Market Concentration, Income Inequality and Business Cycles

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Introduction

Motivating facts in the U.S. economy:

- Increasing market concentration ▸ Markup ▸ Profit
  De Loecker et al. (2020), Basu (2020), Syverson (2018)
- Rising income and wealth inequality ▸ Shares ▸ Income
  Piketty (2013), Kaplan et al. (2017), Bilbiie et al (2022)
- Heterogeneous cyclicality ▸ Cyclicality ▸ Production
  Crouzet et al. (2020), Winberry et al. (2020)

Research question: Do rising market concentration and income/wealth inequality affect business cycles?

1. IRFs
2. Transmission mechanism of aggregate shocks

Introduction

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1. IRFs
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Preview of Empirical Results

Stylized Facts

1. increasing markups/profits
2. increasing income and wealth inequality
3. heterogonous cyclicality and factor inputs

$\Rightarrow$ Hypothesis: (1) + (2) + (3) would affect macro business cycles. How?

Literature

- **Business dynamism**
  Andrews et al. (2016), Gutierrez & Philippon (2017), Decker et al. (2018), Akcigit & Ates (2019), Crouzet & Eberly (2019), Autor et al. (2020), De Loecker et al. (2021)

  ⇒ This paper: the role of business dynamism in business cycles

- **Consumer Heterogeneity**
  Kaplan et al. (2018), Auclert et al.(2020), Bilbiie et al.(2022), Werning (2015), Mian et al. (2021), Straub (2019), Ahn et. al (2018), Auclert et al. (2021), Violante et al. (2020)

  ⇒ This paper: the role of firm heterogeneity

- **Firm Cyclicality**
  Crouzet & Mehotra (2020), Koby & Wolf (2020), Ottonello & Winberry (2020), Van Reenen et al. (2021), Cloyne et al. (2018), Caballero & Engel (1999)

  ⇒ This paper: the role of consumption (mpc) distribution

Outline

Model

Conclusion

Motivating Model

Goal:

- Highlight the key mechanisms

Setup:

- Continuum of households over [0,1]
- λ fraction consume all their income (poor hand-to-mouth) (P)
- $1 - \lambda$ owns all the asset and equity (R)
- Poor only works
- Rich works and trade assets in complete market

Hand-to-mouth Agents' Problem

$$\max_{C_t^p, H_t^p} \quad log(C_t^p) - \chi \frac{(H_t^p)^{1+\eta}}{1+\eta}$$
$$\text{s.t.} \quad P_t C_t^p \leq w_t H_t^p$$

The optimal consumption and labor-supply

$$H_t^p = (\frac{1}{\chi})^{\frac{1}{1+\eta}}$$
$$C_t^p = \frac{w_t}{P_t}(\frac{1}{\chi})^{\frac{1}{1+\eta}}$$

The log-linearization around steady-steady

$$h_t^p = 0$$
$$c_t^p = w_t - p_t = \omega_t$$

Saver's Problem

$$\max_{C_t^r, H_t^r, B_{t+1}, K_{t+1}} \quad log(C_t^r) - \chi \frac{(H_t^r)^{1+\eta}}{1+\eta}$$

$$\text{s.t.} \quad P_t C_t^r + \frac{B_{t+1}}{1-\lambda} + \frac{K_{t+1}}{1-\lambda} \leq w_t H_t^s + (1+r_t)\frac{B_t}{1-\lambda} + (R_t + 1 - \delta)\frac{K_t}{1-\lambda} + \frac{D_t}{1-\lambda}$$

The log-linearized optimal decisions are

$$\eta h_t^r = \omega_t - c_t^r$$
$$c_t^r = c_{t+1}^r - E_t(r_t - \pi_{t+1})$$
$$c_t^r = c_{t+1}^r - \beta R^* E_t(r_t^k - \pi_{t+1})$$

Aggregate Consumption and Labor Supply

Aggregate Labor Supply

$$H_t = \lambda H_t^p + (1 - \lambda) H_t^r$$
$$\Rightarrow h_t = (1 - \lambda) \frac{H^r}{H} h_t^r$$

Aggregate Consumption

$$C_t = \lambda C_t^p + (1 - \lambda) C_t^r$$
$$\Rightarrow c_t = \lambda \frac{C^p}{C} c_t^p + (1 - \lambda) \frac{C^r}{C} c_t^r$$

Euler Equation for Consumption

Combining total consumption, labor supply and Euler Equation

$$c_t = c_{t+1} - E_t(r_t - \pi_{t+1}) - \eta \frac{\lambda}{1-\lambda} \frac{C^p}{C} \frac{H}{H^r} (h_{t+1} - h_t)$$

▸ Derivation ▸ Consumption

Firm's Problem

Final good producers aggregates using CES

$$Y_t = \left(\int_0^1 Y_{i,t}^{\frac{\epsilon-1}{\epsilon}} di \right)^{\frac{\epsilon}{\epsilon-1}}$$

Each intermediate good producer

$$\max_{P_{it}, K_{it}, H_{it}} P_{it} Y_{it} - R_t K_{it} - w_t H_{it}$$

subject to

$$Y_{it} = \left(\frac{P_{it}}{P_t} \right)^{-\epsilon} Y_t \leq A_{it} K_{it}^{\alpha} H_{it}^{1-\alpha} - F$$

Firm's Decision

- The optimization problem with Calvo pricing

$$\pi_t = \beta\pi_{t+1} + \kappa mc_t$$
$$mc_t = \alpha r_t^k + (1-\alpha)w_t - z_t$$

where $\kappa = \frac{(1-\theta)(1-\theta\beta)}{\theta}$

- For a cost minimizing firm,

$$\gamma = \frac{AC}{MC} = \mu(1-s_\pi) = \frac{Y+F}{Y}$$

- The aggregate production

$$y_t = \mu(1-s_\pi)\left(\alpha k_t + (1-\alpha)h_t + z_t\right)$$

Market Clearing Condition

- Goods Market

$$Y_t = C_t + I_t$$
$$\Rightarrow y_t = s_c c_t + (1 - s_c) i_t$$

- Bond Market

$$B_t = 0$$

Euler Equation for Output

- Using $\frac{wH}{PY} = (1 - s_\pi)(1 - \alpha)$ and MCC

$$y_t = y_{t+1} - \frac{s_c}{\phi} E_t(r_t - \pi_{t+1}) - \frac{(1 - s_c)}{\phi}(i_{t+1} - i_t) + \frac{1 - \phi}{\phi}\mu(1 - s_\pi)(z_{t+1} - z_t)$$
$$+ \alpha\frac{1 - \phi}{\phi}\mu(1 - s_\pi)(k_{t+1} - k_t)$$

where $\phi = 1 - \eta\frac{\lambda}{1-\lambda}\frac{1}{\mu}$

Amplification Channels

- $\lambda \to 0 \Rightarrow \phi \to 1$ (RANK)

$$y_t = y_{t+1} - s_c E_t(r_t - \pi_{t+1}) - (1 - s_c)(i_{t+1} - i_t)$$

- $\alpha \to 0 \Rightarrow s_c \to 1$ (TANK)

$$y_t = y_{t+1} - \frac{1}{\phi} E_t(r_t - \pi_{t+1}) + \frac{1-\phi}{\phi}\gamma(z_{t+1} - z_t)$$

- $\lambda \in (0,1)$ and $\alpha \in (0,1)$

$$y_t = y_{t+1} - \frac{s_c}{\phi} E_t(r_t - \pi_{t+1}) - \frac{(1-s_c)}{\phi}(i_{t+1} - i_t) + \frac{1-\phi}{\phi}\gamma(z_{t+1} - z_t) + \alpha\frac{1-\phi}{\phi}\gamma(k_{t+1} - k_t)$$

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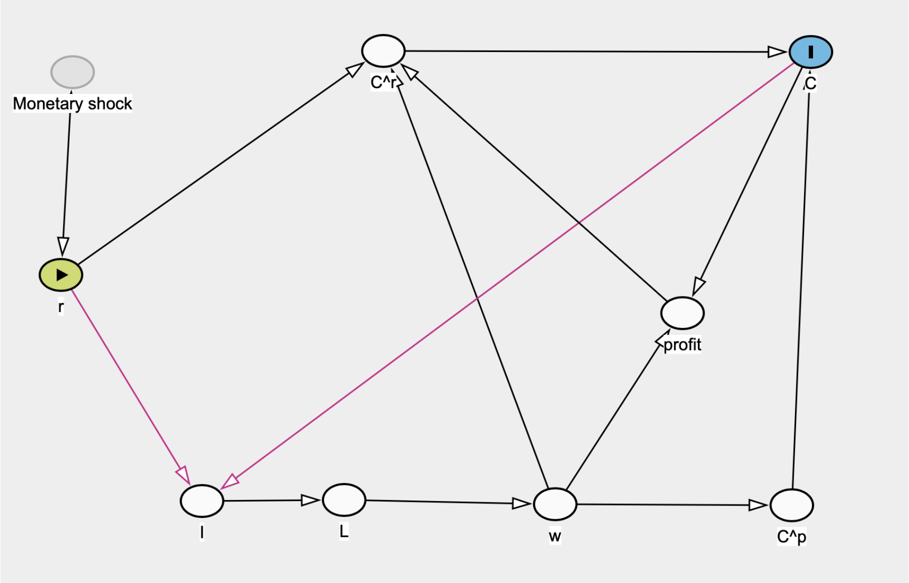
Mechanism(DAG)



Firm Heterogeneity

- There is a continuum of producers over [0,1]
- ξ share large and $1 - \xi$ small
- Large firms more productive and uses both capital and labor
- Small firms are less productive and only decide labor

Small Firms' Problem

Production Function

$$f(H_t^l, K_t^l) = e^l Z_t(\bar{K})^{\alpha}(H_t^l)^{1-\alpha}$$

Maximize profit

$$\max_{p_t^l, h_t^l} p_t^l y_t^l - R_t \bar{K} - w_t H_t^l$$

subject to

$$y_t^l = \left(\frac{p_t^l}{P_t}\right)^{-\epsilon} Y_t \leq e^l A_t \bar{K}^{\alpha}(H_t^l)^{1-\alpha} - F$$

Large Firms' Problem

Production Function

$$Y_t^h = e^h Z_t (K_t^h)^\alpha (H_t^h)^{1-\alpha}$$

$e^h > e^l$.

Maximize profits

$$\max_{p_t^h, k_t^h, h_t^h} p_t^h y_t^h - R_t K_t^h - w_t H_t^h$$

subject to

$$y_t^h = \left(\frac{p_t^h}{P_t}\right)^{-\epsilon} Y_t \leq e^h A_t (K_t^h)^\alpha (H_t^h)^{1-\alpha} - F$$

Total Labor and Capital Demand

Capital Demand

$$K_t = \xi K_t^h + (1-\xi)\bar{K}$$
$$\Rightarrow k_t = \xi \frac{K^h}{K} k_t^h$$

Labor Demand

$$H_t = \xi H_t^h + (1-\xi) H_t^l$$
$$\Rightarrow h_t = \xi \frac{H^h}{H} h_t^h + (1-\xi)\frac{H^l}{H} h_t^l$$

Euler Equation for Output

Combining consumer and firms' problem with MCC

$$y_t = y_{t+1} - \frac{s_c}{\phi} E_t(r_t - \pi_{t+1}) - \frac{1 - s_c}{\phi}(i_{t+1} - i_t) + \frac{1-\phi}{\phi}\gamma(z_{t+1} - z_t)$$
$$+ \frac{1-\phi}{\phi}\gamma\left(\frac{(1+\alpha)(\xi + (1-\xi)\frac{e^L}{e^H})}{\xi + (1-\xi)\left(\frac{e^L}{e^H}\right)^{2(1-1/\epsilon)}} - 1\right)(k_{t+1} - k_t)$$

Outline

Summary

- Inequality and firm heterogeneity matter for business cycles
- Both transmission mechanism and amplification of the aggregate shocks affected

Future Work:

- Solve Philips curve for heterogeneous firms
- Quantify the amplification and propagation mechanisms

Appendix

Outline

Market Concentration

Inequality

Heterogeneous Cyclicality

Theoretical Results

Figure A1: De Loecker et al. (2020)

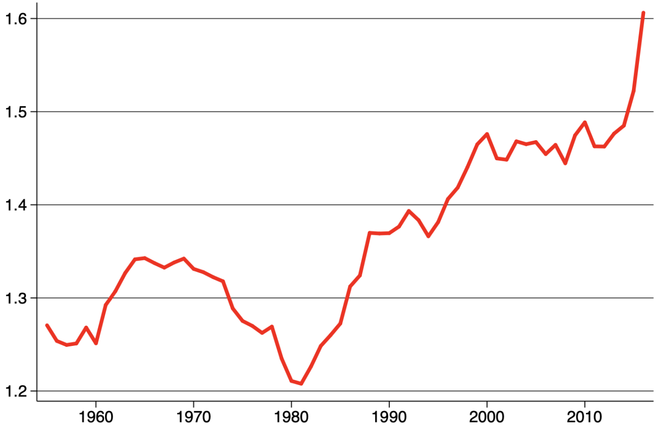


FIGURE I

Average Markups

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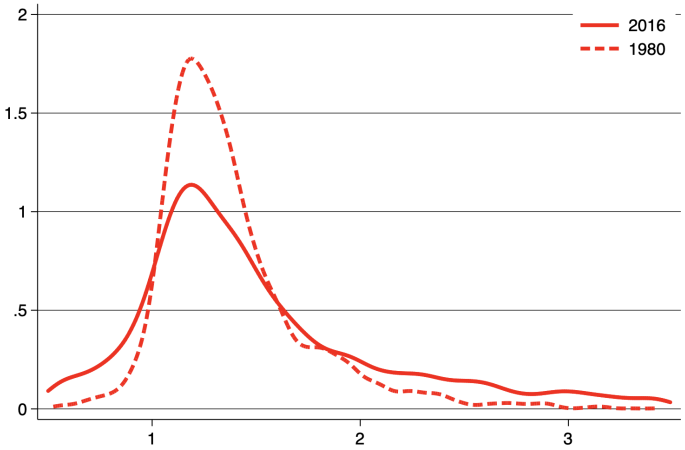
Figure A2: De Loecker et al. (2020)



(A) Kernel density (unweighted)

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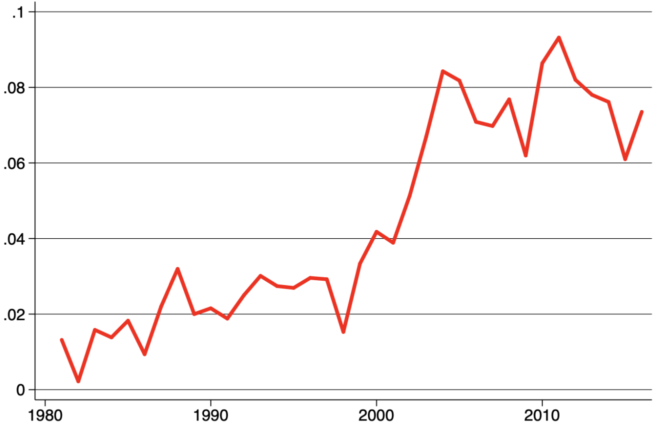
Figure A3: De Loecker et al. (2020)



(A) Average profit rate (revenue weighted)

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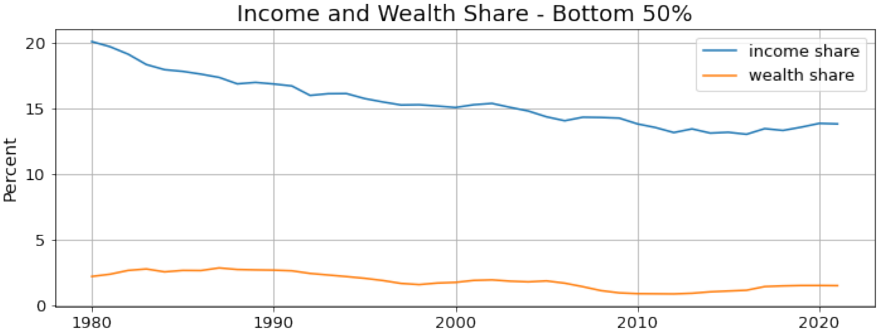
Income and Wealth Share - Bottom 50%
Percent
income share
wealth share
0
5
10
15
20
1980
1990
2000
2010
2020

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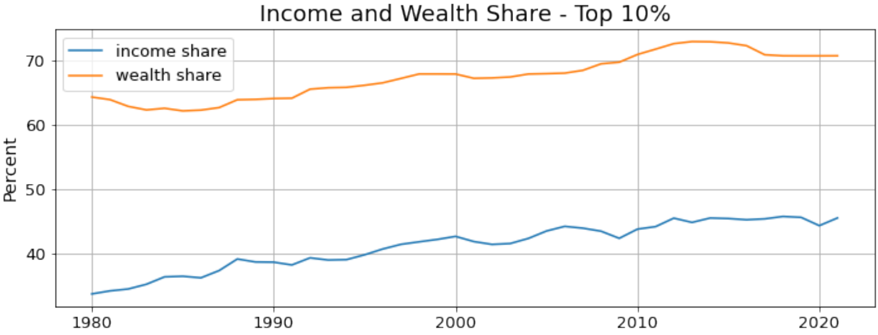
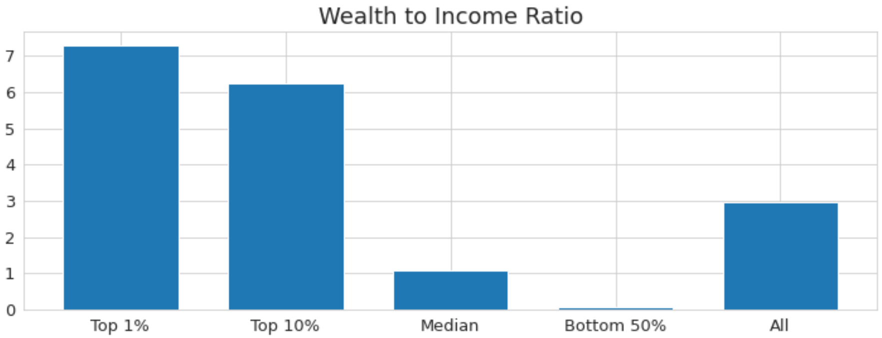

Income and Wealth Share - Top 10%
income share
wealth share
Percent
70
60
50
40
1980
1990
2000
2010
2020

Back


Wealth to Income Ratio
7
6
5
4
3
2
1
0
Top 1%
Top 10%
Median
Bottom 50%
All

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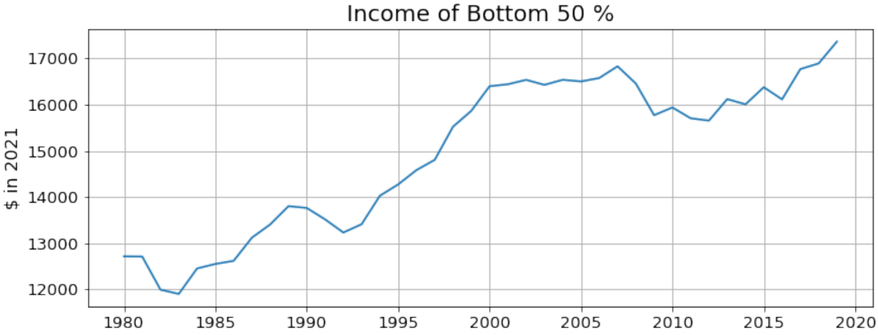
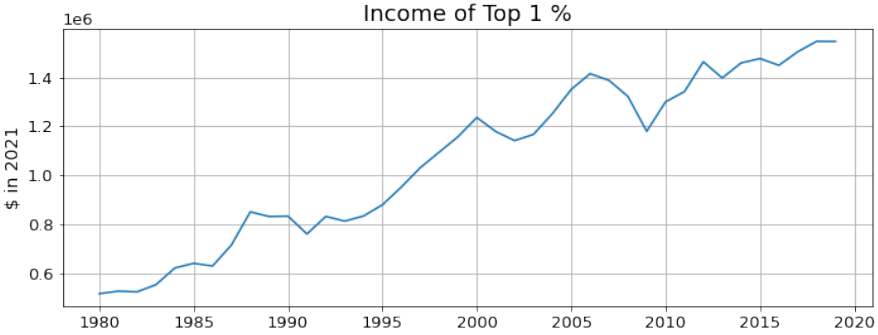
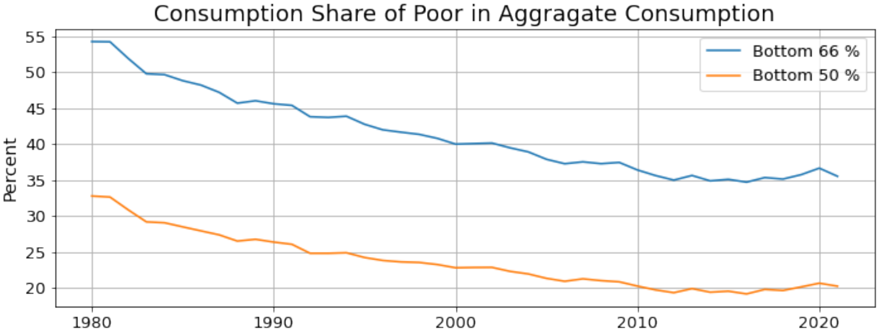

Income of Bottom 50 %
$ in 2021
17000
16000
15000
14000
13000
12000
1980
1985
1990
1995
2000
2005
2010
2015
2020

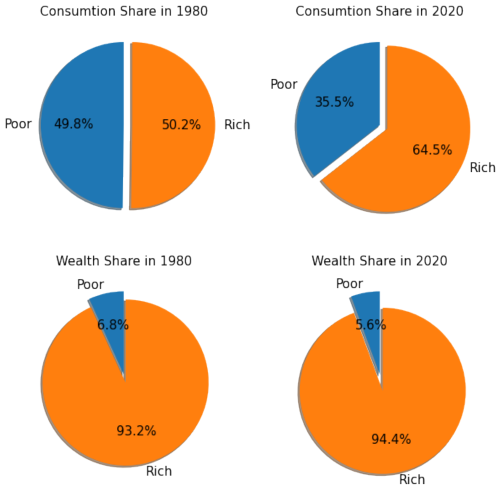
Back


Income of Top 1 %
1e6
$ in 2021
1.4
1.2
1.0
0.8
0.6
1980
1985
1990
1995
2000
2005
2010
2015
2020

Back


Consumption Share of Poor in Aggragate Consumption
Bottom 66 %
Bottom 50 %
Percent
55
50
45
40
35
30
25
20
1980
1990
2000
2010
2020

Back


Consumtion Share in 1980
Poor
49.8%
50.2%
Rich
Consumtion Share in 2020
Poor
35.5%
64.5%
Rich
Wealth Share in 1980
Poor
6.8%
93.2%
Rich
Wealth Share in 2020
Poor
5.6%
94.4%
Rich

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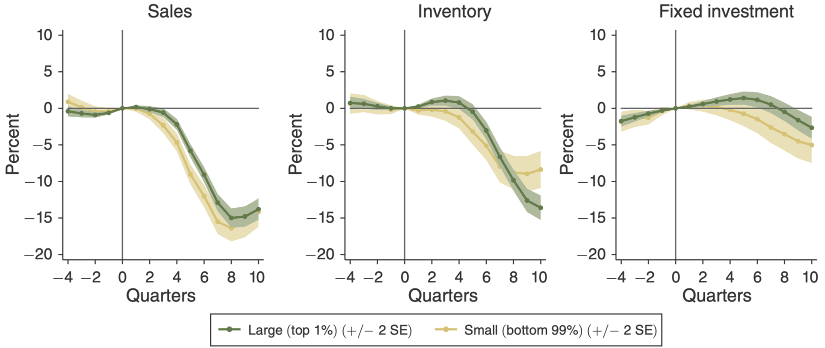
Sales
Inventory
Fixed investment
Percent
Quarters
10
5
0
−5
−10
−15
−20
−4 −2 0 2 4 6 8 10
Large (top 1%) (+/− 2 SE)
Small (bottom 99%) (+/− 2 SE)

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Figure A4: Crouzet et al. (2020)

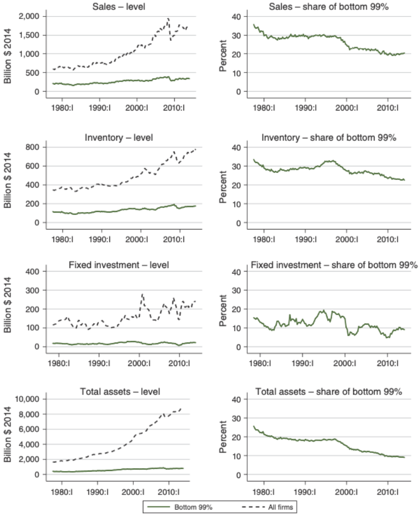

FIGURE 4. CONCENTRATION OF SALES, INVENTORY, FIXED INVESTMENT, AND TOTAL ASSETS IN THE US MANUFACTURING SECTOR

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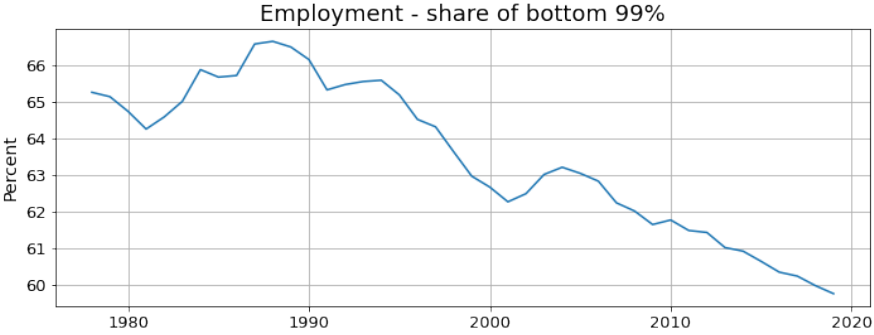
Employment - share of bottom 99%
Percent
66
65
64
63
62
61
60
1980
1990
2000
2010
2020

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Market Concentration

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Derivation of EE for Consumption

Rewriting c_t

$$c_t^r = \frac{C}{C^s}\frac{1}{1-\lambda}c_t - \frac{\lambda}{1-\lambda}\frac{C^h}{C^r}c_t^h$$

$$c_t^r = \frac{C}{C^r}\frac{1}{1-\lambda}c_t - \frac{\lambda}{1-\lambda}\frac{C^h}{C^r}\omega_t$$

$$c_t^r = \frac{C}{C^s}\frac{1}{1-\lambda}c_t - \frac{\lambda}{1-\lambda}\frac{C^h}{C^r}\left(\frac{\eta}{1-\lambda}\frac{H}{H^r}h_t + c_t^r\right)$$

$$c_t^r = c_t - \eta\frac{\lambda}{1-\lambda}\frac{C^h}{C}\frac{H}{H^r}h_t$$

Back