The Minimum Wage in the Short Run and the Long Run

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Motivation

- Recently proposed changes to minimum wage are an order of magnitude increase
  - In CPS data, current national min wage currently bind on $\approx$ 5% of workforce
  - \$15 min wage would bind on $\approx$ 45% of workforce

- Our view: existing evidence uninformative about proposed changes (Neumark 2017)

  $\Longrightarrow$ **goal**: general equilibrium framework to study minimum wage + other policies

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  $\Longrightarrow$ **goal**: general equilibrium framework to study minimum wage + other policies

- Require our framework to match two salient patterns in the data
  1. Large effect of decline in price of capital on college wage premium in long run (Krusell, Ohanian, Rios-Rull, Violante 2000)
  2. Small effect of min wage on employment in the short run (Card and Krueger 2016)

Our Contributions

1. **Develop new framework** with three key features for evaluating minimum wage

   - Embed monopsonistic competition in directed search environment
     - Card and Krueger (2016): competitive labor market does not match data
     - Common alternative: Robinson (1933) pure monopsony
       - Firms underprice labor, so small min wage can increase employment
     - Monopsonistic competition to allow for multiple firms (simple version of Berger, Herkenhoff, and Mongey 2021a)
     - Search is frontier model of labor market and avoids rationing

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   - Putty-clay frictions to adjusting capital-labor ratios in response to price changes
     - Leontief in the short run $\implies$ minimum wage has small effect
     - CES in the long run $\implies$ minimum wage potentially has large effect
     - Discipline long-run elasticities using changes in relative price of capital
     - New evidence that short-run elasticities are smaller than long-run elasticities

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   - Worker heterogeneity to match cross-sectional distribution of wages
     - Key for assessing distributional consequences

Our Contributions

1. **Develop new framework** with three key features for evaluating minimum wage
2. Study **effects of minimum wage** in calibrated version of model

- Long run effects of the minimum wage can be substantial
  - Aggregate level: small increases in the minimum wage raise aggregate employment, but large increases lower employment
  - Micro level: minimum wage disproportionately reduces low-income employment (even if raises aggregate employment!)

- Short run effects are small due to putty-clay frictions $\implies$ impossible to detect long-run consequences of minimum wages in short-run data

Our Contributions

1. **Develop new framework** with three key features for evaluating minimum wage
2. Study **effects of minimum wage** in calibrated version of model
3. Compare with **two natural alternatives**

- Issues with the minimum wage: (i) reduces aggregate employment if too high and (ii) disproportionately decreases employment of low-income workers
- Income tax cut/wage subsidy: reduces monopsony distortion uniformly across workers, addressing issues (i) and (ii)
- Earned income tax credit: reduces monopsony distortion for low income workers but exacerbates for middle income workers (phased out)
  - Increases employment for low-wage workers, addressing issue (ii)
  - But lower middle-wage employment creates negative spillovers which may attenuate benefits to low-wage workers

Related Literature

1. **Neoclassical view**: minimum wage only decreases employment
    - Kennan (1995): evidence for neoclassical view is "elusive"
    - Card and Krueger (2016): after the introduction of min wage, (i) employment does not fall and (ii) mass point in the wage distribution
        - Our model will match these facts as well
2. **Monopsony view**: small minimum wage may increase employment
    - Original idea dates back to Joan Robinson (1933)
    - Recent estimates: Lamadon, Mogstad, and Setzler (2021), Yeh, Macaluso, and Hershbein (2021), *Berger, Herkenhoff, and Mongey (2021a)*
    - Berger-Herkenhoff-Mongey (2021b): min wage w/ firm heterogeneity and oligopsony
3. Alternative views: workers' bargaining power too low + endogenous participation (Flinn 2006); minimum wage eliminates low-wage jobs + induces reallocation (Burdett-Mortensen 1998)
4. Putty-clay: Johansen (1959), Atkeson-Kehoe (1999), *Sorkin (2015)*

Model

Model

- General equilibrium model with heterogeneous workers and homogenous firms
  - Labor market: competitive search environment with
    1. Monopsonistic competition generates firm-specific “labor supply” curve
    2. Endogenous participation by households
  - Production technology subject to putty-clay frictions
  - Minimum wage

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- Plan for the talk:
    - Explain labor market in simple version (without putty-clay or minimum wage)
    - Then add putty-clay frictions
    - Then add minimum wage

Model Environment: Households

- Households are heterogeneous in broad group $b \in \{h, l\}$ and productivity z
    - Let $i = (b, z)$ index household type

- Representative family for type i with preferences

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t u(c_{it} - v(n_{it}) - h(s_{it})), \text{ where}$$

    - $n_{it} = \left(\int_{j=0}^{1} n_{ijt}^{\frac{1+\omega}{\omega}} dj \right)^{\frac{\omega}{1+\omega}}$ (Berger-Herkenhoff-Mongey 2021a), where
      $\omega =$ substitutability across firms j (monopsony power)
      (local concentration, non-wage amentities, etc.)
    - $s_{it} = \int s_{ijt} dj$ mass of family members searching

Model Environment: Firms

- Large number of homogenous firms j who have production function

$$n_b = \left(\int_0^1 z n_b(z)^{\frac{1+\phi}{\phi}} g_b(z) dz \right)^{\frac{\phi}{1+\phi}}$$

$$G(k, n_h) = \left(\lambda k^{\frac{\alpha-1}{\alpha}} + (1-\lambda) n_h^{\frac{\alpha-1}{\alpha}} \right)^{\frac{\alpha}{\alpha-1}}$$

$$y = F(k, n_h, n_l) = \left(\mu n_l^{\frac{\rho-1}{\rho}} + (1-\mu) G(k, n_h)^{\frac{\rho-1}{\rho}} \right)^{\frac{\rho}{\rho-1}}$$

- Krusell, Ohanian, Rios-Rull, Violante (2000): "capital-skill complementarity" if $\rho > \alpha$
- Standard capital accumulation: $k_{jt+1} = (1-\delta) k_{jt} + \frac{1}{q_t} i_{jt}$
  - Relative price q_t is exogenous (later used to discipline elasticities of substitution)

Markets

- Complete markets w.r.t. consumption with date-0 price $Q_{0,t}$, but directed search in the labor market
- Stage 1: firms post post vacancies a_{ijt} and wage w_{ijt} (constant through match)
  - Vacancy posting cost $\kappa_i = \kappa_0 \times z_i^{\tau}$, $\tau =$ curvature of costs w.r.t. productivity
- Stage 2: households send mass s_{ijt} to search for firm j
- Given (a_{ijt}, s_{ijt}), matches formed $m(a_{ijt}, s_{ijt}) = B a_{ijt}^{\eta} s_{ijt}^{1-\eta}$ start work in $t+1$
  - Job-finding rate $\lambda_w(\theta_{ijt}) = m(\underbrace{a_{ijt}/s_{ijt}}_{\theta_{ijt}}, 1)$ and similar job-filling rate $\lambda_f(\theta_{ijt})$
- Matches exogenously separate w/ probability σ each period

The Participation Constraint

- Approach: impose optimal household search decision as constraint on firm behavior
  - Analogy to monopoly: impose household spending as demand curve
  - Except our "labor supply curve" depends on (i) present value of wages W_{ijt+1} and (ii) labor market tightness θ_{ijt}

- In stage 2, households decide how much to search s_{it} + where to search s_{ijt} s.t.

$$\underbrace{h'(s_{it})}_{\text{MC of search}} = \underbrace{\lambda_w(\theta_{ijt}) Q_{t,t+1} \left(W_{ijt+1} - V_{ijt+1} \right)}_{\text{expected PV of wages - disutility of labor supply}} \quad \text{for all } j \text{ with } s_{ijt} > 0,$$

$$\text{where } V_{ijt+1} = \sum_{\tau=0}^{\infty} Q_{t+1,t+1+\tau} (1-\sigma)^{\tau} v'(n_{it+\tau+1}) \left(\frac{n_{ijt+\tau+1}}{n_{it+\tau+1}} \right)^{\frac{1}{\omega}}$$

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- MB of searching $\equiv \mathcal{W}_{it}$ is equated across all firms j s.t. $s_{ijt} > 0$

The Participation Constraint

- In stage 1, firms choose (W_{ijt+1}, a_{ijt}) anticipating this search behavior
    - Consider a symmetric equilibrium where all firms offer same (W_{it+1}, a_{it})
    - Now suppose firm j considers a deviation (W_{ijt+1}, a_{ijt}). Will only get applicants if

$$Q_{t,t+1}\lambda_w(\theta_{ijt})\left(W_{ijt+1} - V_{ijt+1}\right) \geq \mathcal{W}_{it}$$

- Profit maximization problem: choose $a_{ijt}, W_{ijt+1}, \theta_{ijt}$, and k_{jt+1} to maximize

$$\sum_{t=0}^{\infty} Q_{0,t}\left(y_{jt} - q_t\left[k_{jt+1} - (1-\delta)k_{jt}\right] - \int \left(\kappa_i a_{ijt} + \lambda_f(\theta_{ijt-1})a_{ijt-1}W_{ijt}\right) di\right)$$

such that $Q_{t,t+1}\lambda_w(\theta_{ijt})\left(W_{ijt+1} - V_{ijt+1}\right) \geq \mathcal{W}_{it}, \quad k_{j0}, n_{ij0}, \{q_t\}_{t=0}^{\infty}$ given

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- Generalization of Robinson (1933) firm-specific labor supply to search model

$$\frac{\partial V_{ijt+1}}{\partial a_{ijt}} = \lambda_f(\theta_{ijt}) \times \left(\frac{1}{\omega} v'(n_{it+1})\left(\frac{n_{ijt+1}}{n_{it+1}}\right)^{\frac{1}{\omega}-1} \frac{1}{n_{it+1}} + \ldots\right)$$

Monopsony Power in Steady State

- Easy to show **theoretical results**:
    1. Decentralized equilibrium is efficient if and only if $\omega \to \infty$
    2. Steady state employment and wages are decreasing in monopsony power $1/\omega$

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- Monopsony lowers surplus of matched worker-firm pair

$$\frac{\kappa_i}{\lambda_w'(\theta_i)} = \frac{1}{r+\sigma}\left(F_{ni} - v'(n_i) - \frac{\widetilde{\sigma}}{\omega}v'(n_i)\right)$$

- Monopsony distortion: reflects that marginal hire increases marginal disutilities of all other inframarginal hires ▸ Details
  - Must compensate those infarmarginal hires to satisfy participation constraint
  - Note that monopsony distortion = 0 when $\omega \to \infty$

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- Wages are inefficiently marked down below marginal product

$$\frac{w_i}{F_{ni}} = \left(1 + \underbrace{\frac{\frac{(r+\sigma)\kappa}{\lambda_f(\theta_i)}}{\frac{\eta}{1-\eta}\frac{(r+\sigma)\kappa}{\lambda_f(\theta_i)} + v'(n_i)}}_{\text{efficient component}} + \underbrace{\frac{\frac{\tilde{\sigma}}{\omega} v'(n_i)}{\frac{\eta}{1-\eta}\frac{(r+\sigma)\kappa}{\lambda_f(\theta_i)} + v'(n_i)}}_{\text{monopsony component}} \right)^{-1}$$

Putty-Clay Model

- Capital indexed by $v = \{v_i\}_i$ which requires $v_i = \frac{n_i}{k}$ units of i-type labor to operate
- Ex ante, firms choose type(s) in which to invest $k_{jt+1}(v) = k_{jt}(v) + \frac{1}{q_t} x_{jt}(v)$
  - Combined with $\{v_i\}_i$ units of labor produces $f(v)$ units of output, where

$$f(v) = F(1, \{v_i\}) = \left(\mu v_l^{\frac{\rho-1}{\rho}} + (1-\mu) G(1, v_h)^{\frac{\rho-1}{\rho}} \right)^{\frac{\rho}{\rho-1}}$$

- Ex post, capital services are Leontief: $y_{jt}(v) = \min\{k_{jt}(v), \min_i \{\frac{n_{ijt}(v)}{v_i}\}\} f(v)$
  - Cannot uninstall existing capital $x_{jt}(v) \geq 0$

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    $\Longrightarrow$ in principle, firm operates many capital stocks by type $k_{jt}(v)$
- **Aggregation theorem**: under some conditions, aggregate capital k_{jt} and output y_{jt} are sufficient state variables ▸ Details
  - Steady state in the putty-clay model is the same as with standard capital

Introducing the Minimum Wage

- Impose minimum wage $\overline{w}$ unexpectedly starting from steady state

$$W_{ijt+1} \geq \overline{W}_{t+1} = \sum_{s=0}^{\infty} Q_{t+1,t+1+s}(1-\sigma)^s \overline{w}$$

- Will characterize transition path to new steady state numerically

Introducing the Minimum Wage

Proposition

Let w_i *be the flow wage of type* i *in initial steady state. A small increase* $d\overline{w}$ *starting from* $\overline{w} = \min_i\{w_i\}$ *increases employment in the new steady state if and only if*

$$\frac{\widetilde{\sigma}}{\omega} > \eta(r+\sigma)\frac{\kappa_i}{\lambda'_w(\theta_i)}$$

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- To build intuition, consider individual worker type i:
  - Monopsony distortion implies wage w_i below the efficient level w_i^{comp}
  - Small increase in $\overline{w} > w_i$ brings wage closer to w_i^{comp}, raising employment Details
  - But if $\overline{w} >> w_i^{\text{comp}}$, employment falls because worker too expensive
- Type-specific minimum wages $\overline{w}_i = w_i^{\text{comp}}$ would completely undo distortions

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  - But if $\overline{w} >> w_i^{\text{comp}}$, employment falls because worker too expensive
- Uniform minimum wage $\overline{w}$ creates tradeoffs:
  - Aggregate effect: depends on mass w/ lower distortions vs. $\overline{w} >> w_i^{\text{comp}}$
  - Distributional effect: correcting high-z distortion requires $\overline{w}$ too high for low-z

Calibration w/ Short Run vs. Long Run Elasticities of Substitution

Overview of Our Calibration Strategy

- Exogenously fix some parameters, but choose key features to match data
  - Idiosyncratic productivity z: match wage distribution from CPS
  - Monopsony power ω: consider range estimated in recent literature
  - Elasticities of substitution: use changes to relative price of capital q_t
    1. Choose long-run elasticities ρ and α to match data
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- Long-run elasticities: use permanent decline in relative price starting in 1980s Details
  - Combine sector-level q_{st} ($\texttt{BEA}$) with household-level income data ($\texttt{Census} + \texttt{ACS}$)
  - Perform long-run regressions of college income share$_{st}$ on relative price q_{st}
    $\implies$ semi-elasticity ≈ -0.08 consistent with "capital-skill complementarity"
  - Target semi-elasticity in model calibration

Parameters to be Chosen

Parameter	Description	Value
Labor market frictions		
ω	Monopsony power	
κ	Vacancy posting cost	
Worker productivity distribution $\log \mathcal{N}(\mu_b, \sigma_b)$		
μ_l	Mean of non-college z (normalization)	0.00
σ_l	SD of non-college z	
μ_h	Mean of college z	
σ_h	SD of college z	
Production function		
α	Long-run elasticity of substitution b/t k and n_h	
ρ	Long-run elasticity of substitution b/t n_l and $G(k, n_h)$	
μ	Coefficient on non-college labor n_l	
λ	Coefficient on capital k	

▸ Fixed Parameters

Calibration: Empirical Targets

Moment	**Description**	**Data**	**Model**
Average wage markdown			
$\mathbb{E}[w_{ni}]/\mathbb{E}[F_{ni}]$	Average wage markdown (BHM)	0.71	0.71
Average unemployment rate			
$\mathbb{E}[s_i]/(\mathbb{E}[s_i] + \mathbb{E}[n_i])$	Average unemployment rate	0.13	0.12
Wage Distribution, CPS 2010-2014			
$\mathbb{E}[w_{hz}]/\mathbb{E}[w_{lz}]$	College wage premium	1.83	1.80
$\log w_{l75} / \log w_{l25}$	Non-college interquartile range	1.32	1.26
$\log w_{h75} / \log w_{h25}$	College interquartile range	1.29	1.24
Response to capital price decline (our data)			
$d \log \frac{k}{n} / d \log q$	Response of capital-labor ratio	-0.51	-0.52
d college share $/ d \log q$	Response of college inc. share	-0.10	-0.10
Average income shares			
$\mathbb{E}[w_i n_i]/Y$	Aggregate labor share	0.57	0.58
$\pi_h \mathbb{E}[w_{hz} n_{hz}]/\mathbb{E}[w_i n_i]$	College income share	0.43	0.43

- Choose scale parameters to match average employment rates

Calibration: Fitted Parameters

Parameter	Description	Value
Labor market frictions		
ω	Monopsony power	0.17
κ	Vacancy posting cost	0.31
Worker productivity distribution $\log \mathcal{N}(\mu_b, \sigma_b)$		
μ_l	Mean of non-college z (normalization)	0.00
σ_l	SD of non-college z	0.97
μ_h	Mean of college z	1.33
σ_h	SD of college z	1.07
Production function		
α	Long-run elasticity of substitution b/t k and n_h	0.47
ρ	Long-run elasticity of substitution b/t n_l and $G(k, n_h)$	1.27
μ	Coefficient on non-college labor n_l	0.54
λ	Coefficient on capital k	0.64

- Long-run elasticities ρ and α similar to KORV ▸ Calibrated Wage Distribution

Model Validation: Leontief in the Short Run?

- Can distinguish short run vs. long run elasticities if we have temporary changes:
  - Putty-clay model: only adjust K-L ratios on investment bought at lower price
  - Standard model: large change in K-L ratios (intertemporal substitution)

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- Use changes in after-tax price from bonus depreciation (Zwick and Mahon 2017)
  - Implemented following 2001 and 2008 recessions
  - Differentially affect sectors depending on tax-life of capital goods
  - Denote τ_{st} = PV of depreciation allowances per \$ of investment ▸ Details

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- Putty-clay model predicts regression coefficient $\alpha_1 \approx 0$ in

$$\Delta\text{college share}_{st} = \alpha_0 + \alpha(t) + \alpha_1 \Delta\tau_{st} + \varepsilon_{st}$$

Model Validated: Small Short-Run Responses to Bonus Depreciation

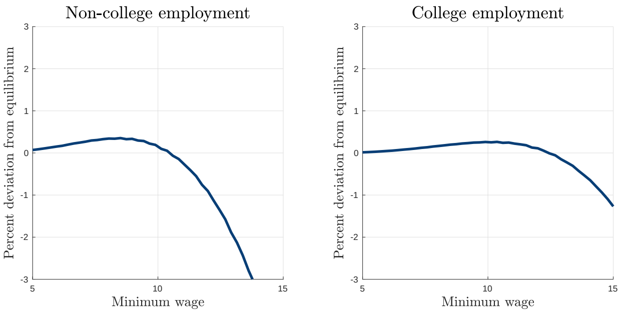
	(1)	(2)	(3)
investment_{st}	1.305*		
	(0.701)		
$\Delta\text{college share}_{st}$		**-0.019**	-0.006
		(0.013)	(0.152)
R-squared	0.97	**0.035**	0.041
Time period	Pooled	**Pooled**	Pooled
Time trend?	No	**No**	Yes

$$\Delta\text{college share}_{st} = \alpha_0 + \alpha(t) + \alpha_1 \Delta\tau_{st} + \varepsilon_{st}$$

- No significant change in college income share, consistent with putty-clay model
  - Replicate tax shock in model and find only putty-clay matches data (standard model predicts large + positive coefficient) ▸ Details
- Investment response in line with Zwick and Mahon (2017) ▸ Separate rounds ▸ Scatterplots

Quantitative Analysis of the Minimum Wage

Aggregate Effects of the Minimum Wage in the Long Run



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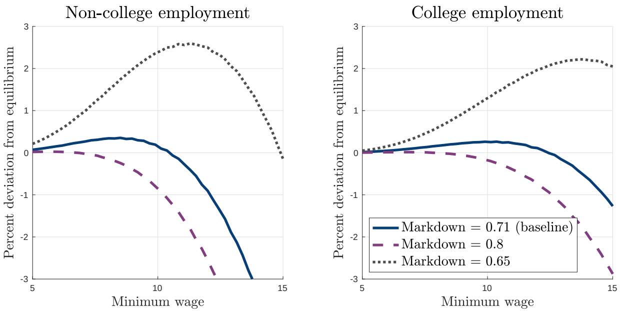
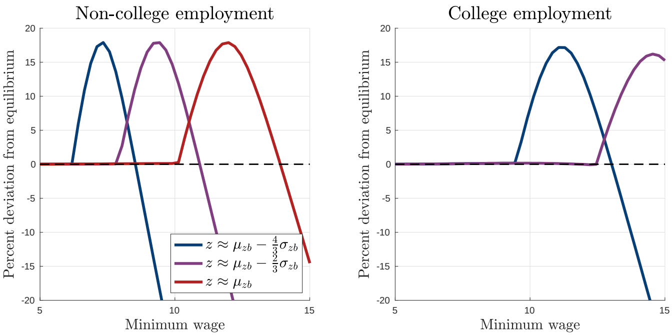


- Small increases in $\overline{w}$ reduce average monopsony distortion, but large increases make average worker too expensive
- Peak of the "Laffer curve" increasing in the degree of monopsony power

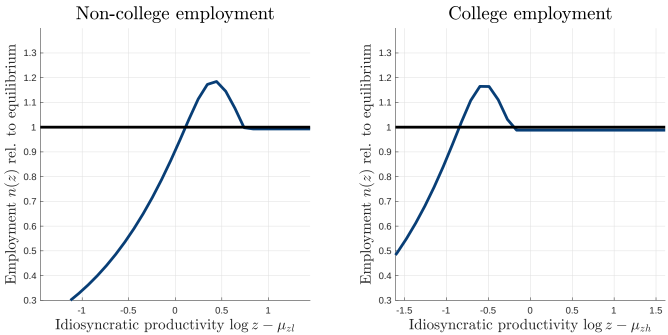
Role of $\rho - \alpha$ Labor Income

Distributional Effects of the Minimum Wage in the Long Run



- Peak of Laffer curve depends on individual productivity z
- Reducing distortion for high-z workers requires pricing out low-z workers

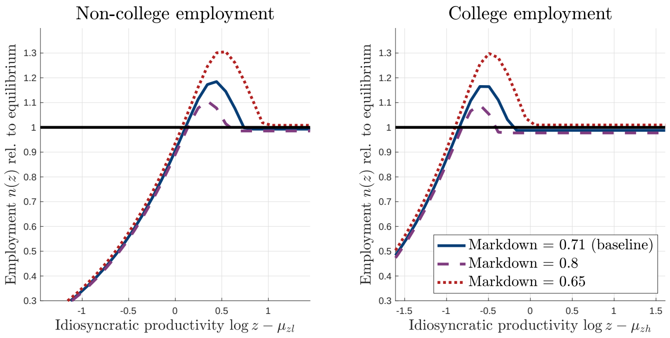
Distributional Effects of a $15 Minimum Wage in the Long Run



- Low z: inefficiently high wages reduce employment
- Medium z: reduced monopsony distortions raise employment
- High z: no significant effect on employment

▸ Role of $\rho - \alpha$ ▸ Labor Income ▸ Wage Distribution ▸ Employment Distribution ▸ Markdowns

Distributional Effects of a $15 Minimum Wage in the Long Run



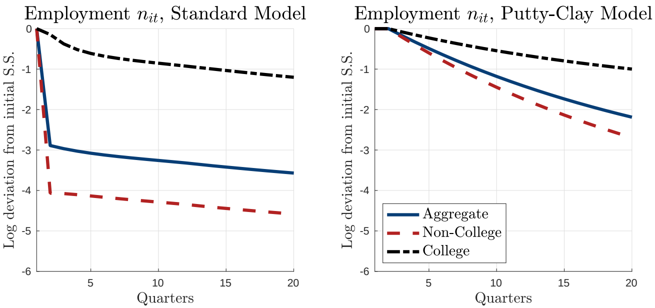
- Low z: inefficiently high wages reduce employment
- Medium z: reduced monopsony distortions raise employment
- High z: no significant effect on employment

Role of $\rho - \alpha$ | Labor Income | Wage Distribution | Employment Distribution | Markdowns

Summary of Minimum Wage Analysis

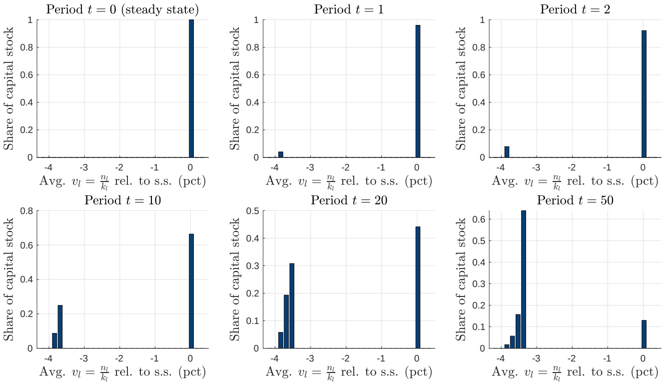
- In the long run, minimum wage can have substantial effects
  - Aggregate level: small increases in the minimum wage raise aggregate employment, but large increases lower employment
  - Micro level: minimum wage disproportionately reduces low-income employment

Short Run vs. Long Run



- Standard model converges to new steady state in $\approx 1-2$ years
  - Immediately substitute away from labor, especially non-college and low-z
- Putty-clay model is only $\approx 20\%$ to new steady state by then
  - Substitution towards less labor intensive capital takes time

Role of Putty-Clay Frictions



- Firms let old capital type depreciate to build new, less labor-intensive capital $\Longrightarrow$ transition speed largely determined by $\delta = 0.04$ ▸ Paths of Labor-Capital Ratios

Summary of Minimum Wage Analysis

- In the long run, minimum wage can have substantial effects
  - Aggregate level: small increases in the minimum wage raise aggregate employment, but large increases lower employment
  - Micro level: minimum wage disproportionately reduces low-income employment
- Short run effects are small due to putty-clay frictions
  - Won't detect long-run consequences using short-run data 1-2 years out

Alternative Policies to the Minimum Wage

Alternative Policies to the Minimum Wage

- Study alternative policies in terms of two goals:
  - Reduce monopsony distortion in aggregate
  - Redistribute towards low-income workers

- Only compare steady states (long-run effects)

Alternative Policy 1: Labor Tax Cut/Wage Subsidy

- Alternative 1: labor income tax cut $\approx$ tax credit τ_c
  - Finance w/ corporate income tax, allowing for full expensing of investment and recruiting costs (nondistortionary)
  - From firm's perspective, reduces monopsony distortion on hiring:

$$\frac{\kappa_i}{\lambda_w'(\theta_i)} = \frac{1}{r+\sigma}\left(F_{ni} - v'(n_i) - \left(\frac{\widetilde{\sigma}}{\omega} - \frac{\widetilde{\sigma}/\omega - \tau_c}{1+\tau_c}\right) v'(n_i)\right)$$

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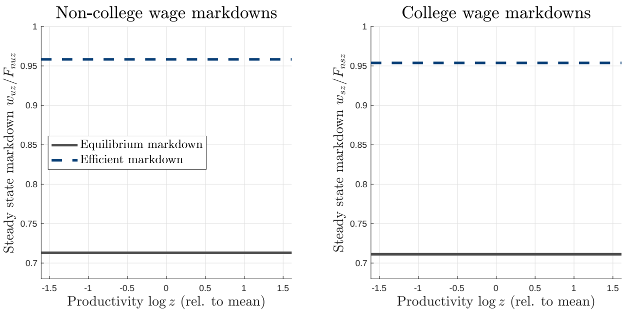
- Effect on monopsony distortion is equivalent to wage subsidy τ_f:

$$\frac{\kappa_i}{\lambda_w'(\theta_i)} = \frac{1}{r+\sigma}\left(F_{ni} - v'(n_i) - \left(\frac{\widetilde{\sigma}}{\omega} - \tau_f\left(1+\frac{\widetilde{\sigma}}{\omega}\right)\right) v'(n_i)\right) \quad \Longrightarrow \quad \tau_f = \frac{\tau_c}{1+\tau_c}$$

  - Analogous to subsidy to undo monopoly distortion in New Keynesian models
  - Compare to \$15 min wage by setting τ_f s.t. cost = loss in profits due to min wage

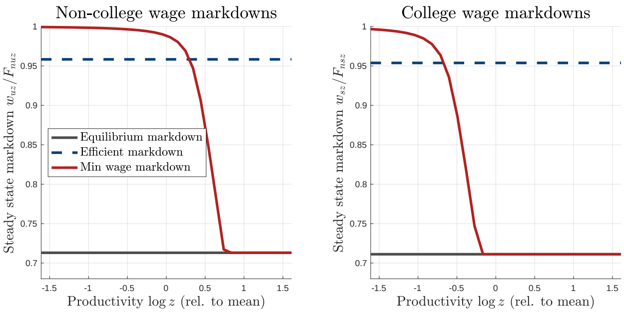
Distributional Effects of the Labor Tax Cut/Wage Subsidy



- Monopsony power implies larger markdowns than efficient level

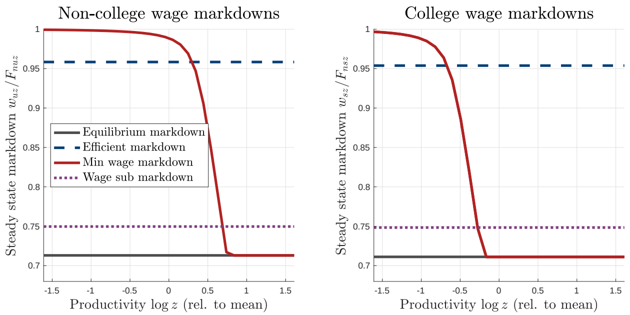
$$\frac{w_i}{F_{ni}} = \left(1 + \frac{\frac{(r+\sigma)\kappa}{\lambda_f(\theta_i)}}{\frac{\eta}{1-\eta}\frac{(r+\sigma)\kappa}{\lambda_f(\theta_i)} + v'(n_i)} + \frac{\frac{\widetilde{\sigma}}{\omega} v'(n_i)}{\frac{\eta}{1-\eta}\frac{(r+\sigma)\kappa}{\lambda_f(\theta_i)} + v'(n_i)}\right)^{-1}$$

Distributional Effects of the Labor Tax Cut/Wage Subsidy



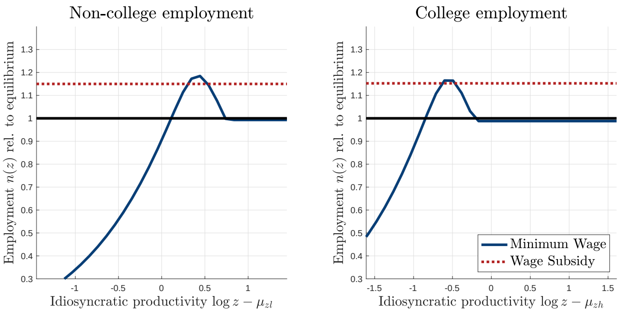
- Effect of minimum wage on markdowns depends heterogeneous across workers z:
    1. Low z: markdowns shrink below efficient level
    2. Medium z: markdowns fall closer to efficient level
    3. High z: no significant effect on markdowns

Distributional Effects of the Labor Tax Cut/Wage Subsidy



- But wage subsidy shrinks markdowns uniformly across workers

Distributional Effects of the Labor Tax Cut/Wage Subsidy



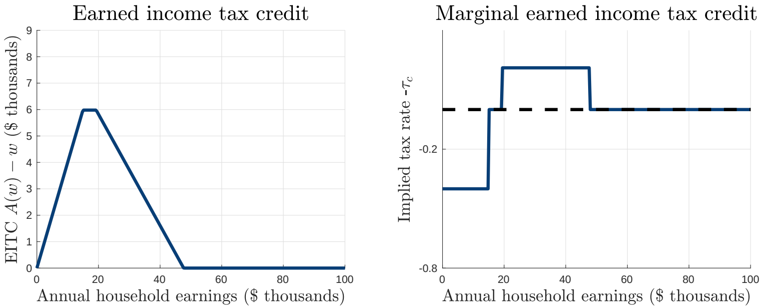
- But wage subsidy shrinks markdowns uniformly across workers, raising their employment equally

Summary of the Labor Tax Cut/Wage Subsidy

- **Verdict**: wage subsidy/tax credit improve upon min wage in terms of two main goals
  1. Micro level: increases employment uniformly across workers (does not disproportionately harm low-income)
  2. Aggregate level: always increases employment because directly reduces monopsony distortion ▸ Details

Alternative Policy 2: Earned Income Tax Credit

- Earned income tax credit (EITC): refundable tax credit for proportional to income
  - Tax credit ≈ 40% of each dollar earned up to a cap (phase-in region)
  - Eventually the credit is phased out at ≈ 20%



Alternative Policy 2: Earned Income Tax Credit

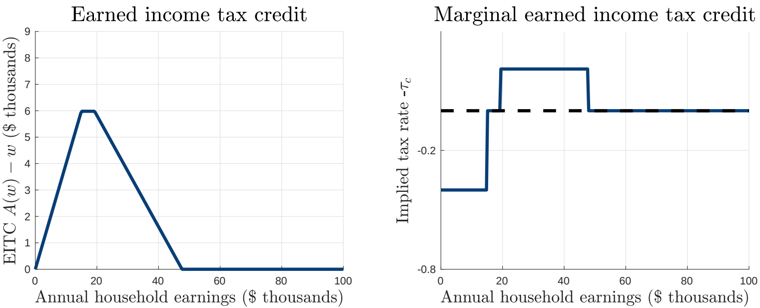
- Earned income tax credit (EITC): refundable tax credit for proportional to income
  - Tax credit $\approx 40\%$ of each dollar earned up to a cap (phase-in region)
  - Eventually the credit is phased out at $\approx 20\%$

- Alleviates monopsony distortion in phase-in region ($\tau_c > 0$)

$$\frac{\kappa_i}{\lambda_w'(\theta_i)} = \frac{1}{r+\sigma}\left(F_{ni} - v'(n_i) - \left(\frac{\widetilde{\sigma}}{\omega} - \frac{\widetilde{\sigma}\omega - \tau_c}{1+\tau_c}\right) v'(n_i)\right)$$

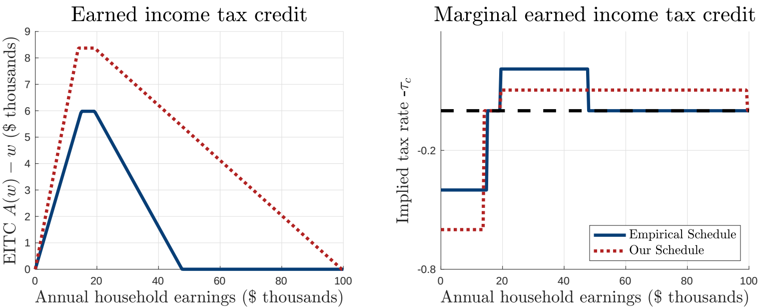
- But exacerbates monopsony distortion due to phase-out region ($\tau_c < 0$)

Alternative Policy 2: Earned Income Tax Credit



- Experiment: alter schedule s.t. corporate tax = profit loss from $15 min wage

Alternative Policy 2: Earned Income Tax Credit



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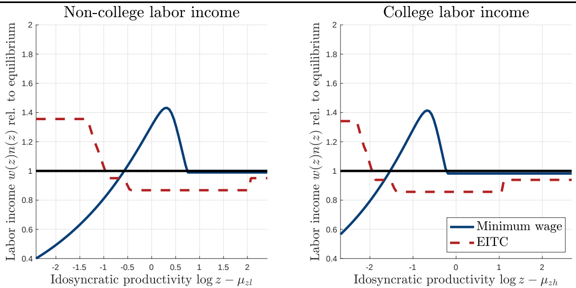
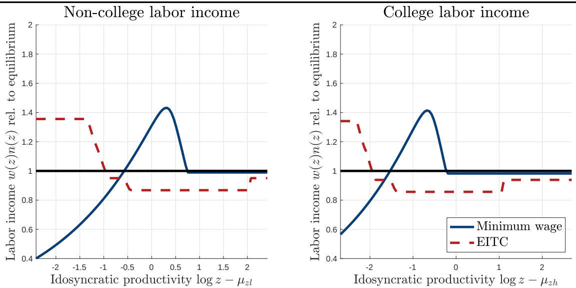
Distributional Effects of the Earned Income Tax Credit



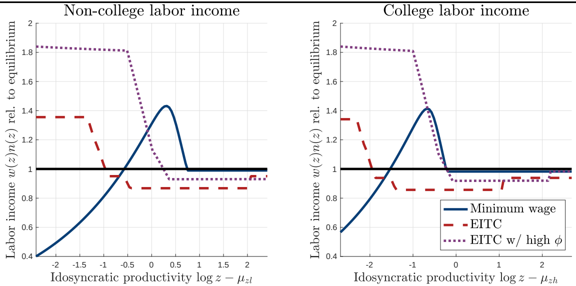
- EITC raises employment/income over phase-in region, but lowers employment/income over phase-out region (where distortion is exacerbated)

Distributional Effects of the Earned Income Tax Credit



- But the benefits over phase-in region are attenuated by indirect spillovers:
  - Larger phase-out region $\implies$ overall non-college employment n_{lt} falls
  - Reduces marginal product over phase-in region because workers are imperfectly substitutable ($\phi < \infty$)

Distributional Effects of the Earned Income Tax Credit



- But the benefits over phase-in region are attenuated by indirect spillovers:
  - Larger phase-out region $\implies$ overall non-college employment n_{lt} falls
  - Reduces marginal product over phase-in region because workers are imperfectly substitutable ($\phi < \infty$)
- Strength of negative spillovers depends crucially on substitutability ϕ

Summary of the Earned Income Tax Credit

- **Verdict**: EITC improves upon minimum wage for redistribution, but:
  - Negative spillovers from phase-out region can severely attenuate direct benefit
  - And lead to decline in aggregate employment!

Conclusion

Conclusion: Our Contributions

1. **Developed new framework** with three key features for evaluating minimum wage
   - Embeds monopsonistic competition in directed search environment
   - Has worker heterogeneity to assess distributional effects of min wage
   - Short-run elasticities of substitution $<$ long-run elasticities

2. Studied **effects of minimum wage** in calibrated version of model
   - Long-run effects can be substantial: may increase or decrease aggregate employment, but disproportionately reduces low-income employment
   - Short run effects are small due to putty-clay frictions

3. Compared with **two natural alternatives**: wage subsidy and earned income tax credit
   - Wage subsidy reduces monopsony distortion uniformly across workers
   - EITC reduces distortion for low-income workers but exacerbates for middle-income workers, generating (potentially large) negative spillovers

Appendix

Monopsony Distortion in Dynamic Model ▸ Back

- Optimal labor demand of firms ("free entry" in vacancy posting):

$$\frac{\kappa_i}{\lambda_w'(\theta_{ijt})} = Q_{t,t+1}\left(\underbrace{Y_{ijt+1}}_{\text{PV of marginal products}} - \underbrace{V_{it+1}}_{\text{PV of marginal distutility}} - \underbrace{\lambda_f(\theta_{ijt})a_{ijt}\widetilde{V}_{ijt+1}}_{\text{monopsony distortion}}\right) \quad \text{where}$$

$$\widetilde{V}_{ijt+1} = \frac{1}{\omega}v'(n_{it})\left(\frac{n_{ijt+1}}{n_{it+1}}\right)^{\frac{1}{\omega}-1}\frac{1}{n_{it+1}} + \ldots$$

- Monopsony distortion: marginal hire increases PV of marginal disutilities $\widetilde{V}_{ijt+1}$ for all other inframarginal hires $\lambda_f(\theta_{ijt})a_{ijt}$
  - Must compensate those inframarginal hires to satisfy participation constraint
  - Note that monopsony distortion = 0 when $\omega \to \infty$

- Generalization of Robinson (1933) firm-specific labor supply to search model

Aggregation Theorem (Atkeson-Kehoe 1999) Back

Proposition

If all capital is fully utilized, i.e. $n_{ijt} = v_i k_{jt}(v)$ for all i, t, and v, then the aggregate capital stock k_{jt} and aggregate output y_{jt} are sufficient statistics for $\{k_{jt}(v)\}$:

1. *Firms only invest in one type:* $x_{jt}(v) > 0$ *for at most one* $v \equiv v^*_{jt+1}$
2. *Total capital follows* $k_{jt+1} = (1-\delta)k_{jt} + \frac{1}{q_t} x_{jt}(v^*_{jt+1})$
3. *Total output follows* $y_{jt+1} = (1-\delta)y_{jt} + \frac{1}{q_t} x_t(v^*_{jt+1}) f(v^*_{jt+1})$

Aggregation Theorem (Atkeson-Kehoe 1999) Back

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- $f(v)$ concave $\implies$ only one labor-to-capital ratio v is optimal given current prices
  - Let other types of capital depreciate
- So total capital = undepreciated old capital + new investment, and
  total output = output produced by old capital + output produced by new investment

Aggregation Theorem (Atkeson-Kehoe 1999) ▸ Back

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- Two nice implications:
  1. Only affects firms' decisions through marginal products Y_{ijt+1}
  2. Steady state is the same as the neoclassical model

▸ Task-based production function

Task-Based Production Function

Back

- Limitation of CES: decreases in q_t increase wage of all types w_{it}
  - Increases in capital stock raise marginal product F_{ni} $\forall i$

- Task-based models allow for wage stagnation if q_t falls
  - Increases in capital stock may decrease F_{ni} for some i

- Would only change our production function $F(k, \{n_i\})$.
  Simple proof of concept (drawn from Hubmer-Restreppo 2021):

$$y_t = \left(\int_0^1 y_t(x)^{\frac{\eta-1}{\eta}} dx \right)^{\frac{\eta}{\eta-1}}, \text{ where } y_t(x) = k_t(x) + \psi_n(x) n_t(x)$$

  - $x \in [0, 1]$ indexes a task
  - $k_t(x)$ and $n_t(x)$ = amount of capital/labor allocated to task x
  - Tasks ordered such that $\psi_n'(x) > 0$

Task-Based Production Function

Back

- The task-based production function solves

$$F(k,n) = \max_{k(x),n(x)} \left(\int_0^1 (k_t(x) + \psi_n(x) n_t(x))^{\frac{\eta-1}{\eta}} \, dx \right)^{\frac{\eta}{\eta-1}}$$

$$\text{such that } \int_0^1 k(x)dx \leq k, \; \int_0^1 n(x)dx \leq n,$$

$$k(x) \geq 0 \text{ for all } x, \text{ and } n(x) \geq 0 \text{ for all } x.$$

- Solution: cutoff $\alpha \in [0,1]$ s.t. $n(x) = 0 \forall x \leq \alpha$ and $k(x) = 0 \forall x > \alpha$
  - Capital allocation $k(x) = k/\alpha$
  - Labor allocation $n(x) = n \frac{\psi_n(x)^{\eta-1}}{\Psi_n(\alpha)}$, $\Psi_n(\alpha) = \int_\alpha^1 \psi_n(x)^{\eta-1} dx$
  - Cutoff solves $\alpha \psi_n(\alpha) = \Psi_n(\alpha) \frac{k}{n}$

Task-Based Production Function ▸ Back

- Can write the task-based production function as
$$F(k,n) = \left(\alpha^{\frac{1}{\eta}} k^{\frac{\eta-1}{\eta}} + \Psi_n(\alpha)^{\frac{1}{\eta}} n^{\frac{\eta-1}{\eta}}\right)^{\frac{\eta-1}{\eta}} \quad \text{where } \alpha \text{ solves}$$
$$\alpha \psi_n(\alpha) = \Psi_n(\alpha)\frac{k}{n}$$

- $F(k,n)$ is CRS, so capital EE pins down $\mathcal{K} = \frac{k}{n}$ and therefore α

- But now an increase in $\mathcal{K}$ may decrease $F_n \equiv F_n(\mathcal{K};\alpha(\mathcal{K}))$:
$$F_n(\mathcal{K};\alpha(\mathcal{K})) = \frac{\partial F(\mathcal{K},1;\alpha(\mathcal{K}))}{\partial n} - \alpha'(\mathcal{K})\frac{k}{n^2}\frac{\partial F(\mathcal{K},1;\alpha(\mathcal{K}))}{\partial \alpha}$$

- Key question: how to separately identify η vs. $\alpha(\mathcal{K})$?

Putty-Clay Task-Based Production Function ▸ Back

- Suppose a type of capital is indexed by (α, v) and that

$$y_{jt}(\alpha, v) = \min\{k_t(\alpha, v), \frac{n_t(\alpha, v)}{v} f(v)$$

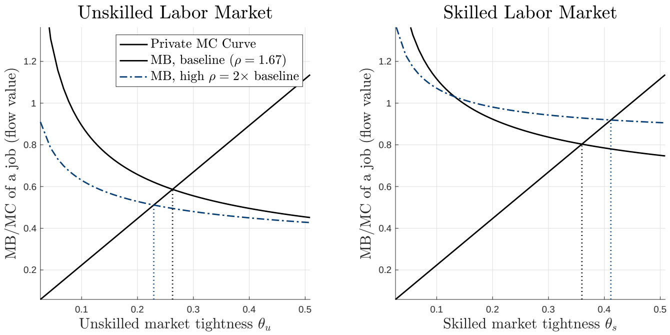
where $f(v) = F(k, n; \alpha)/k$ from above.

- Then you will get similar aggregation theorems as before

$$y_{t+1} = (1-\delta)y_t + \frac{1}{q_t}\int x_t(\alpha, v) f(v) d\alpha dv$$
$$n_{t+1} = (1-\delta)n_t + \frac{1}{q_t}\int x_t(\alpha, v) v d\alpha dv$$

Role of Capital-Skill Complementarity

Back



$$F_{nu}(n_u, n_s) = \frac{\kappa_u}{\eta}(\sigma n_u)^{\frac{1}{\eta}}(r + \sigma) + v'(n_u) + \frac{\widetilde{\sigma}}{\omega}v'(n_u)$$

$$F_{ns}(n_u, n_s) = \frac{\kappa_s}{\eta}(\sigma n_s)^{\frac{1}{\eta}}(r + \sigma) + v'(n_s) + \frac{\widetilde{\sigma}}{\omega}v'(n_s)$$

- If non-college workers more substitutable with college workers/capital, gap in equilibrium marginal products widens

Effect of Minimum Wage on Employment ▸ Back

- To build intuition, consider a special case in steady state:
  1. No heterogeneity in z within broad skill group $b \in \{n, c\}$
  2. Exogenous search intensity $s = 1$

- Euler equation pins down optimal choice of capital $k(n_n, n_c)$

  $\implies$ marginal products $F_{nb}(n_n, n_c) \equiv F_{nb}(k(n_n, n_c), n_n, n_c)$

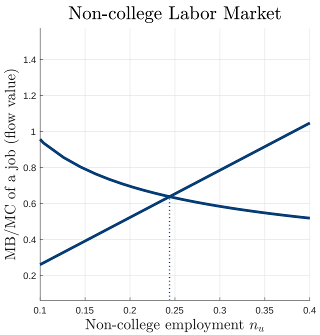
- Using $n_b = \frac{1}{\sigma}\lambda_w(\theta_b)$, employment determined by the system

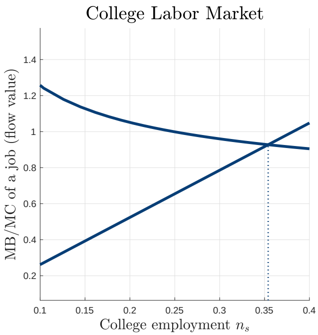
$$F_{nb}(n_u, n_s) = \kappa_b(\sigma n_b)^{\frac{\eta}{1-\eta}}(r+\sigma) + w(n_b) + \frac{\widetilde{\sigma}}{\omega} v'(n_b) \text{ if not binding}$$

$$F_{nb}(n_u, n_s) = \kappa_b(\sigma n_b)^{\frac{\eta}{1-\eta}}(r+\sigma) + \overline{w} + \gamma_b(n_{nc}, n_c; \overline{w})\frac{\widetilde{\sigma}}{\omega} v'(n_b) \text{ if binding}$$

Effect of Minimum Wage in Special Case

Back



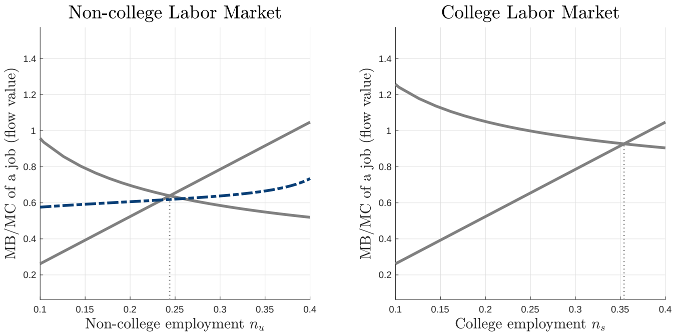


- Firms' private marginal cost of hiring in equilibrium:

$$MC^*(n_u) = \kappa_b(\sigma n_b)^{\frac{\eta}{1-\eta}}(r+\sigma) + w(n_b) + \frac{\widetilde{\sigma}}{\omega}v'(n_b)$$

where $w(n_b) = \eta(F_{nb} - \frac{\widetilde{\sigma}}{\omega}v'(n_b)) + (1-\eta)v'(n_b)$

Effect of Minimum Wage in Special Case ▸ Back

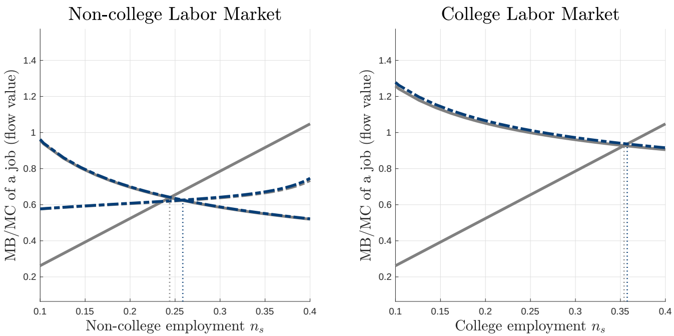


$$MC^*(n_{ub}) = \kappa_b(\sigma n_b)^{\frac{\eta}{1-\eta}}(r+\sigma) + w(n_b) + \frac{\widetilde{\sigma}}{\omega}v'(n_b)$$

$$\overline{MC}(n_b) = \kappa_b(\sigma n_b)^{\frac{\eta}{1-\eta}}(r+\sigma) + \overline{w} + \gamma_b(n_u, n_s; \overline{w})\frac{\widetilde{\sigma}}{\omega}v'(n_b)$$

- Min wage increases intercept ($\overline{w} \geq w(n_b^*)$), but decreases slope ($\gamma_b(n_{nc}^*, n_c^*; \overline{w}) < 1$) $\implies$ net effect on marginal cost is ambiguous

Effect of Minimum Wage in Special Case ▸ Back



- For small increases in $\overline{w}$, net effect decreases marginal cost $\Longrightarrow$ increases employment
- Some positive spillovers through marginal products

Effect of Minimum Wage in Special Case ▸ Back

- For large increases in $\overline{w}$, net effect increases marginal cost

  $\Longrightarrow$ generates a "Laffer curve" as function of the minimum wage

Data Sources ▸ Back

- Combine two sources of data:
  1. Sector-level prices from **BEA detailed fixed asset tables** ▸ Details

$$\Delta \log q_{st} \equiv \sum_{a=1}^{A} \omega_{sat} \Delta \log q_{at}$$

  2. Household-level income data from **Census** (decadal 1960-2000) and **American Community Survey** (annual after 2000)

- Main outcome of interest is sector-level college income share:

$$\text{college share}_{st} = \frac{\text{sector } s \text{ income to} \geq \text{bachelors degree}}{\text{total labor income in sector } s}$$

"Capital-Skill Complementarity" in the Long Run ▸ Back

	(1)	(2)	(3)	(4)
investment$_{st+10}$	-0.93***	**-1.37*** **		
	(0.210)	**(0.269)**		
college share$_{st+10}$				
R-squared	0.135	**0.390**		
Time Fixed Effects?	No	**Yes**		

$$\log i_{st+10} - \log i_{st} = \alpha_0 + \alpha_t + \alpha_1(\log q_{st+10} - \log q_{st}) + \varepsilon_{st}$$

- Investment price elasticity ≈ -1.4 within "consensus range" (Zwick and Mahon 2017)

Capital-Skill Complementarity in the Long Run ▸ Back

	(1)	(2)	(3)	(4)
$\text{investment}_{st+10}$	-0.93***	-1.37***		
	(0.210)	(0.269)		
$\text{college share}_{st+10}$			-0.049***	**-0.083*** **
			(0.017)	**(0.016)**
R-squared	0.135	0.390	0.04	**0.18**
Time Fixed Effects?	No	Yes	No	**Yes**

$$\text{college share}_{st+10} - \text{college share}_{st} = \alpha_0 + \alpha_t + \alpha_1(\log q_{st+10} - \log q_{st}) + \varepsilon_{st}$$

- Semi-elasticity of college income share ≈ -0.08 consistent with "capital-skill complementarity"
- We target 20-year semi-elasticity in response to permanent price change q^* ▸ Details

▸ Scatterplots ▸ Capital-Labor Ratios ▸ By Decade ▸ Twenty Year Changes

Capital-Skill Complementarity in the Long Run

Back

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			(0.017)	**(0.016)**
R-squared	0.135	0.390	0.04	**0.18**
Time Fixed Effects?	No	Yes	No	**Yes**

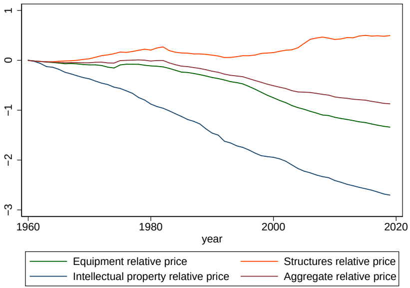
$$\text{college share}_{st+10} - \text{college share}_{st} = \alpha_0 + \alpha_t + \alpha_1(\log q_{st+10} - \log q_{st}) + \varepsilon_{st}$$

- Relationship to Krusell, Ohanian, Rios-Rull, and Violante (2000):
  - Our inferred elasticities depend on labor market frictions/labor supply
  - We use sectoral variation to control for aggregate conditions

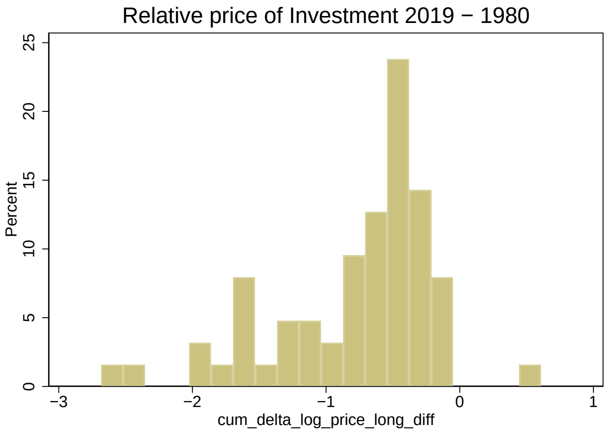
Relative Price of Investment Goods ▸ Back

$$\Delta \log q_{st} \equiv \sum_{a=1}^{A} \omega_{sat} \Delta \log q_{at}$$

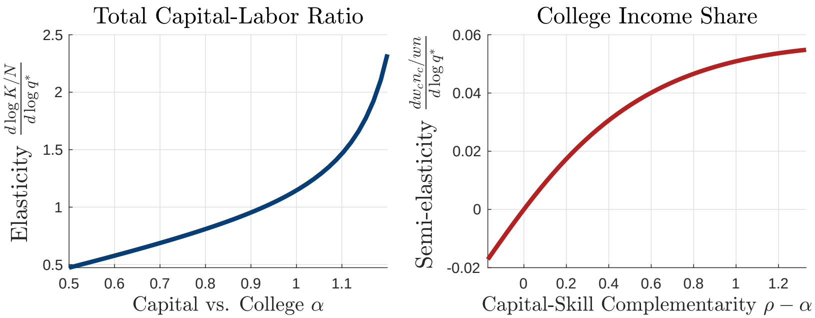
- $\Delta \log q_{at}$: relative price of good a ($\approx$ 100 assets, excluding R&D and artistic originals)
- ω_{sat}: Tornqvist share of sector s investment expenditures on good a ($\approx$ 65 sectors)



Histogram of Relative Price Changes ▸ Back



Mapping to Production Elasticities Back



1. Decline in relative price decreases marginal product of capital
   $\implies$ increases average capital-to-labor ratio

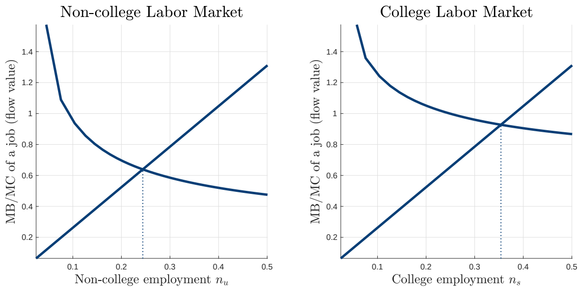
2. Higher capital-to-labor ratio increases marginal product of labor, differentially depending on capital-skill complementarity ρ and α

Details

Identifying Long-Run Elasticities ▸ Back

$$F_{nu}(n_u, n_s) = \frac{\kappa_u}{\eta}(\sigma n_u)^{\frac{1}{\eta}}(r+\sigma) + v'(n_u) + \frac{\widetilde{\sigma}}{\omega}v'(n_u)$$

$$F_{nb}(n_u, n_s) = \frac{\kappa_s}{\eta}(\sigma n_s)^{\frac{1}{\eta}}(r+\sigma) + v'(n_s) + \frac{\widetilde{\sigma}}{\omega}v'(n_s)$$



Identifying Long-Run Elasticities ▸ Back

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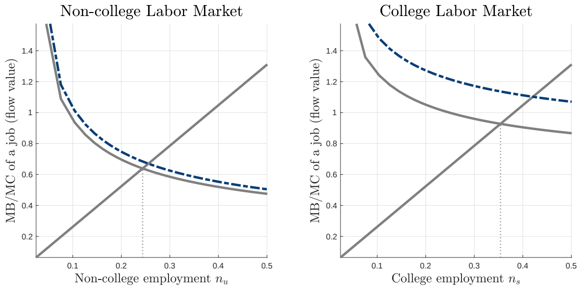

- Direct effect (change in F_{nb} holding n_{-b} fixed) stronger for high-college due to capital-skill complementarity (ρ vs. α)

Identifying Long-Run Elasticities ▸ Back

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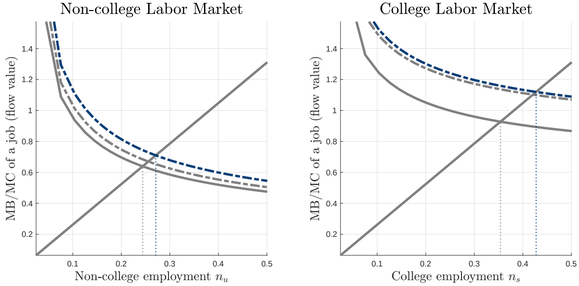
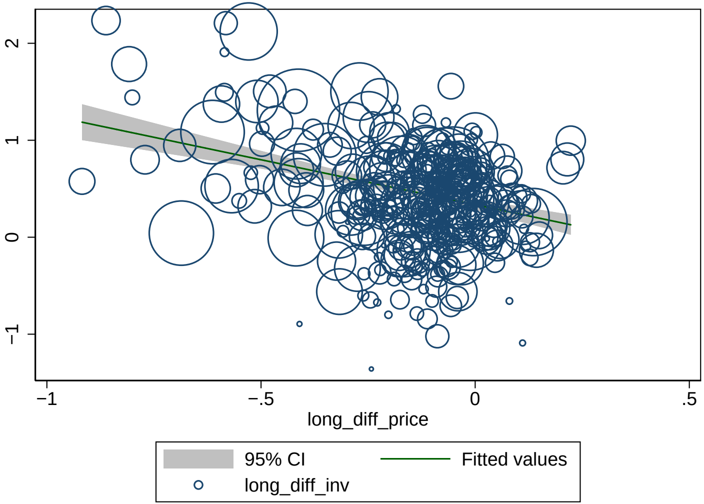


- Higher n_b also raises marginal product of n_{-b} (indirect effect), but smaller than direct effect

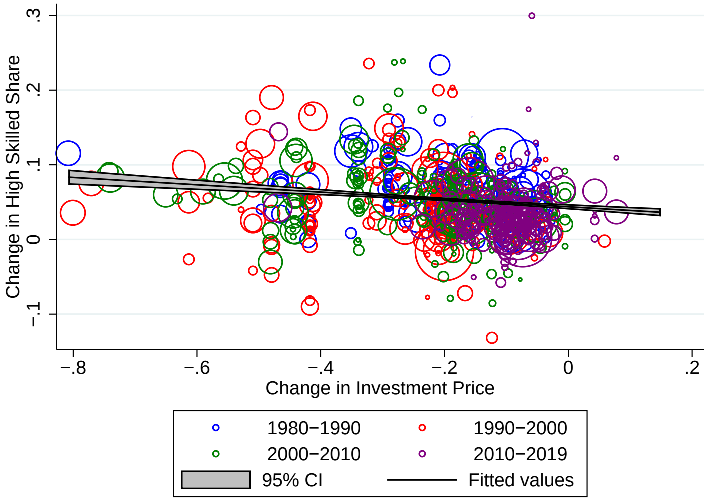
Scatterplot of Long Run Investment Relationship

Back



Scatterplot of Long-Run College Income Share

▸ Back



Long-Run Response of Capital to Labor Ratio ▸ Back

	(1)	(2)	(3)	(4)	(5)
$\log(k_{st+10}/wn_{st+10})$	-0.51***	-1.34***	-0.202	-0.34	-0.28*
	(0.12)	(0.23)	(0.22)	(0.196)	(0.15)
R-Squared	0.69	0.25	0.01	0.04	0.02
Time Fixed Effects	Yes	No	No	No	No
Time Period	Pooled	1980s	1990s	2000s	2010s

$$\log(k_{st+10}/wn_{st+10}) - \log(k_{st}/wn_{st}) = \alpha_0 + \alpha_t + \alpha_1 (\log q_{st+10} - \log q_{st}) + \varepsilon_{st}$$

Results by Decade for Investment ▸ Back

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\log q_{st+10} - \log q_{st}$	-0.93***	**-1.37*****	-0.75	-1.65***	-1.71***	-2.21***	-0.64**	-0.69*
	(0.210)	**(0.269)**	(0.891)	(0.290)	(0.363)	(0.286)	(0.235)	(0.324)
Observations	376	**376**	63	62	63	63	62	63
R^2	0.135	**0.390**	0.012	0.351	0.267	0.495	0.110	0.069
Sample	Pooled	**Pooled**	60-70	70-80	80-90	90-00	00-10	10-19
Time FEs	No	**Yes**	No	No	No	No	No	No

$$\log i_{st+10} - \log i_{st} = \alpha_0 + \alpha_t + \alpha_1(\log q_{st+10} - \log q_{st}) + \varepsilon_{st}$$

Results by Decade for College Income Share ▸ Back

	(1)	(2)	(3)	(4)	(5)	(6)
college share$_{t+10}$	-0.049***	**-0.083*** **	-0.087**	-0.102***	-0.055***	-0.097***
	(0.017)	**(0.016)**	(0.038)	(0.029)	(0.023)	(0.034)
R-Squared	0.04	**0.18**	0.09	0.10	0.06	0.08
Time Fixed Effects	No	**Yes**	No	No	No	No
Time Period	Pooled	**Pooled**	1980s	1990s	2000s	2010s

$$\text{college share}_{st+10} - \text{college share}_{st} = \alpha_0 + \alpha_t + \alpha_1 \left(\log q_{st+10} - \log q_{st}\right) + \varepsilon_{st}$$

Long Run Effects Over 20 Years ▸ Back

	(1)	(2)
bach share$_{t+20}$	-0.101***	**-0.096*** **
	(0.020)	**(0.021)**
R-Squared	0.17	**0.20**
Time Fixed Effects	No	**Yes**
Time Period	Pooled	**Pooled**

$$\text{college share}_{st+20} - \text{college share}_{st} = \alpha_0 + \alpha_t + \alpha_1 (\log q_{st+20} - \log q_{st}) + \varepsilon_{st}$$

- Semi-elasticity of college income share ≈ -0.10
- SD of price changes $\approx$ 0.26 increase college share by 2.5pp (relative to mean increase of 9.8pp over this period)

Long Run Effects Over 20 Years ▸ Back

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Time Fixed Effects	No	**Yes**
Time Period	Pooled	**Pooled**

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- Semi-elasticity of college income share ≈ -0.10
- SD of price changes ≈ 0.26 increase college share by 2.5pp (relative to mean increase of 9.8pp over this period)

Mapping to Production Elasticities ▸ Back

- Suppose long-run estimates in data ≈ comparing steady states with different relative prices q^*
- Consider simple model where $s_{ijt} \equiv 1$ and w/out $z-$ heterogeneity

$$F_k(1, \frac{n_u}{k}, \frac{n_s}{k}) = q^*(r+\delta)$$

$$F_{nb}(1, \frac{n_u}{k}, \frac{n_s}{k}) = \frac{\kappa_b}{\eta}(\sigma n_b)^{\frac{1}{\eta}}(r+\sigma) + v'(n_b) + \frac{\widetilde{\sigma}}{\omega}v'(n_b) \text{ for } b \in \{h, l\}$$

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1. Decline in relative price decreases marginal product of capital
   $\implies$ increases average capital-to-labor ratio

Mapping to Production Elasticities ▸ Back

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2. Higher capital-to-labor ratio increases marginal product of labor, differentially depending on ρ and α ▸ Details

Bonus Depreciation Allowance ‣ Back

- Normal IRS rules: deduct new investment expenditures over time according to MACRS schedule δ_{at}

$$\text{Present value } \tau_s = \sum_{t=0}^{T} \left(\frac{1}{1+r} \right)^t \mathbb{E}_a[\delta_{at} | s]$$

Bonus depreciation allows firms to immediately deduct fraction $\theta_t \in \{0.3, 0.5, 1\}$

$$\text{Present value } \tau_{st} = \theta_t + (1 - \theta_t)\tau_s$$

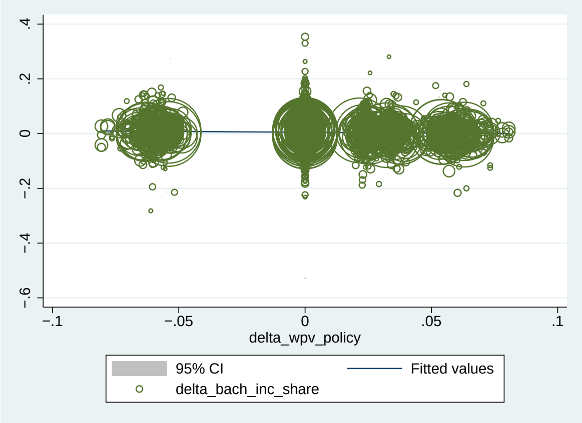
Separating the Two Rounds of Bonus ▸ Back

	(1)	(2)	(3)	(4)	(5)
investment_{st}	1.305*				
	(0.701)				
$\Delta\text{college share}_{st}$		0.003	-0.045**	**-0.019**	-0.006
		(0.036)	(0.020)	**(0.013)**	(0.152)
R-squared	0.97	0.046	0.081	**0.035**	0.041
Time period	Pooled	Bonus 1	Bonus 2	**Pooled**	Pooled
Time trend?	No	Linear	Linear	**Linear**	No
Time Fixed Effects?	Yes	No	No	**No**	Yes

$$\Delta\text{college share}_{st} = \alpha_0 + \alpha(t) + \alpha_1 \Delta z_{st} + \varepsilon_{st}$$

Small Short-Run Responses to Bonus Depreciation

Back



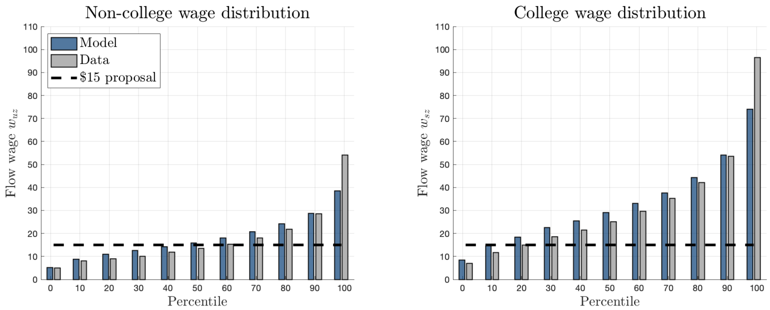
Calibration: Fixed Parameters ▸ Back

Parameter	Description	Value
Households		
β	Discount factor (quarterly)	0.99
γ	Labor supply "elasticity"	2.00
π_l	Fraction of non-college households	0.75
ϕ	Elasticity of substitution across z	2.00
Firms		
δ	Capital depreciation rate (equipment + software)	0.04
Labor market frictions		
σ	Job destruction rate	0.11
η	Elasticity of matching function w.r.t. vacancies	0.50

$$u(c_i - v(n_i) - h(s_i)) = \log\left(c_i - \chi_b\left(\frac{n_i^{1+1/\gamma}}{1+1/\gamma} + \frac{s_i^{1+1/\gamma}}{1+1/\gamma}\right)\right)$$

Calibrated Wage Distribution

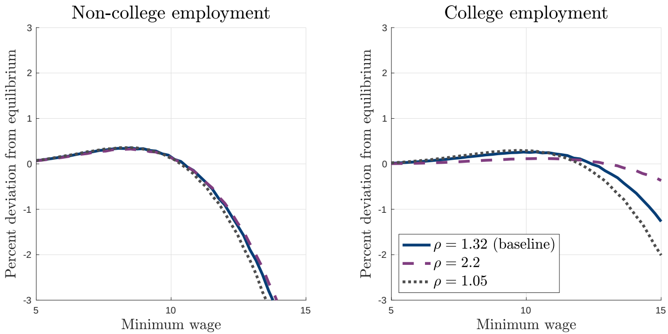
Back



- $z \sim \log \mathcal{N}(\mu_b, \sigma_b)$ fits wage distribution fairly well
  - Captures bottom half, where minimum wage will bind
  - Underpredicts thickness of right tail

Aggregate Effects of the Min Wage in the Long Run

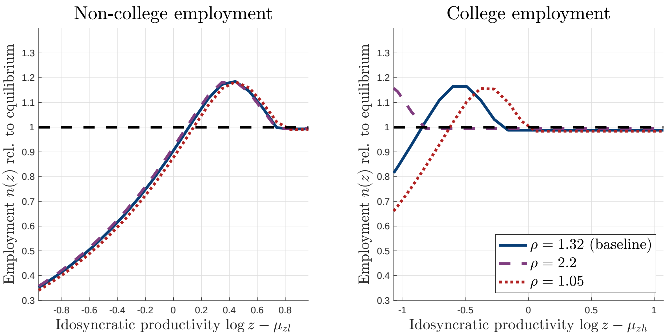
▸ Labor Income



- Small increases in $\overline{w}$ reduce average monopsony distortion, but large increases make average worker too expensive
- Peak of the "Laffer curve" increasing in the degree of monopsony power
- Distribution by education depends on capital-skill complementarity

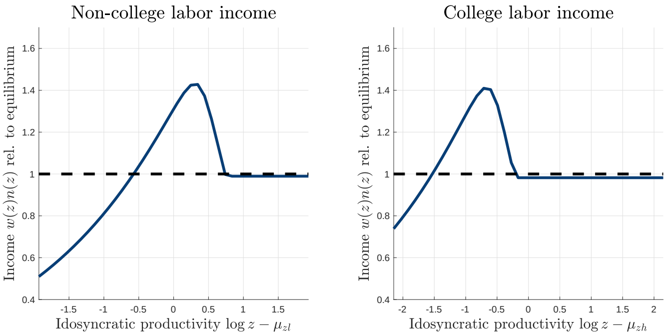
Long Run Effects of a $15 Minimum Wage: Comparative Statics

Back



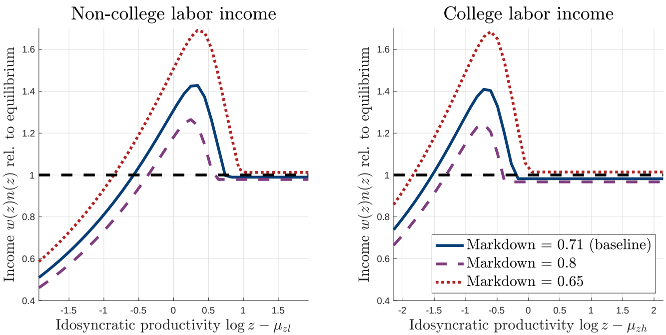
Long Run Effects of a $15 Minimum Wage: Labor Income

Back



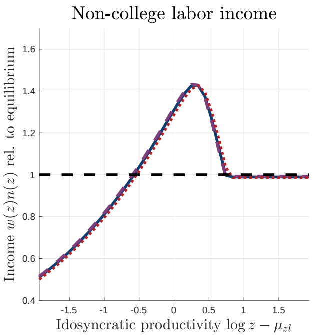
Long Run Effects of a $15 Minimum Wage: Labor Income

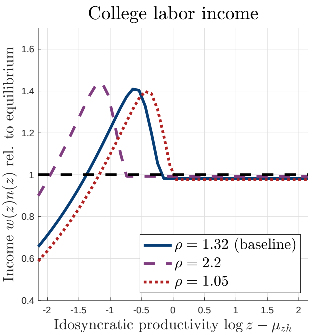
Back



Long Run Effects of a $15 Minimum Wage: Labor Income

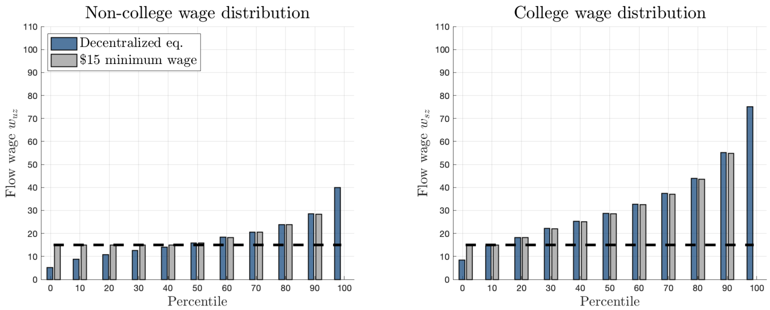
Back





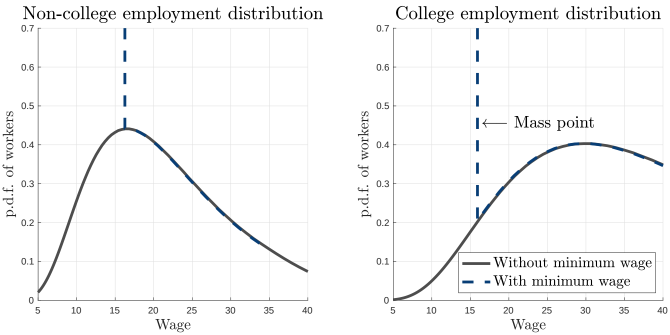
Long-Run Effects of a $15 Minimum Wage

Back



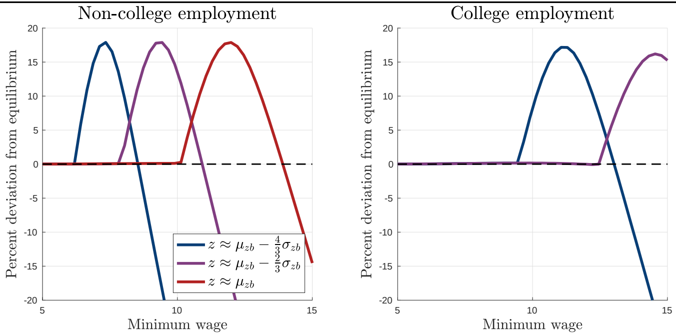
- By construction, raises wages at bottom of the distribution (especially for non-college workers)
- But slightly lowers wages for the rest of the distribution

Long-Run Effects of a $15 Minimum Wage ▸ Back

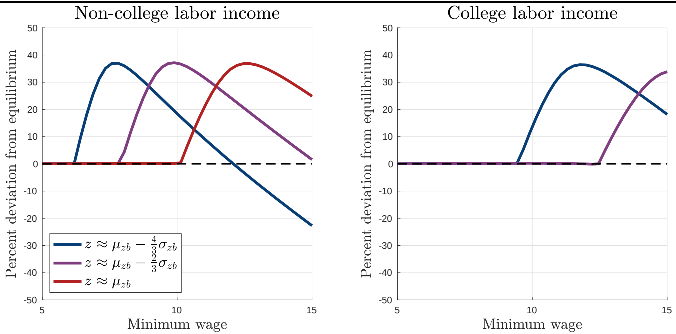


- Min wage creates a mass point in the employment distribution, but mass is $<$ fraction below $\overline{w}$ in decentralized equilibrium
- Job destruction disproportionately borne by non-college

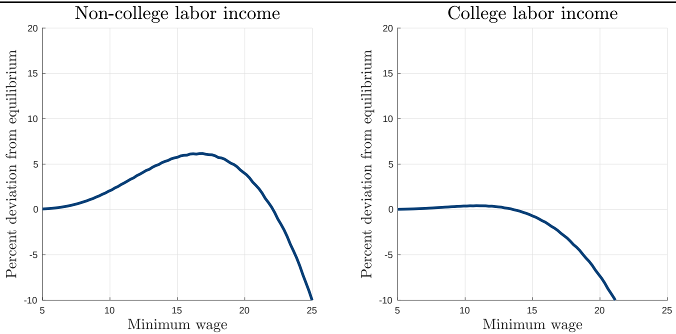
Long Run Minimum Wage "Laffer Curves" ▸ Back



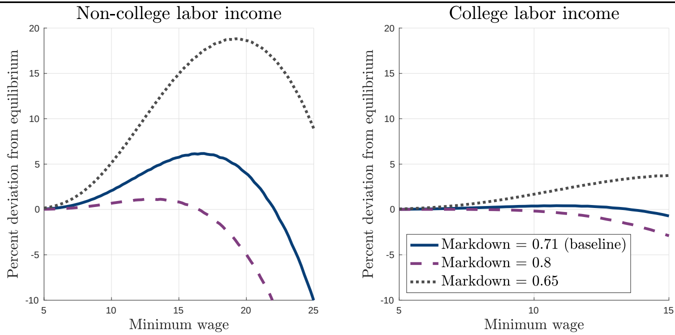
Long Run Minimum Wage “Laffer Curves” ▸ Back



Long Run Minimum Wage “Laffer Curves” ▸ Back

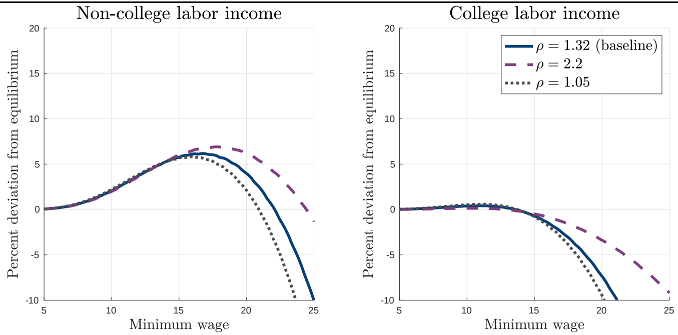


Long Run Minimum Wage "Laffer Curves" ▸ Back

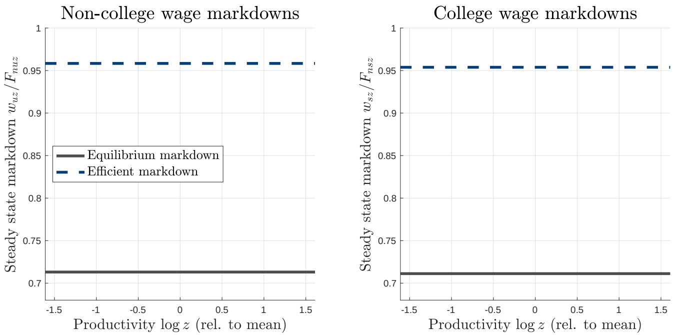


Long Run Minimum Wage "Laffer Curves"

Back



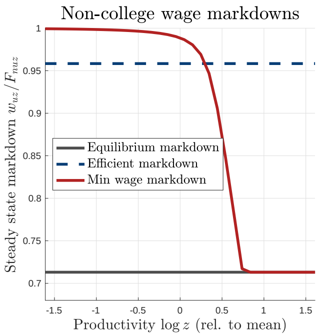
Distributional Effects of a $15 Minimum Wage in the Long Run ▸ Back

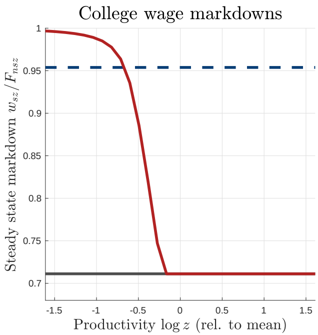


- Monopsony power implies larger markdowns than efficient level

$$\frac{w_i}{F_{ni}} = \left(1 + \frac{\frac{(r+\sigma)\kappa}{\lambda_f(\theta_i)}}{\frac{\eta}{1-\eta}\frac{(r+\sigma)\kappa}{\lambda_f(\theta_i)} + v'(n_i)} + \frac{\frac{\widetilde{\sigma}}{\omega} v'(n_i)}{\frac{\eta}{1-\eta}\frac{(r+\sigma)\kappa}{\lambda_f(\theta_i)} + v'(n_i)} \right)^{-1}$$

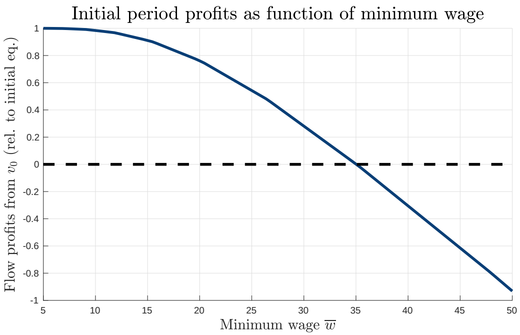
Distributional Effects of a $15 Minimum Wage in the Long Run
Back





- Effect of minimum wage on markdowns depends on idiosyncratic productivity z
    1. Low z: markdowns shrink below efficient level
    2. Medium z: markdowns fall closer to efficient level
    3. High z: no significant effect on markdowns

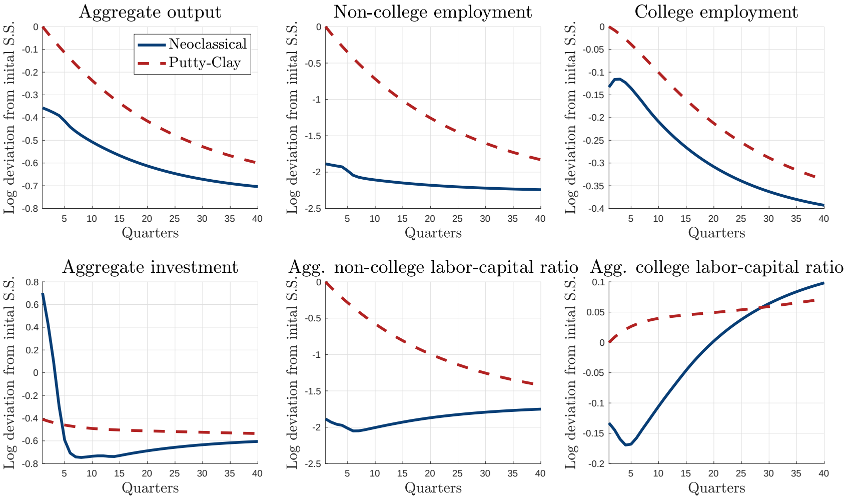
Why Firms Still Fully Utilize Capital ▸ Back



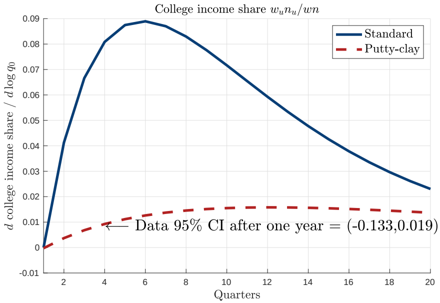
- Fully utilize capital of type v if $f(v) - \int w_{it} n_{it}(v) \pi_i di > 0$
    - Condition satisfied for all v_{t+1} due to monopsony profits
- E.g. upon impact, condition satisfied if minimum wage $\leq$ \$34

Minimum Wage Transition Paths

▸ Back

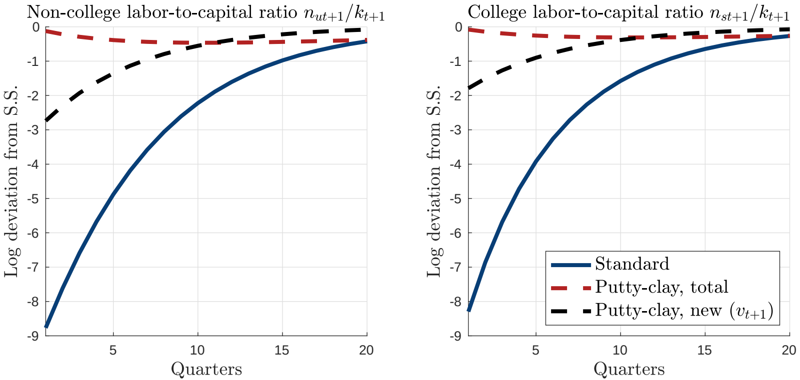


Validating Putty-Clay Frictions ▸ Back

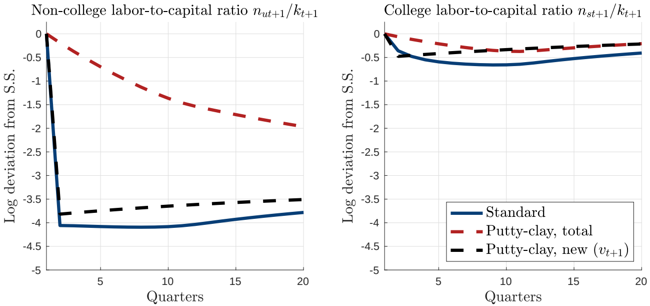


- Bonus depreciation in model = transitory shock to q_0 w/ $\log q_t = \rho \log q_{t-1}$
  - Set $q_0 \approx 50\%$ bonus and $\rho_q = 1$ year half-life
  - Set $Q_{t,t+1} = \beta$ because data controls for aggregate conditions
- Neoclassical model: large changes in K-L ratios and therefore college income share
- Putty-clay model: smaller change in K-L ratios gives realistic response of college income share ▸ Details

K-L Ratios Following Bonus Depreciation Shock ▸ Back

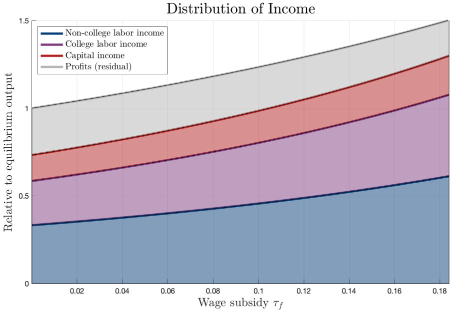


Role of Putty-Clay Frictions ▸ Back



- Neoclassical model: labor-capital ratios immediately adjust
- Putty-clay model: L-K ratios on new investment v^*_{it+1} adjust quickly, but investment is small fraction of the total capital stock

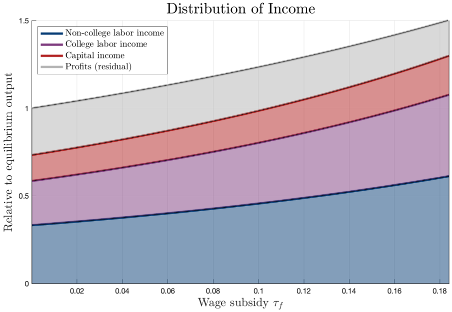
Evaluating the Wage Subsidy: Aggregate Effects ▸ Back



- Subsidy increases both labor income and aggregate GDP

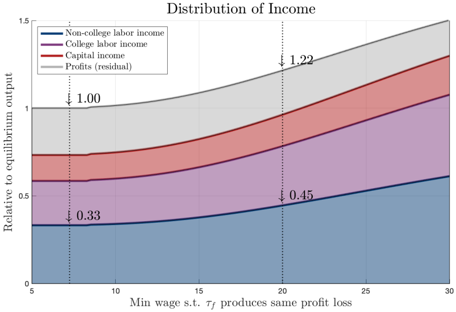
Evaluating the Wage Subsidy: Aggregate Effects

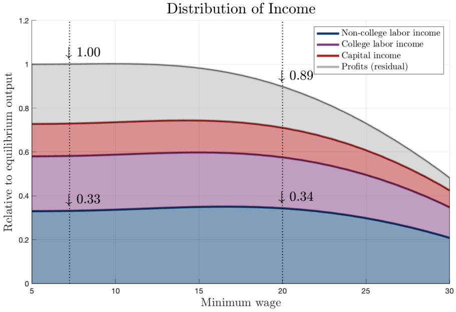
Back



- Subsidy increases both labor income and aggregate GDP
- To make comparable to minimum wage, set τ_f s.t. required corporate income tax = loss in profits due to min wage

Evaluating the Wage Subsidy: Aggregate Effects ▸ Back





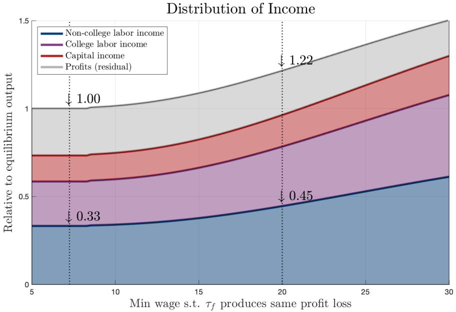
- Subsidy increases both labor income and aggregate GDP (unlike minimum wage)

Alternative Policy 1: Wage Subsidy

Back

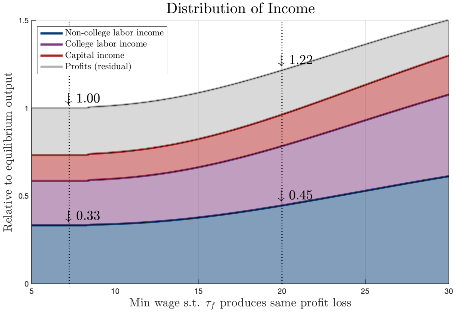
- Social security + medicare currently financed with 6% payroll tax

Aggregate Effects of the Benchmark Wage Subsidy ▸ Back



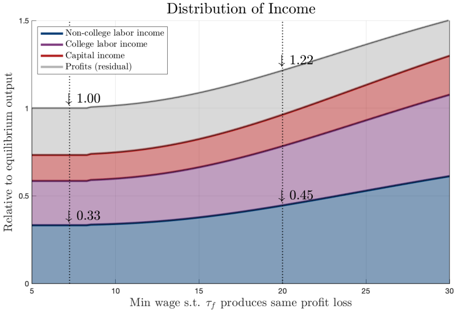
- Subsidy increases both labor income and aggregate GDP

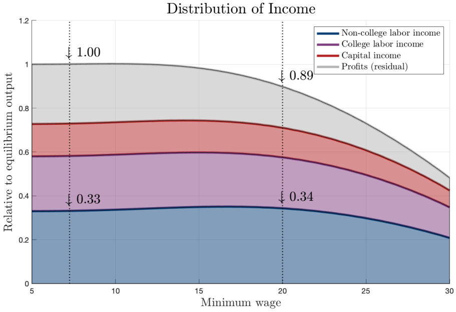
Aggregate Effects of the Benchmark Wage Subsidy ▸ Back



- Subsidy increases both labor income and aggregate GDP
- To make comparable to minimum wage, set τ_f s.t. required corporate income tax = loss in profits due to min wage

Aggregate Effects of the Benchmark Wage Subsidy ▸ Back





- Subsidy increases both labor income and aggregate GDP (unlike minimum wage)

Alternative Policy 2: Earned Income Tax Credit ▸ Back