

# LECTURE 5. BUSINESS CYCLES AND INEQUALITY

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*Bonn Summer School: The Macroeconomics of Inequality  
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# Overview

- Objective: understand the roles of recessions (macro event) on inequality trends in US
- Context: a labor force participation theory

# Questions

- How much of the rise in US earnings inequality in the last 50 years is due to recessions?
- Had the US experienced fewer/milder recessions, how different would its earnings distribution be today?

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- Had the US experienced fewer/milder recessions, how different would its earnings distribution be today?
- How will the 2020 Covid recession impact inequality trends?

# Outline

- Facts
- Model
- Counterfactuals and answers
- Covid

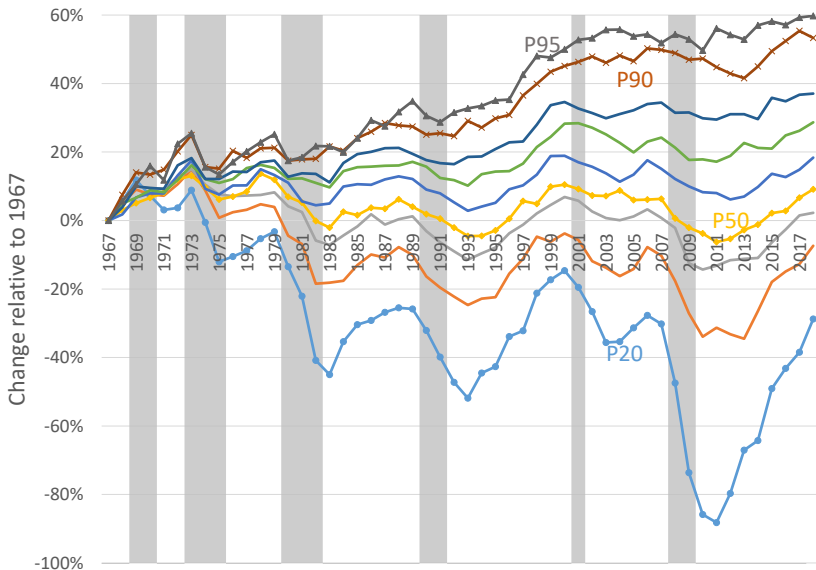
# Data

- CPS 1967-2018
- Men, Prime-age (25-54)
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- Earnings = wages & salaries + business income + farm income
- **Don't drop the zeros!** Important part of rise in inequality
  - ▶ Most studies focus on full-time full-year workers
  - ▶ Standard inequality measures [e.g.  $var(\log)$ ] force dropping zeros
  - ▶ Administrative data sets miss non-earners by construction

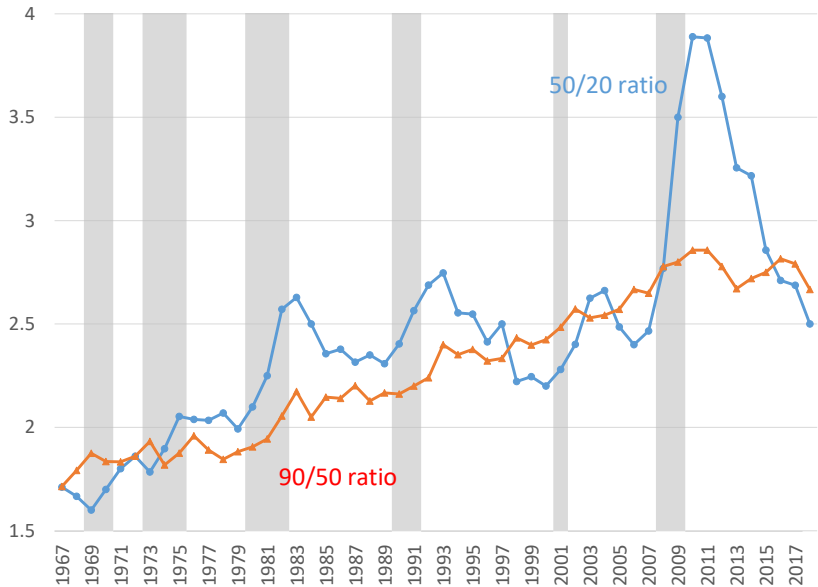
# US Real Earnings Distribution: 1967-2018



Sample: March CPS, All Males, Aged 25-55



# Inequality at the top and at bottom: 1967-2018



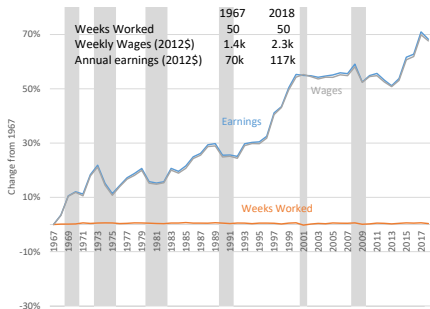
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# Main Features

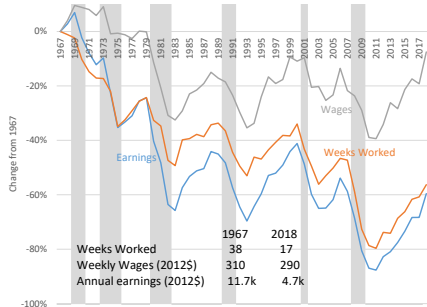
- Widening dispersion, at both the top and the bottom
- Increase at the top: steady rise
- Increase at the bottom: cyclical pattern
  1. increases sharply in recession
  2. only partially recovers in expansions
- Inequality at the bottom: **gap between poor and middle class**

# The Tale of the Tails: Wages vs Hours

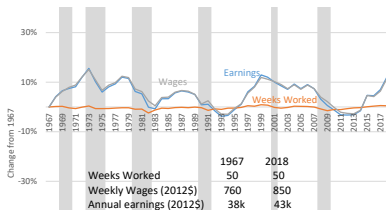
## Top 85-95%



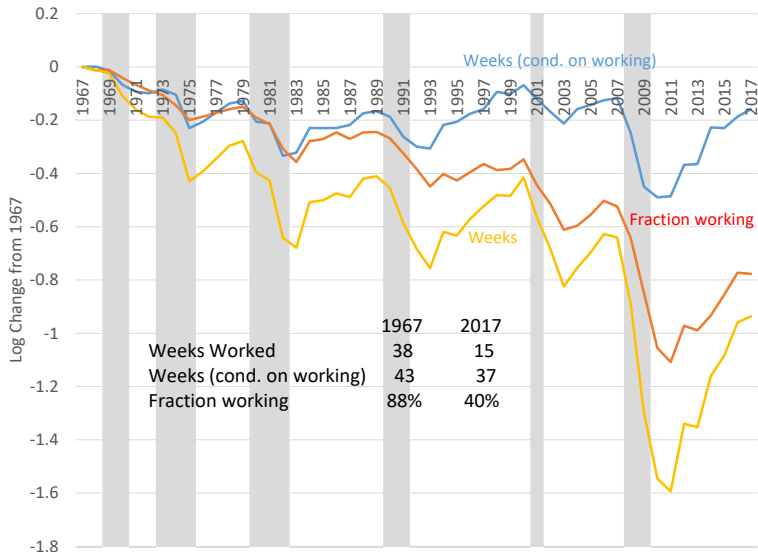
## Bottom 0-20%



## Mid 45-55%

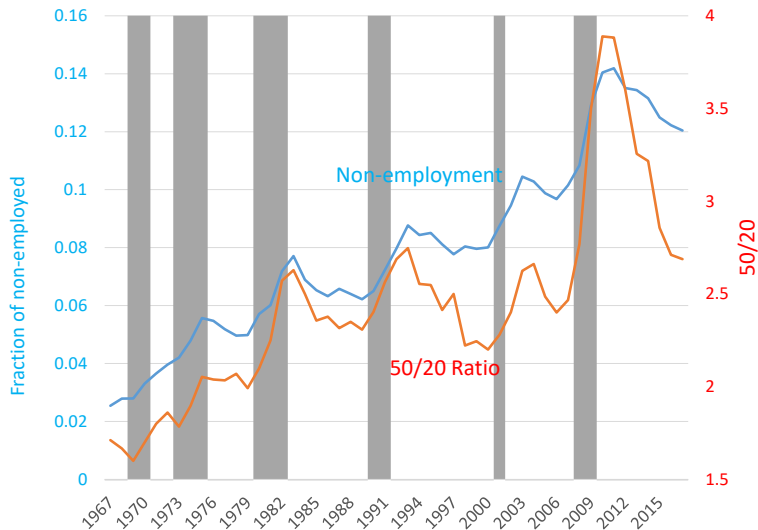


# Intensive and Extensive Margins at the Bottom



Sample: March CPS, Males, Aged 25-54

# Inequality at the Bottom and Non-Employment

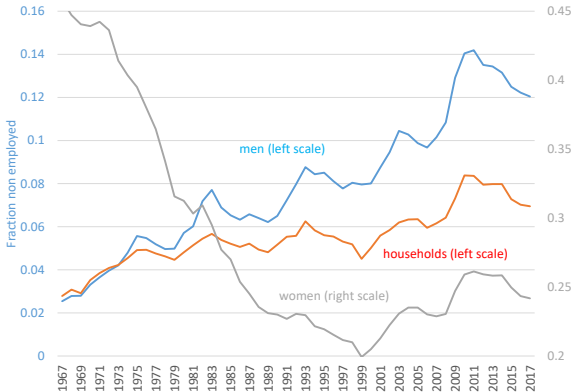


Sample: March CPS, Males, Aged 25-54

# Why prime-age men?

- Group with participation least likely affected by additional factors (aging, culture)
- Same forces likely important for women in recent years

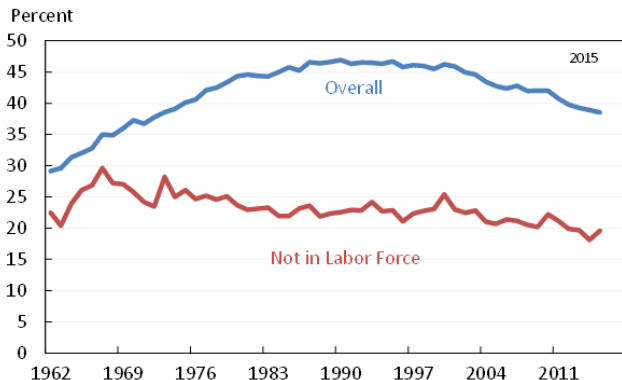
Non-employment for men, women, households



## Does the fall in participation for men reflect rising participation for women?

- If women replacing men's earnings within the household, declining men participation might not impact household earnings inequality
- Data are not consistent with this: fewer than 1/4 of non-participating men have a working spouse ...and that share has decline over the past 50 years
- Rising female participation amplifies earnings inequality at the top, does not mitigate earnings inequality at the bottom

# Share of prime age men with spouse in the labor force



Source: Bureau of Labor Statistics, Current Population Survey (Annual Social and Economic Supplement); CEA calculations.



# Dynamics of Inequality at the Bottom: Trend vs Cycle

	Trend	Recessions
Non-employment	Goes up	Goes up
	⇓	⇓
Earnings of bottom 20%	Goes down	Goes down
	⇓	⇓
Inequality at the bottom (50/20)	Goes up	Goes up

- Two interpretations:
  1. Inequality on a secular upward trend, and business cycles just generate fluctuations around this trend
  2. Recessions increase inequality, and long run increase is cumulative effect of series of recessions
- Data alone not enough: **need a model**

## A Theory of a “Double Whammy”

- **Recessions** are times when lots of workers lose their jobs
- With their jobs, they lose skills (**scarring**)
- Job/skill loss disproportionately impacts low-skilled workers, who may already be *marginal* labor market participants
- In recoveries most jobs/skills slowly return, unless...
- Recession happens **against backdrop of trend-decline** in low skill wages relative to the “value of leisure”
- Then, low-skill workers might never come back to labor market

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**Recessions accelerate the trend**

# Model Ingredients

- Three-state model of the labor market:  $x_t \in \{E, U, N\}$
- Skill dynamics depend on state (learning/scarring)
- **Dynamic Participation decision**
- **Cycle**: Fluctuations in job finding rate (Shimer, 2012)
  - ▶ Job finding and losing rates unequal across skills
- **Trend**: skill-biased technical change
- Start by describing model with neither cycle nor trend

## Demographics & Preferences

- **Demographics:** overlapping generations of individuals of age  $a = 0, \dots, A$ . Stationary population size normalized to 1

- **Preferences:** linear in consumption (numeraire) and leisure

$$u(c, \ell) = c + \exp(\phi) \ell$$

- ▶ discount at rate  $\beta$

- **Skills:** each individual has skill  $s$  which evolves stochastically

- **Budget Constraint:** no intertemporal borrowing and lending

$$c = w(s) \mathbb{I}_{\{x_t = E\}}$$

# Technology

- Aggregate production function linear in effective labor

$$C = Y = \int \exp(\sigma s) \cdot L(s) ds$$

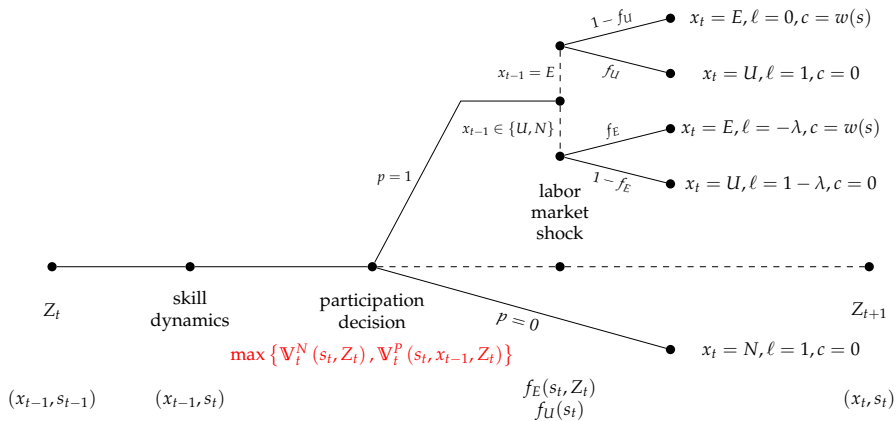
where  $L(s)$  is the mass of employed workers with skill  $s$

- Labor market is competitive:

$$\log w(s) = \sigma s \quad \Rightarrow \quad \text{var}(\log w) = \sigma^2 \cdot \text{var}(s)$$

- $\sigma$  is a measure of **skill bias** in technology

# Timeline



# Skill Dynamics

- Skills evolve as

$$s_{t+1} = \rho s_t + \mathbb{I}_{\{x_t=E\}} \cdot \delta^+ - \mathbb{I}_{\{x_t \neq E\}} \cdot \delta^- + \varepsilon_{t+1}, \quad \text{with } \varepsilon_{t+1} \sim \mathbb{N}(0, v_\varepsilon)$$

- $\delta^+$  is pct skill growth during employment ( $E$ )
- $\delta^-$  is the pct skill loss from not working ( $U, N$ )



## Cycles and Trends

- **Cycles:** State-dependent job finding probabilities

- ▶ Aggregate state  $Z$  (cyclical indicator)

- ▶  $Z \in \{B, X, R, C\}$

$B = Boom, X = eXpansion, R = Recession, C = Crisis$

$$\Pr(x_t = U | x_{t-1} = E, s)$$

$$\Pr(x_t = E | x_{t-1} = U, s, Z)$$

- **Trends:** Time effect in the return to skill:

$$\sigma_{t+1}^2 = \sigma_t^2 + \gamma_\sigma$$

## Other Secular Trends in Cohort Effects

- Cohort effects in mean initial skill level:

$$\bar{s}_{0,t+1} = \bar{s}_{0,t} + \gamma_{\bar{s}_0}$$

- Cohort effects in mean value of leisure (video-games):

$$\bar{\phi}_{t+1} = \bar{\phi}_t + \gamma_{\bar{\phi}}$$

with  $\gamma_{\bar{\phi}} = \gamma_{\bar{s}_0}$  (balanced growth)

- Cohort effects **neutral** on participation

# Changing Returns to Skills and Participation

- SBTC:
  - ▶ Creates more wage inequality at labor market entry
  - ▶ Weakens wage growth for low-skill workers
- And, as a result:
  - ▶ Increases the number of marginal participants
  - ▶ Increases the sensitivity of participation to negative skill shocks and unemployment spells
  - ▶ Makes participation more sensitive to recessions

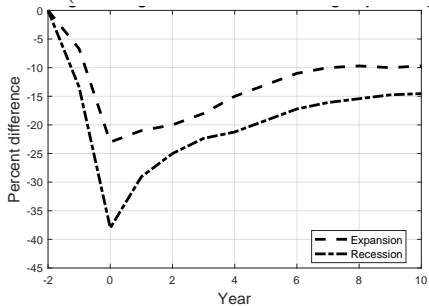
# Key Calibration Targets

- Scarring
- Job Transition Probabilities
- Unemployment and Long term Unemployment
- Inequality at the Top

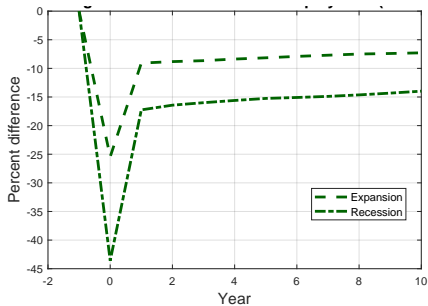
# Scarring ( $\delta^-$ ): data vs model

Percentage earning losses after unemployment

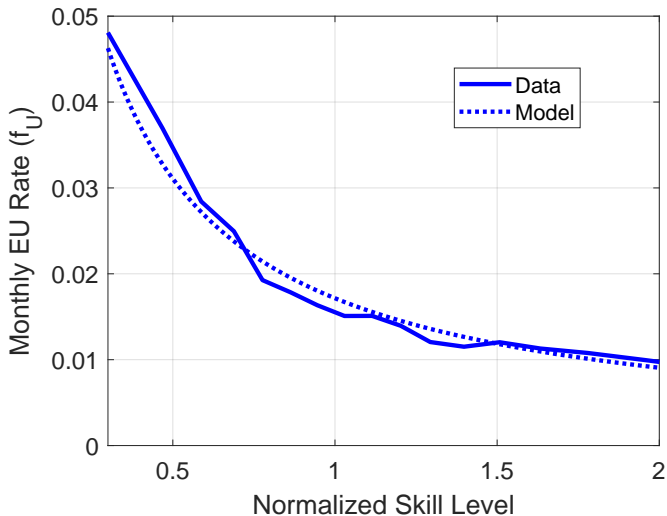
Data (Davis and Von Wachter, 2011)



Model

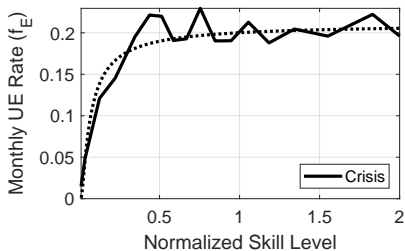
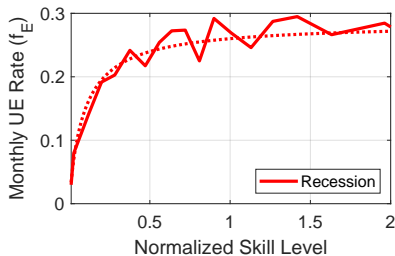
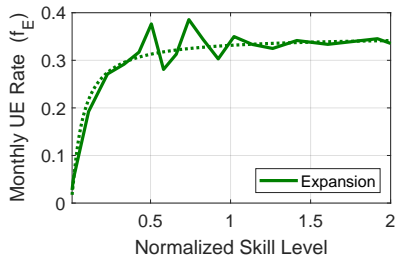
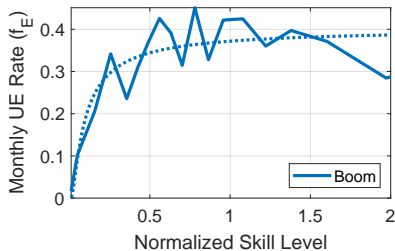


# EU transition (constant over time) CPS 1989-2019

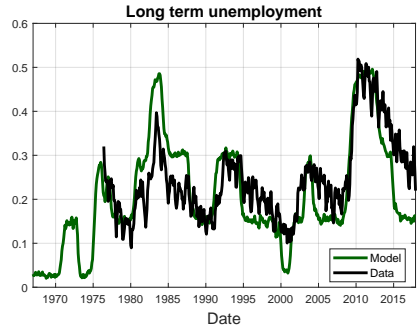


# UE transition (changing with aggregate state $Z$ )

## CPS 1989-2019



# Unemployment and Long term unemployment





# Wage Inequality at the top over time and over age

- At median earnings and above: earnings  $\simeq$  wages
- Pick:
  - ▶  $\nu_\epsilon$ : dispersion of skill shocks
  - ▶  $\gamma_\sigma$ : increase in skill bias over time
- To match time/age effects in earnings 90/50 for age/year cells

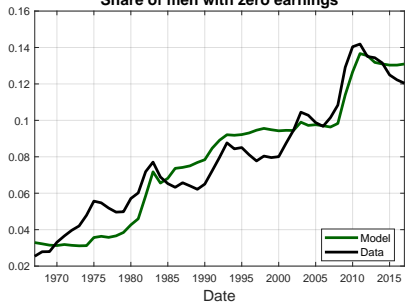
# Experiments

Three versions of the model:

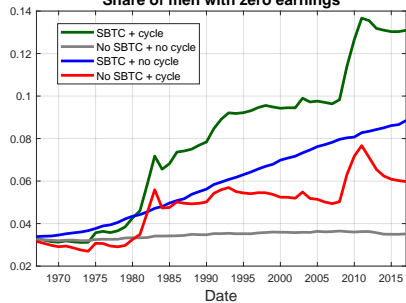
- Baseline
- **No trend**: baseline without secular increase in inequality ( $\sigma_t = \bar{\sigma}$ )
- **No cycle**: baseline without recessions ( $u_t = 4\%$ ,  $t = 1967, \dots, 2017$ )

# Non Participation

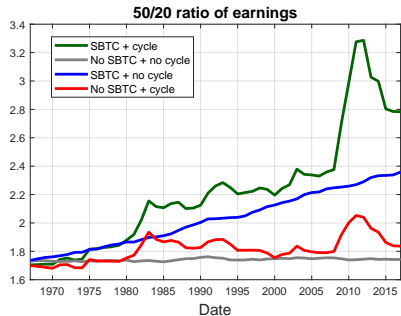
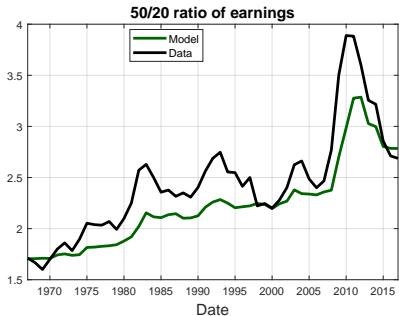
Share of men with zero earnings



Share of men with zero earnings



# Inequality



# Answers

- **Recessions w/o SBTC** would have had smaller impact on non-employment and inequality
  - ▶ Job and skill losses in recessions largely recouped in expansions
- **SBTC w/o recessions** would have had smaller impact on non-employment and inequality
  - ▶ Skill growth on the job for low wage workers partially offsets declining low skill wages
- Recessions against a backdrop of SBTC → **“double whammy”**
  - ▶ Recession pushes many low skill workers into nonemployment
  - ▶ Skill losses through scarring amplified by downward trend in low skill wages → many job losers never come back to the labor market

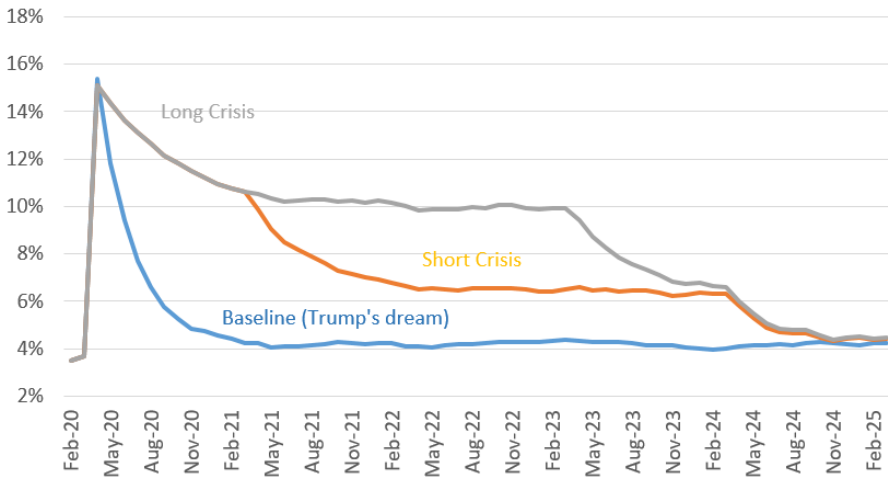
# Predicting consequences of COVID shock on: Participation and Inequality

- Modelling the Covid shock
- Impact: large increase in job separation
- Medium run:
  - ▶ Short/long duration of crisis state (Low job finding rate)
  - ▶ With/without extended benefits

# Job separation in March 2020 (CPS)

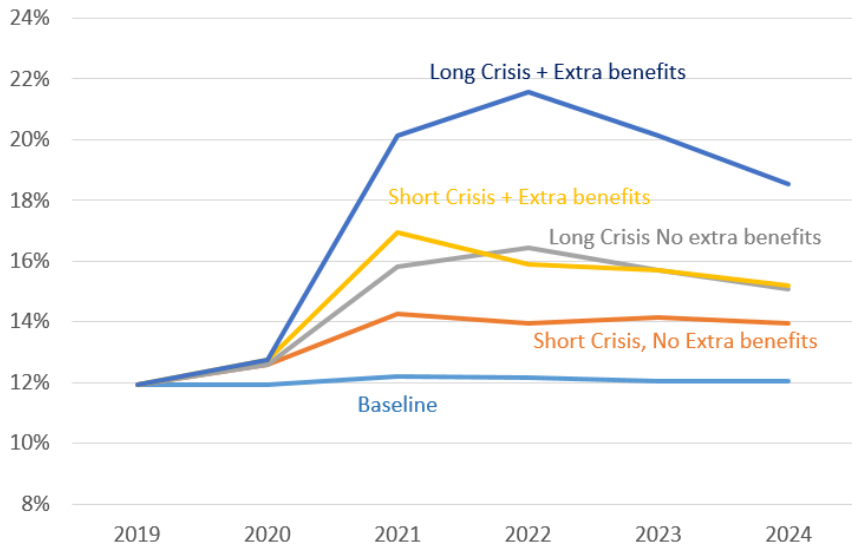


# Unemployment Scenarios

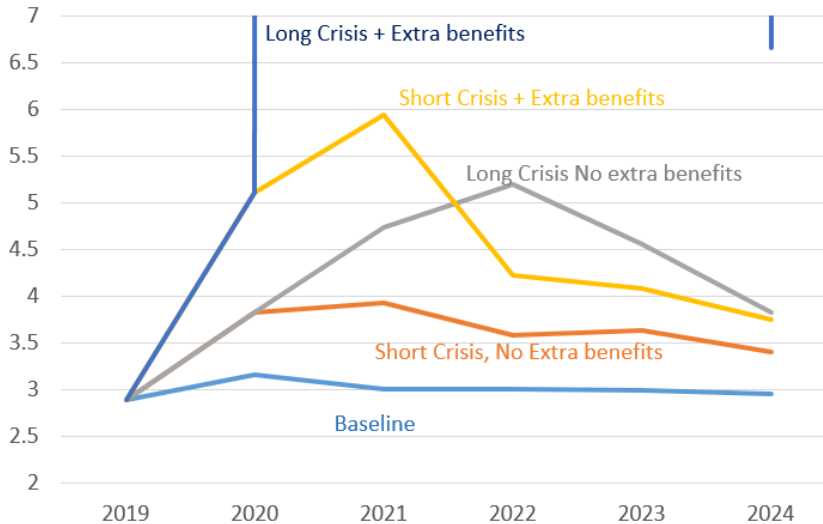




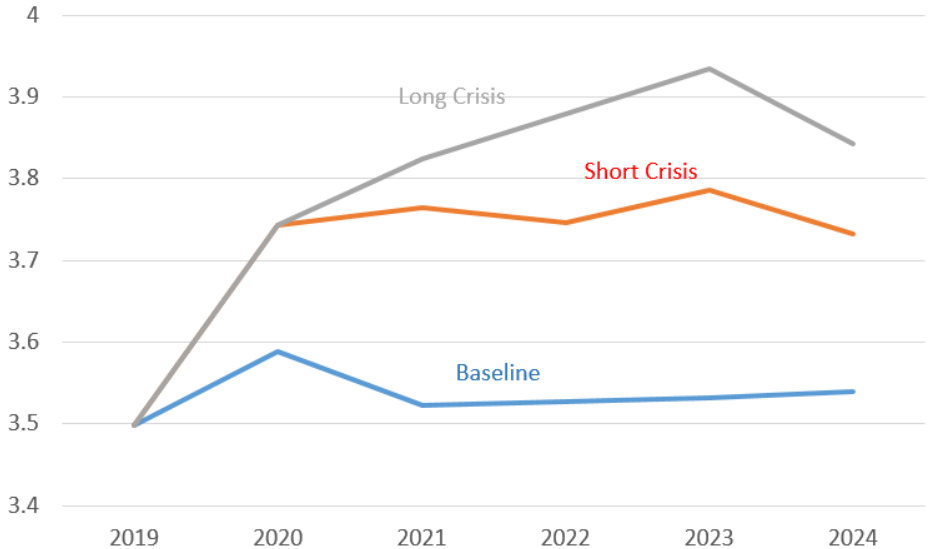
## Fraction of men with zero earnings



# 50/20 ratio



# 90/50 ratio



# COVID takeaway and to-do

- COVID crisis possibly pushing non-participation and inequality at historically high levels
- To do:
  - ▶ Women, non prime age workers
  - ▶ Changes in skill bias
  - ▶ Changes in scarring

# Conclusions

- Simple theory of participation to explain impact of recessions on earning distribution
- Deep recessions can have large and long lasting changes to the shape of the earnings distribution
- COVID crisis might push the US society in uncharted territory