The Rise of US Earnings Inequality: Does the Cycle Drive the Trend?

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VMACS, May 2020

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Bonus track: The impact of the COVID recession on inequality trends (feat. Lukas Mann, Princeton)

The views stated here are the authors' and do not necessarily reflect those of the Federal Reserve Bank of Minneapolis

## Motivation and Questions

- Large increase in US earnings inequality over the past 50 years
- Common interpretation is based on secular causes (skill-biased technical change, globalization, weaker unions ...)
- Much less emphasis on cyclical factors (Jaimovich and Siu, 2018)

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#### 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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#### 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?
- 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)
- Earnings = wages & salaries + business income + farm income

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- CPS 1967-2018
- Men, Prime-age (25-54)
- 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



#### **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







#### 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



## Dynamics of Inequality at the Bottom: Trend vs Cycle



- 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, ..., 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:

$$\log w(s) = \sigma s \implies var(\log w) = \sigma^2 \cdot var(s)$$

•  $\sigma$  is a measure of skill bias in technology

#### Timeline



## **Skill Dynamics**

Skills evolve as

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

- $\delta^+$  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)

► 
$$Z \in \{B, X, R, C\}$$
  
 $B = Boom, X = eXpansion, R = Recession, C = Crisis$ 

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

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

• 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:

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

• 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



## 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, ..., 2017)

#### Non Participation



## 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  $\rightarrow$  "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 unchartered territory