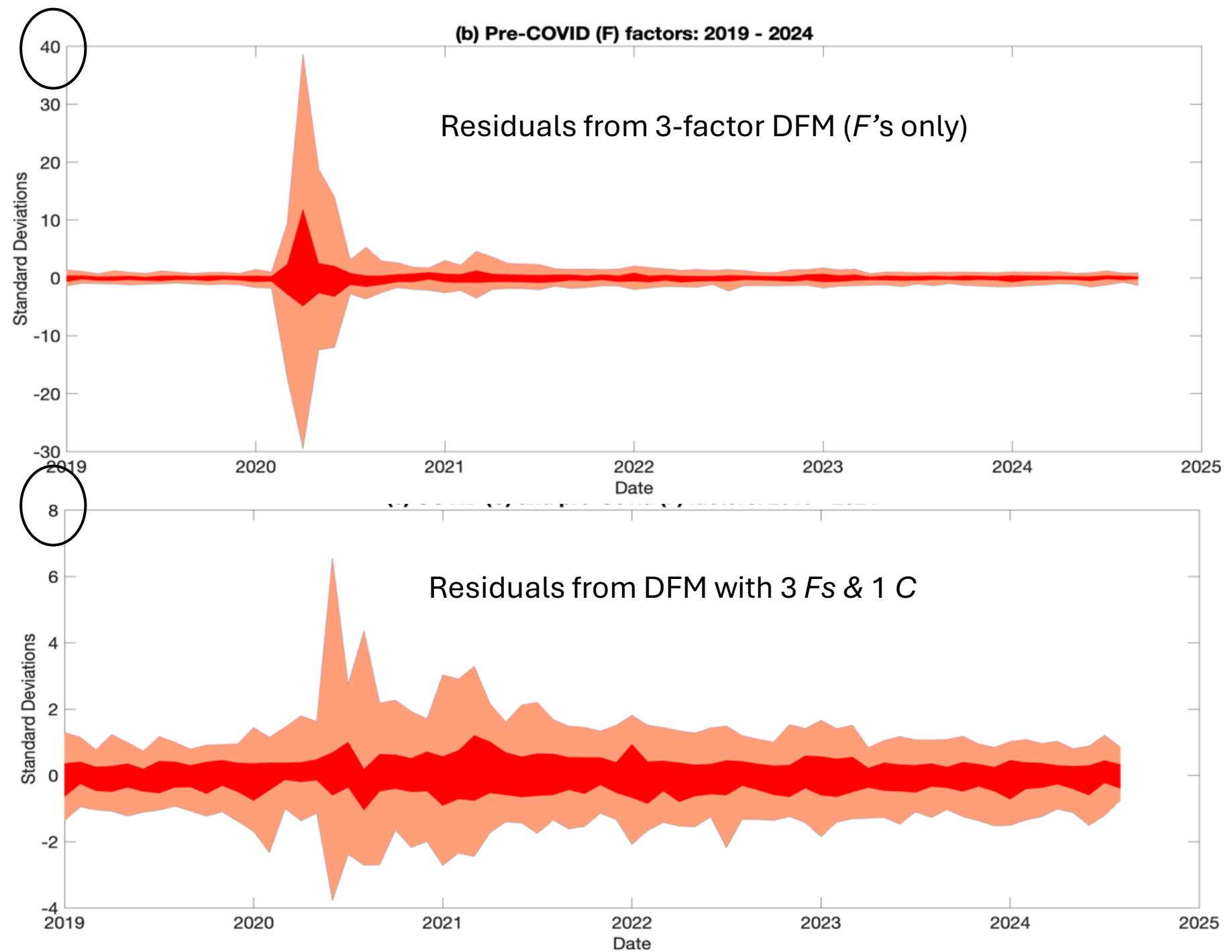
Standardized data
(mainly growth rates)



Residuals from
3-factor DFM
(F 's only)

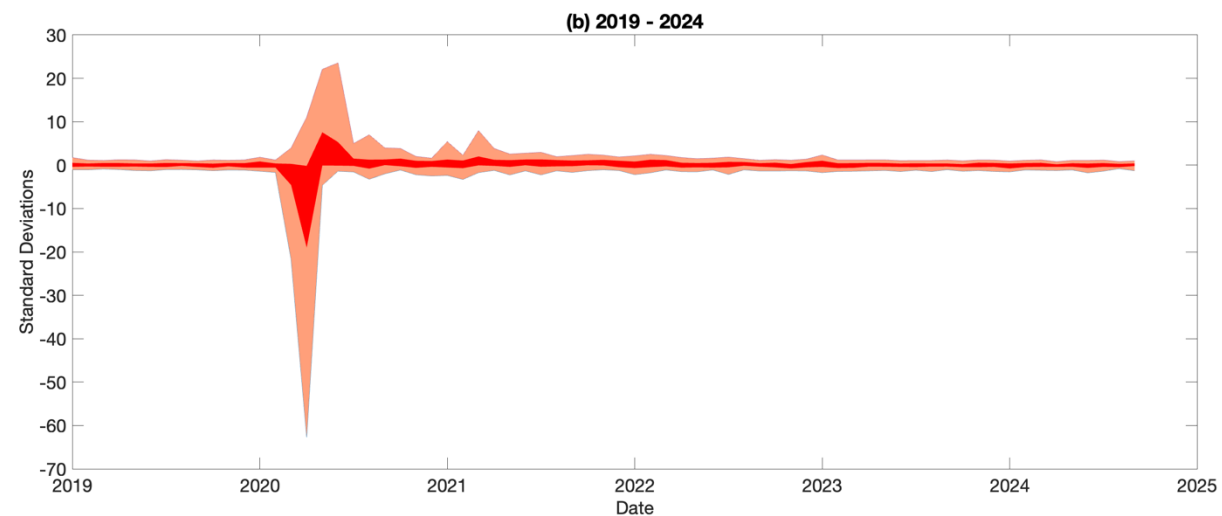


Cross-sectional quantiles during COVID

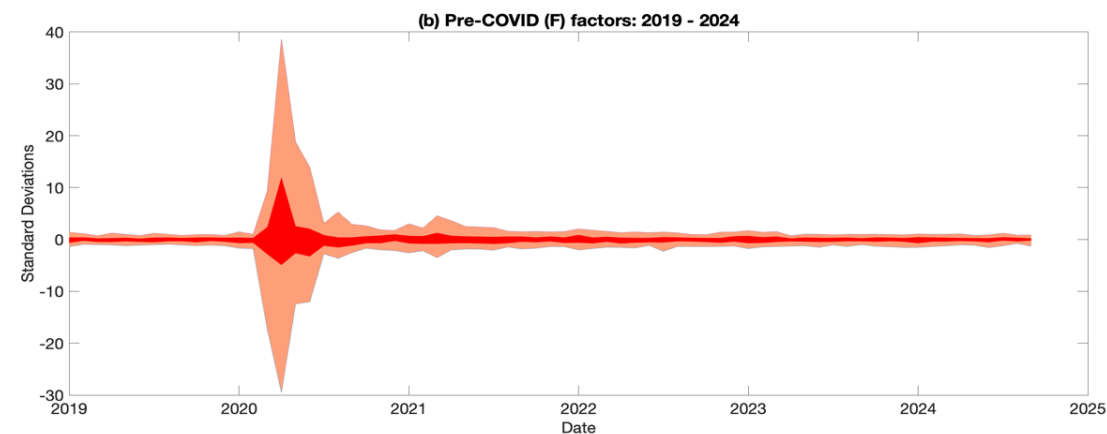


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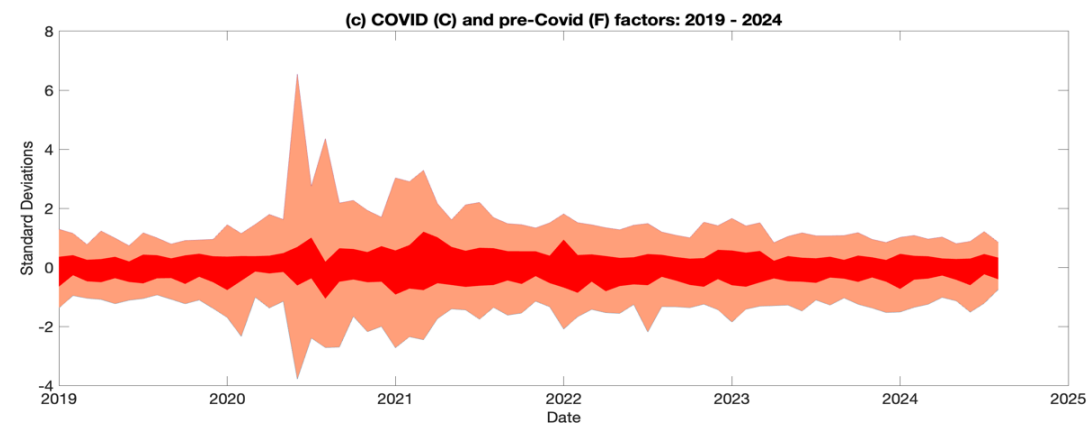
Standardized data (pre-COVID standard deviations)



Residuals from 3-factor DFM (F 's only)



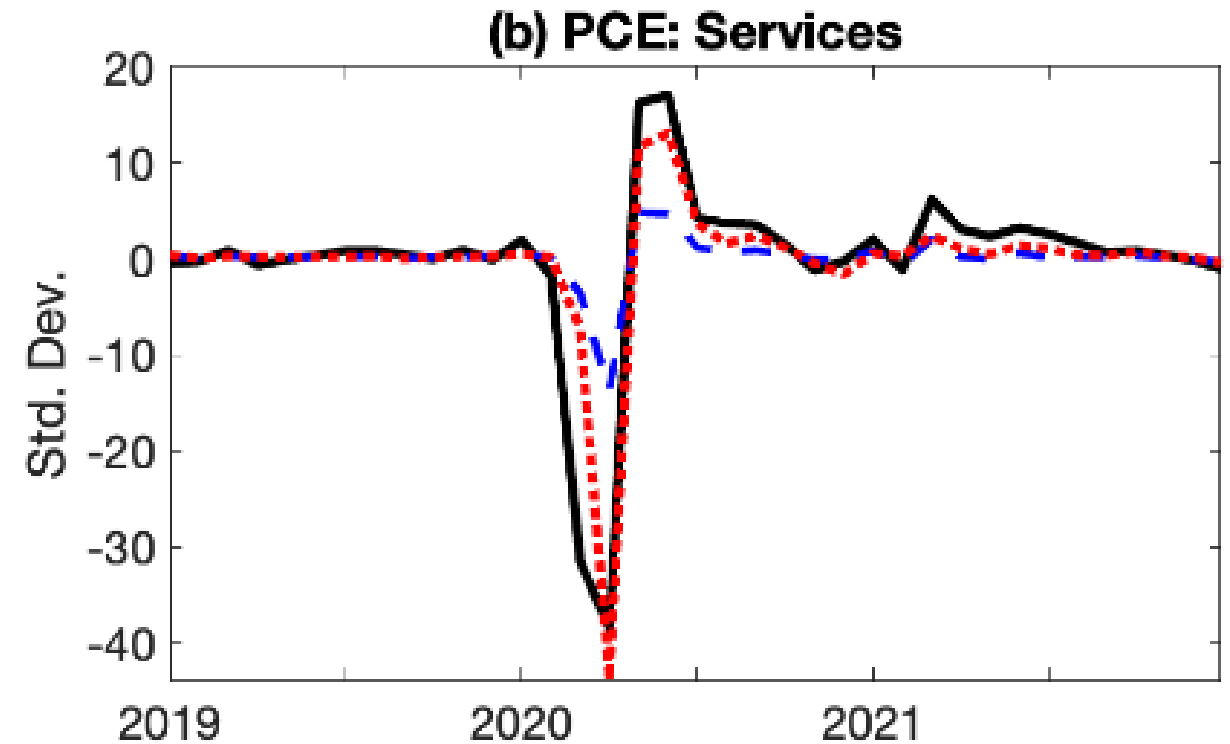
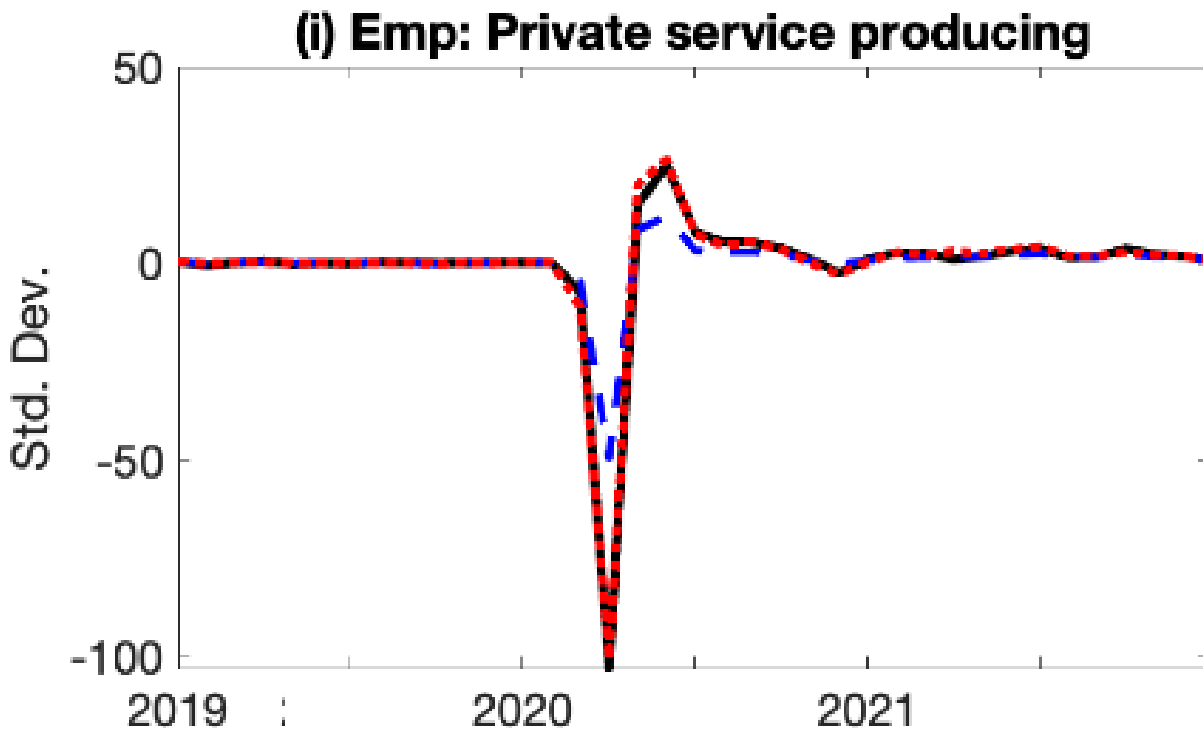
Residuals from DFM with 3 F s & 1 C



DFM: Improvement of fit from COVID factor

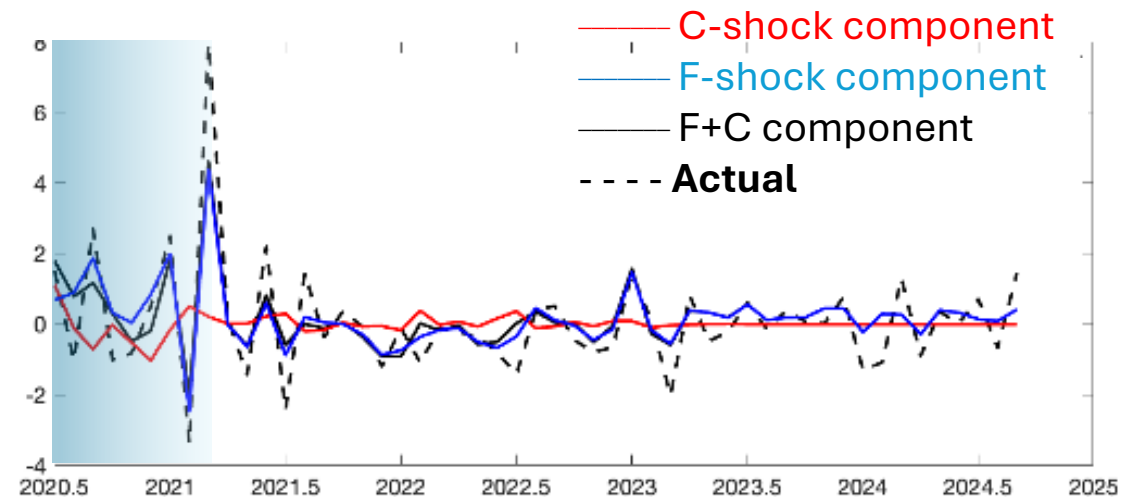
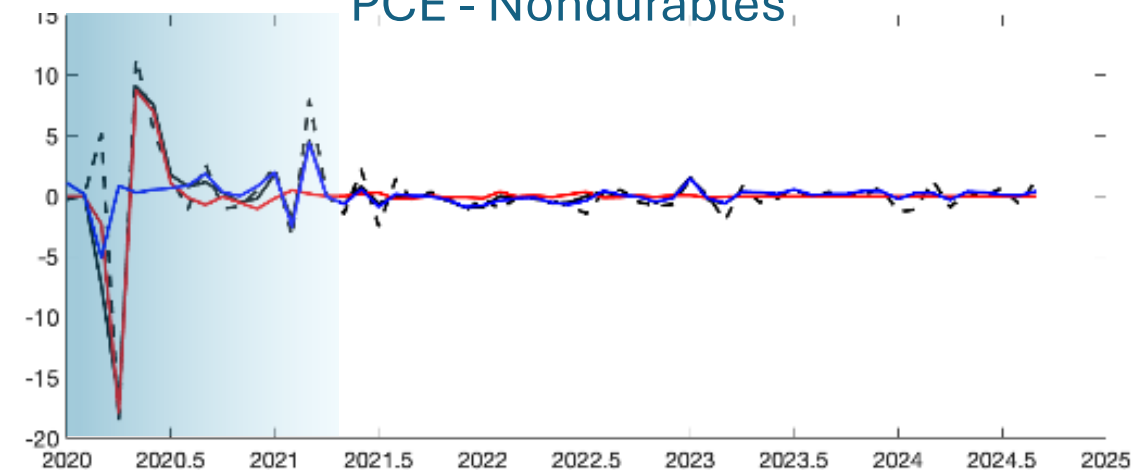
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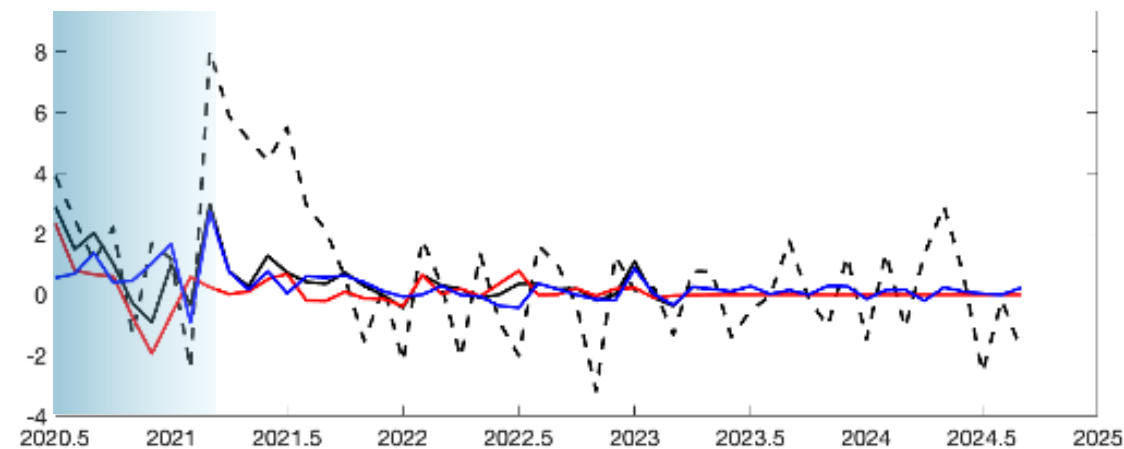
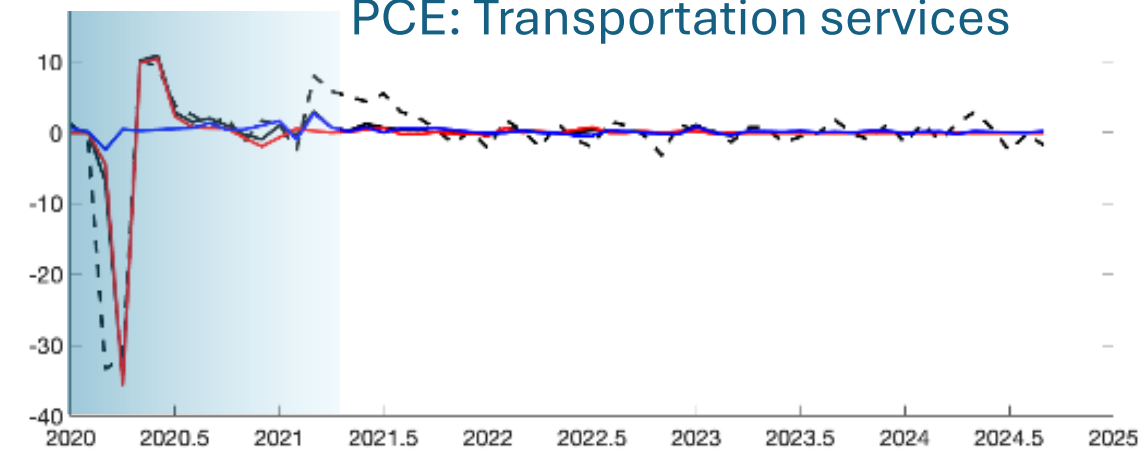


Historical decompositions: Contribution of COVID & Conventional (F) Shocks

PCE - Nondurables



PCE: Transportation services



Did the macroeconomy catch Long COVID?

Many structural changes:

- Long COVID & LFPR
- Early retirements
- Remote work
- Gig work

Macro manifestations?

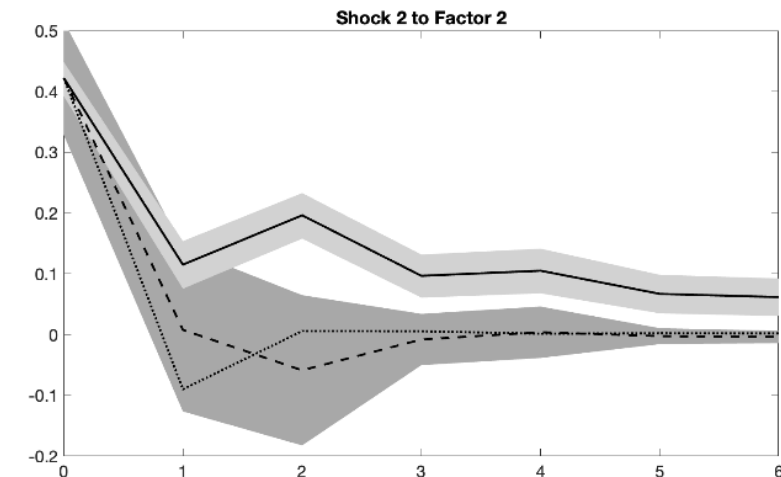
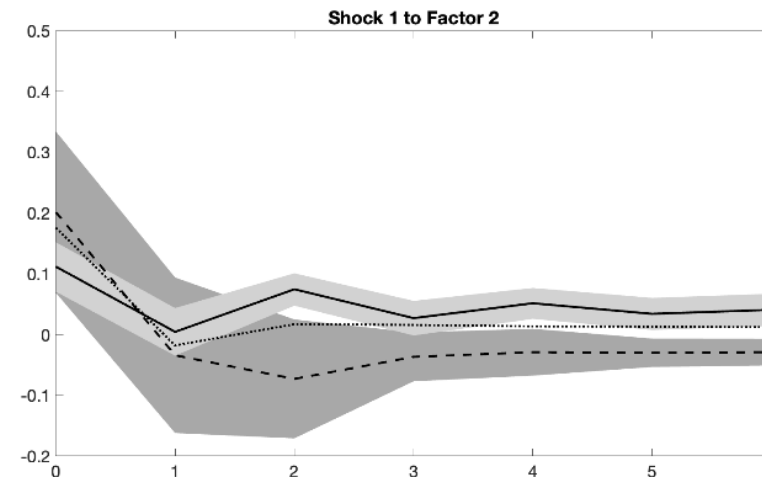
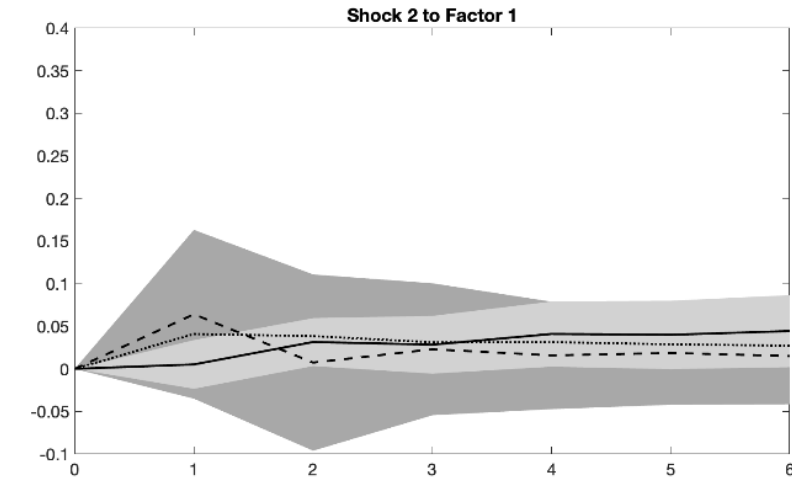
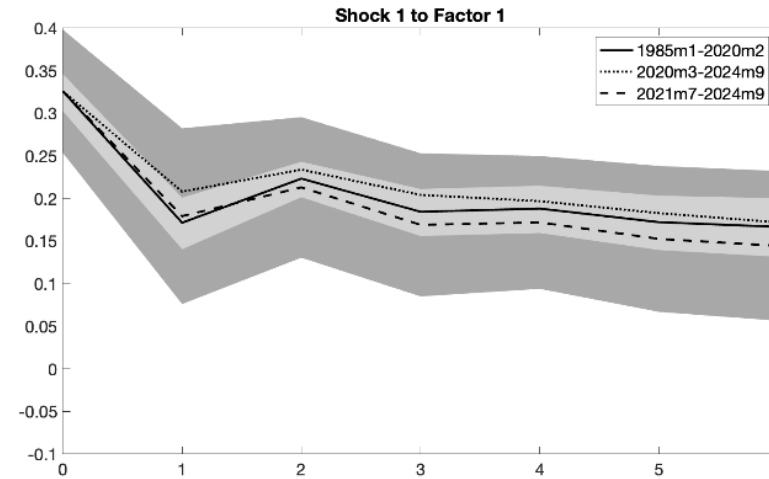
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IRFs for 2 F VAR(2): pre-COVID & COVID

Cholesky factorization



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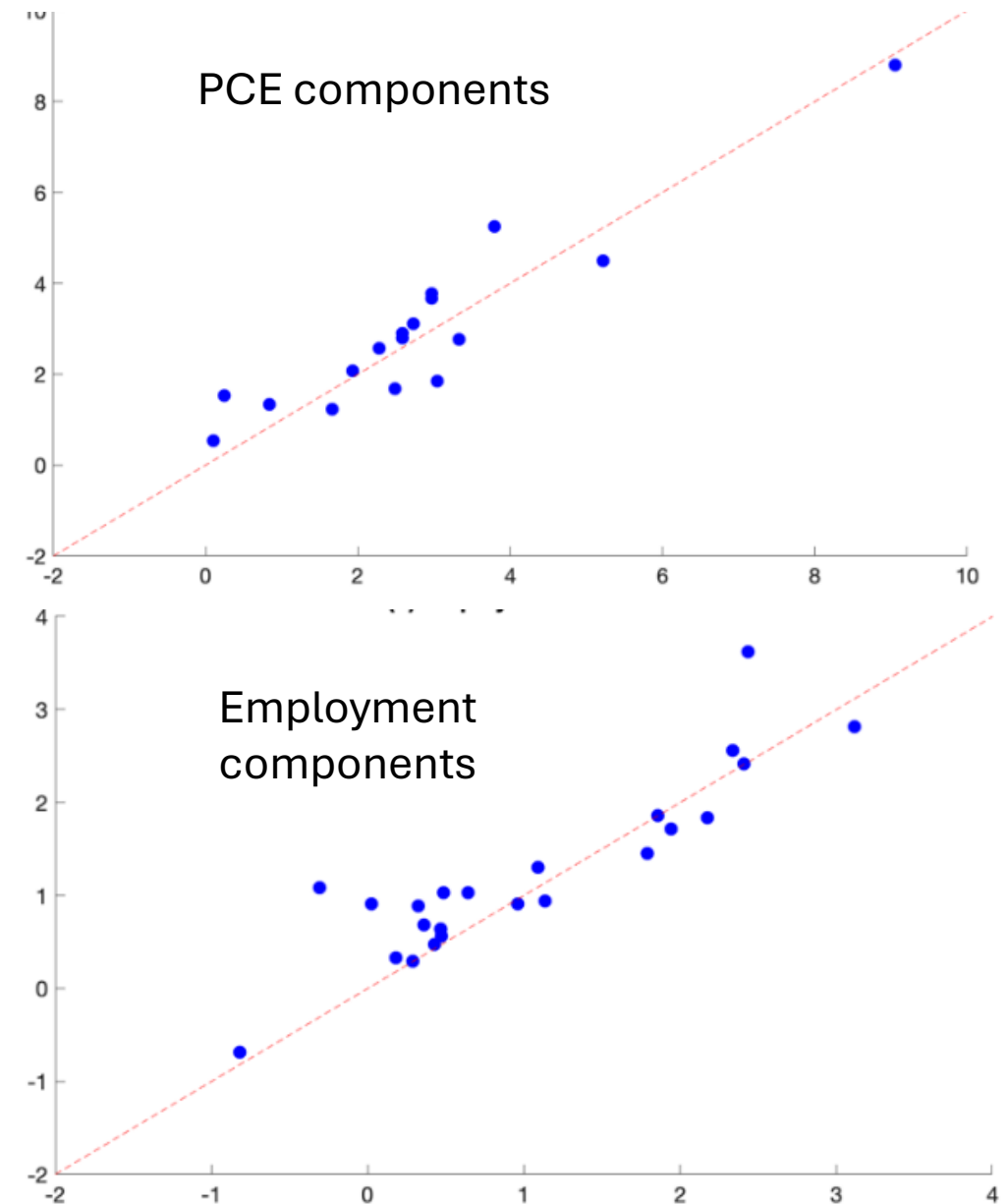
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Sectoral Growth in
2024:III v. 2019:IV
One-sided smoothed
with 45° line



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