Macroeconomic Dynamics of Labor Market Policies

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Setting the Stage

- *Monopsony power* in the labor market has motivated proposals for many labor market policies such as an increase in the minimum wage or an expansion of the earned income tax credit (EITC).

- There exists *large heterogeneity* across workers in the wages they earn (mostly driven by worker effects).

- Given many of these labor market policies target only a subset of workers, their ultimate effect will depend on the ability of *firms to substitute among workers (and other inputs).*

- The literature finds very different estimates of the extent to which firms can substitute across workers depending on the time horizon.

Highlight Key Tension in Literature

- Larger *longer-run* elasticities of labor-labor substitution:
  - Katz-Murphy (1992) estimate an elasticity of substitution across workers in different education groups of about 1.5.
  - Card-Lemieux (2001) estimate an elasticity of substitution across workers within an education group in the range of 4 to 6.
- Smaller *short-run* elasticities of labor-labor substitution:
  - The bulk of the minimum wage literature finds essentially no *short-run* elasticity across worker types.

This Paper

- Develop a macroeconomic framework to assess the distributional impact of labor market policies over time.
- Framework incorporates:
  - *Monopsony power* in the labor market
  - *Rich worker heterogeneity*
  - Putty-clay frictions which generate *small elasticities of substitution in the short run* but *larger elasticities of substitution in the long run*.
- Parameterize framework to match key facts about the US labor market.
- Apply the framework to study the effects of increasing the *minimum wage* or expanding the *Earned Income Tax Credit (EITC)*.

Key Findings: Part 1

- Adjustment dynamics are important for studying the distributional welfare effects of popular labor market policies.
- However, the transition dynamics operate in different ways between the minimum wage and the EITC.
- For large changes in the *minimum wage*, low wage workers are helped significantly in the short run but hurt in the long run.
- For a large expansion of the *EITC*, low wage worker are helped significantly in the short run but the benefits are even larger in the long run.
- **Reason for the difference**: It matters whether the firm or the government is paying the marginal cost of the transfer to workers.

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Key Findings: Part 2

- Model highlights how changes in policy can be non-monotone in the size of the policy change and can flip sign between the short and long run.
- Small changes in policies reduce monopsony distortion; large changes induce firms to adjust their input mix.
- Researchers cannot simply project the labor market response to *large* policy changes using the labor market response to *small* policy changes.
- Researchers cannot project the *long run* labor market response from large policy changes using the *short run* labor market response.
- Key theoretical forces – such as the *extent of monopsony power*, *the degree of input substitutability* and *the time it takes to adjust inputs* – are critical for determining the dynamic welfare effects of labor market policies.

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Key Model Components

Model Environment: Household Heterogeneity

- Households heterogeneous in broad *education group* $g \in \{h, l\}$ and *ability* z
  - Let $i = (g,z)$ index household type.

- Note: Large number of representative families of each type i such that each family takes wages as given.

- *Define* μ_i : Mass of workers of each z type within an education group – pinned down to match the wage distribution within each education group.

Model Environment: Firm Long-Run Production

- Firms use heterogeneous labor and capital in the production of a homogenous output good.

- CES aggregator of labor within an education group. Implies *labor-labor substitutability across workers of different ability within an education group* (like Card-Lemieux 2001)

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Model Environment: Firm Long-Run Production

- For each education group g, there is an aggregate amount of efficiency units of labor used in firm production:

$$\bar{n}_g = \left(\sum_{i \in I_g} z_i \left(\mu_i n_i \right)^{\frac{\phi-1}{\phi}} \right)^{\frac{\phi}{\phi-1}} \qquad (1)$$

- **Key Parameter 1:** μ_i – mass of workers of each z type within an education group; pinned down to match wage distribution within each education group.

- **Key Parameter 2**: ϕ – governs the elasticity of substitution across workers within an education type. Target Card-Lemieux (2001) estimate of 4.

Model Environment: Firm Long-Run Production

- Large number of homogeneous firms *j* who have nested CES production function:

$$G(\bar{n}_l, \bar{n}_h) = \left(\lambda \bar{n}_l^{\frac{\alpha-1}{\alpha}} + (1-\lambda)\bar{n}_h^{\frac{\alpha-1}{\alpha}} \right)^{\frac{\alpha}{\alpha-1}} \qquad (2)$$

$$y = F(k, \bar{n}_h, \bar{n}_l) = \left(\psi k^{\frac{\rho-1}{\rho}} + (1-\psi) G(\bar{n}_l, \bar{n}_h)^{\frac{\rho-1}{\rho}} \right)^{\frac{\rho}{\rho-1}} \qquad (3)$$

- α – Elasticity of substitution between capital and college workers. Discipline with Katz-Murphy estimate of 1.4
- ρ – Elasticity of substitution between G(.) and capital. Assume $\rho = 1$ in benchmark analysis and then explore other estimates from literature.

Model Environment: Putty-Clay Adjustment

- New capital can be used in any ratio with labor, but ratios are fixed once capital installed.
  - Capital is *CES in the long run* (as described above) but is *Leontief in the short run.*

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- Given installed capital, firms can either: (i) Operate a machine with fixed labor to capital ratios (for each worker type) or (ii) operate the machine at less than full capacity (including not at all)
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- **Key Parameter 3:** δ (depreciation rate) determines speed at which capital adjustment occurs.

Model Environment: Household Preferences

- Representative family for type *i* with *GHH preferences*

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

- $v(n_{it})$: Disutility of labor supply (more on this on the next slide)
- $h(s_{it})$: Disutility of search (not really important for our quantitative analysis; determines how much of changes in employment show up as changes in unemployment vs. changes in labor force)

Model Environment: Household Preferences

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

$$n_{it} = \left(\sum_j n_{ijt}^{\frac{1+\omega}{\omega}} \right)^{\frac{\omega}{1+\omega}}$$

- These preferences are a way to embed a notion of monopsony power into the model (see Berger et al, 2021)
- Background concept: Workers have idiosyncratic preferences for different work places.
- Let *j* index ex-ante homogenous firms. The more that firm *j* hires relative to other firms, the more they are attracting workers for whom firm *j* is not their most preferred.

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- These preference structure proxies for this notion of idiosyncratic preferences.
- These are analogous to the love of variety CES preferences over goods that generates monopolistic competition in the product market.
- These preferences generates upward sloping labor supply curves at the j firms.

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- ***Key Parameter 4:*** ω – governs size of firm monopsony.
- Discipline this parameter using estimates of the wage markdown from the literature. Literature estimates ratios of wage relative to marginal product of between 0.65 and 0.85.
- As $\omega \rightarrow \infty$, jobs become perfectly substitutable to workers and firm monopsony power goes to zero.

Firm Monopsony Power in Directed Search Framework

- **Idea**: Given that a *marginal* hire increases the marginal disutilities of work of all *inframarginal* hires, then:

  - Firms must compensate inframarginal hires to satisfy their participation constraints

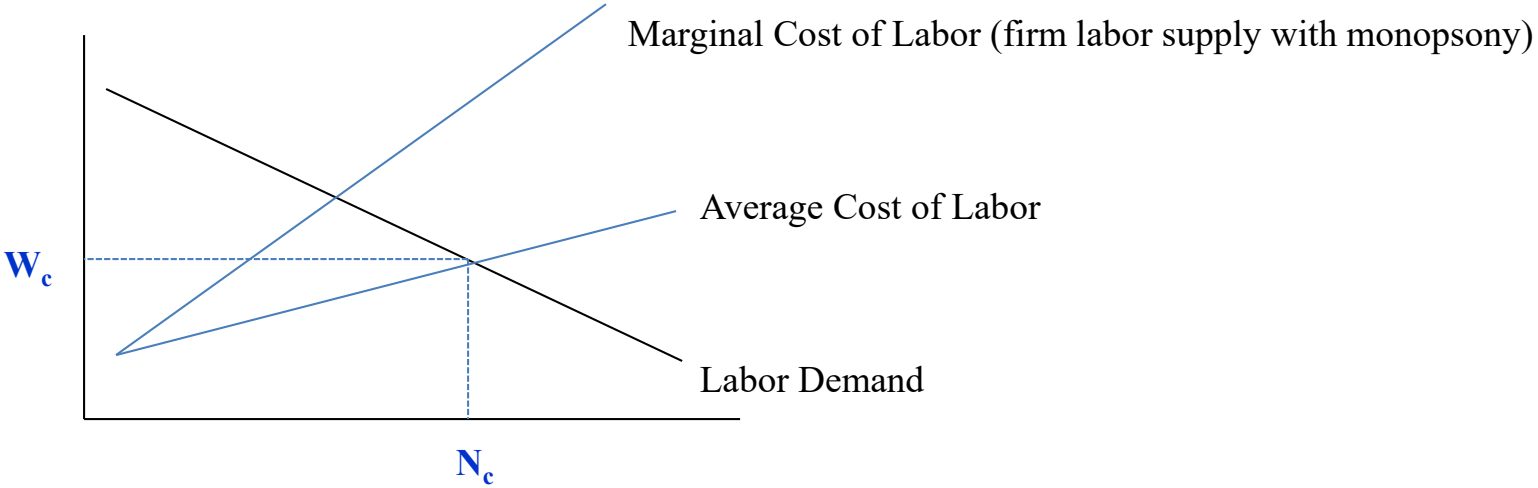
  - Since firms internalize this cost, they hire *fewer* workers and pay workers *lower* wages

  - Firms average cost curve is below than their marginal cost curve

Implication: *Employment and wages are inefficiently low and decrease with the degree of monopsony power (governed by ω)*

Intuition with Textbook Monopsony Model

- **Assume static monopsony case with no worker heterogeneity and no-search**



- N_c and W_c are the *competitive level of employment and wages*

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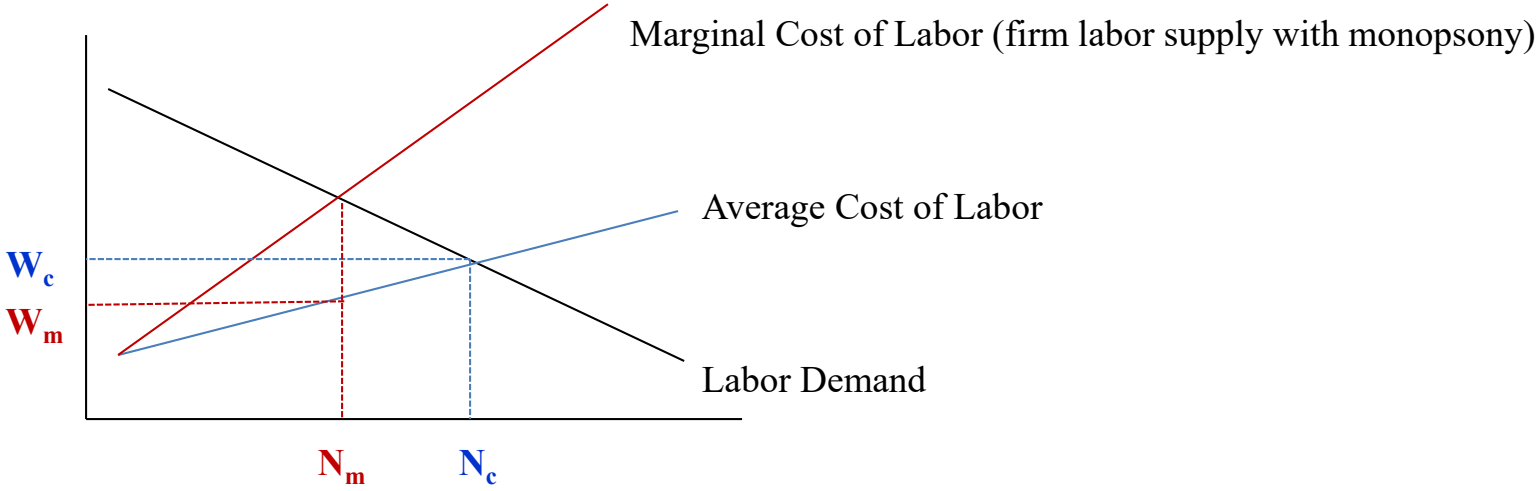
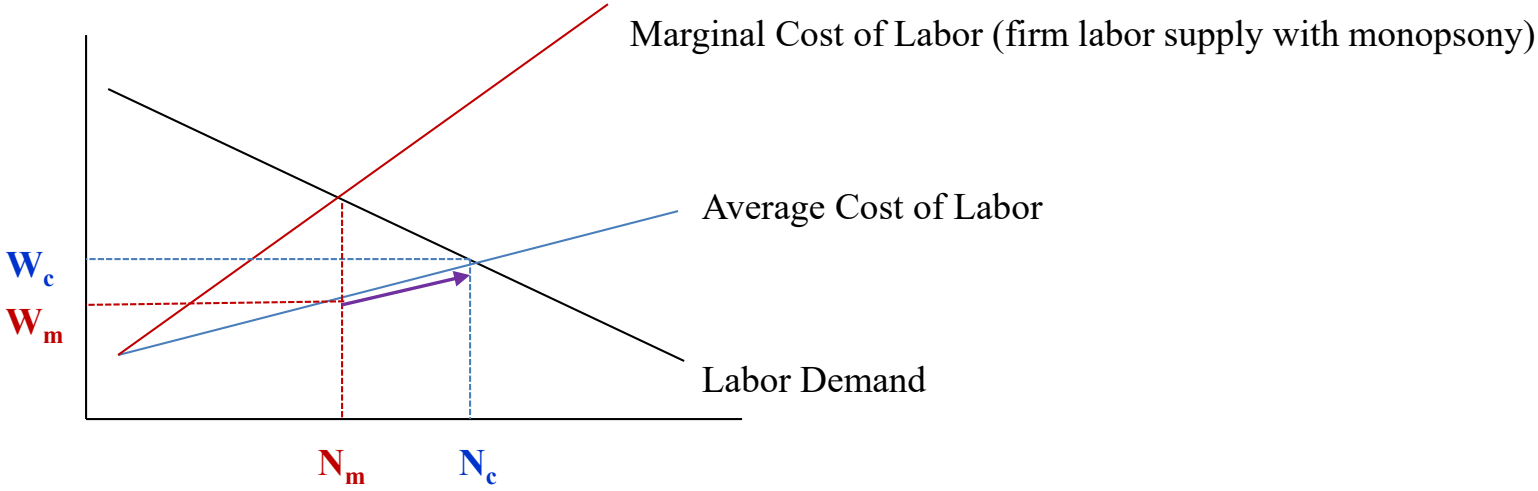


- N_c and W_c are the *competitive level of employment and wages*
- N_m and W_m are the *monopsony level of employment and wages* (lower than competitive level)

Intuition with Textbook Monopsony Model

- **Add a minimum wage – hump shaped employment effects**



- A minimum wage will *increase employment* if minimum wage is between W_m and W_c (*move along average cost of labor curve*)

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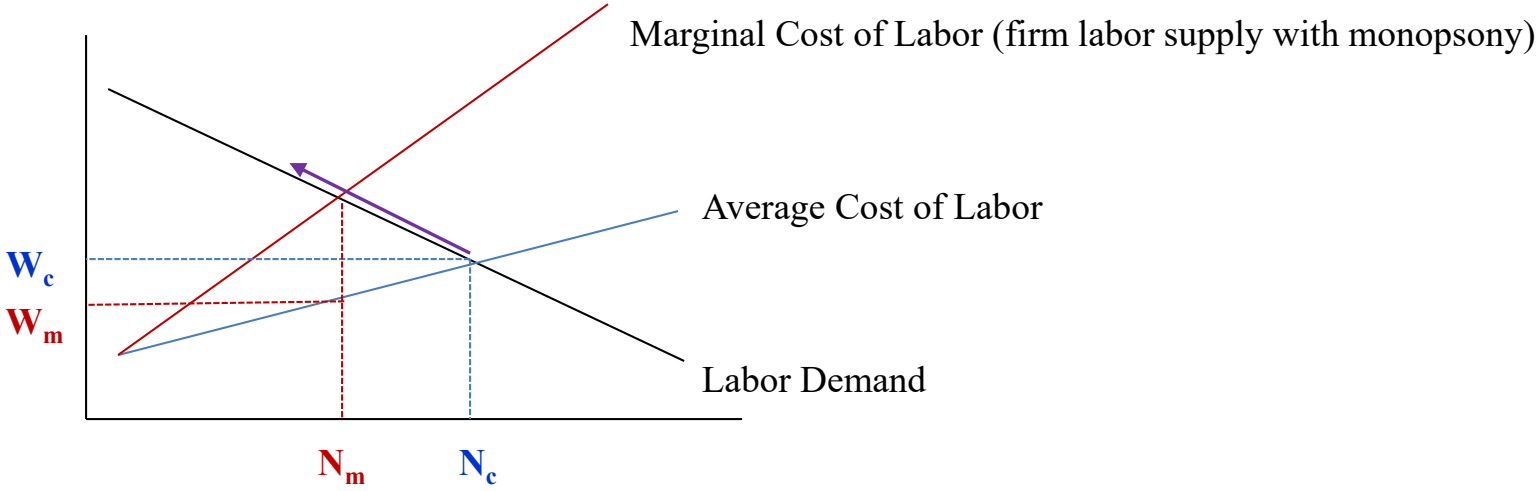


- A minimum wage will start *decreasing employment* if minimum wage rises above W_c (*start moving along the labor demand curve as in neoclassical model*)

Note 1: Wage Markdown in Search Framework

- Even with no monopsony power ($\omega \to \infty$), there will be a small wage markdown with directed search as firms must be compensated for their job posting costs.

- This efficient portion of the markdown is quantitatively small in our calibration (using estimates on job posting costs from literature).

Note 2: Things Not in the Model

- Endogenous firm entry (may respond as different policies affect firm profits)
- Endogenous worker skill upgrading (may respond as the demand for different skills change in the long-run).
- Price responses of different policies; our policy changes will be in real changes (model is real). Abstract from different consumers having different consumption bundles.

If time, we will talk about how adding these forces may change our results.

Review of Key Parameterization of Model

Key Parameters

- ***Monopsony power (ω)***: Calibrate parameter to match estimates of wage markdown in the literature. Estimates range from 0.65 to 0.85 in recent literature. Target 0.75 in our baseline quantification and do robustness to other values.

- ***Labor-labor long-run substitutability (ϕ):*** Calibrate to match lower bound regressions from Card-Lemiuex 2000 – get an estimate of 4.0.

- ***Distribution of types (μ_j):*** Set to match moments of the wage distribution within education groups.

- ***Depreciation rate (δ)***. Set to 15%.

Results

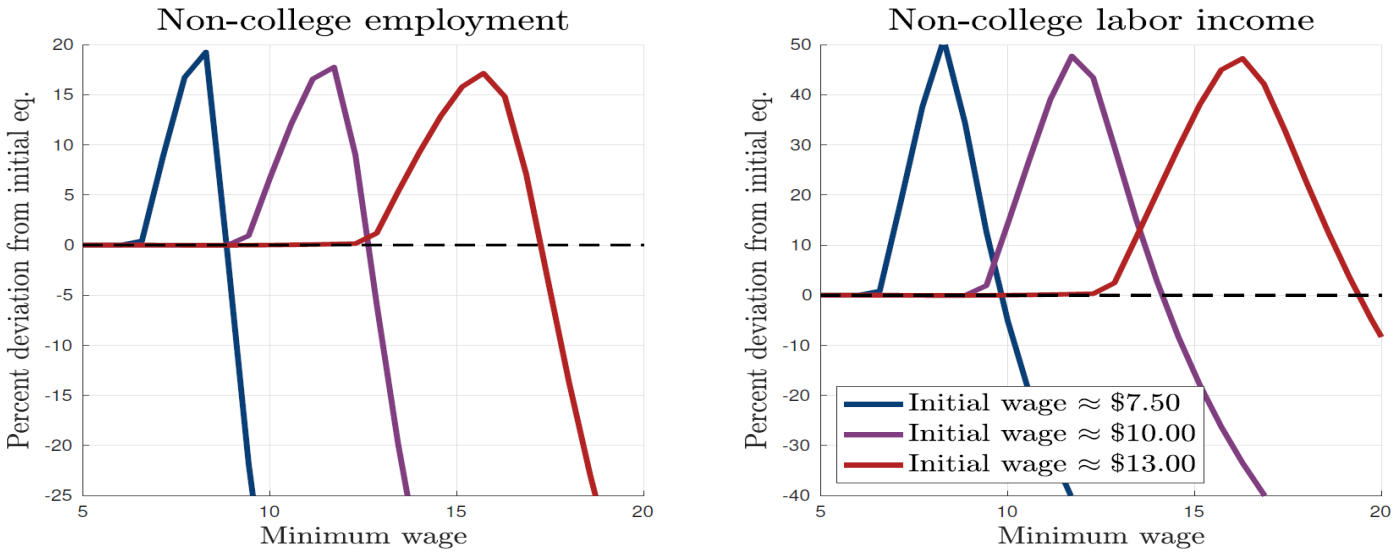
Road Map

- ***Start with Minimum Wage***
  - Unexpected *permanent* change in *real* minimum wage
  - *Long-Run Results* – Highlight non-linear response
  - *Short-Run Results* - Highlight when short-run results are informative about long-run results.
  - *Transition Paths* – Contrast dynamic welfare results with only long-run welfare results.
  - *Temporary Change in Minimum Wage*

- ***Turn to EITC***
  - Highlight difference in dynamic patterns relative to the minimum wage

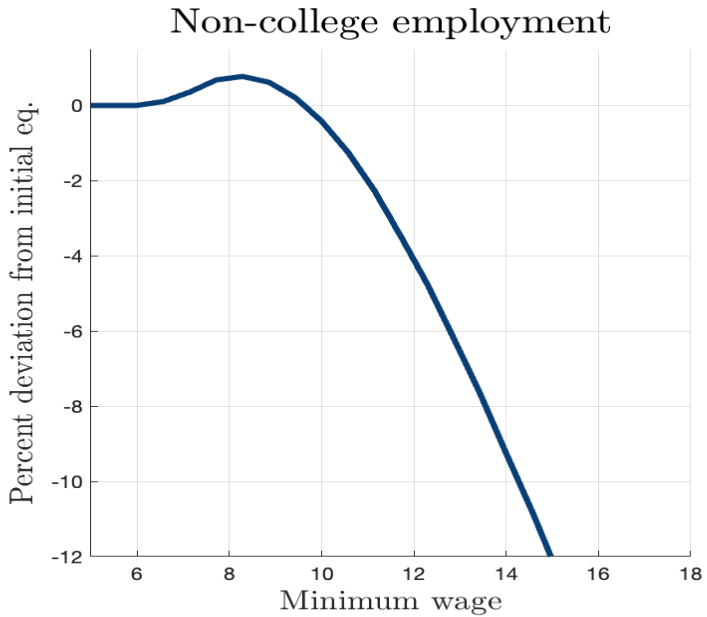
Long Run Effects of the Minimum Wage: Permanent Real Change

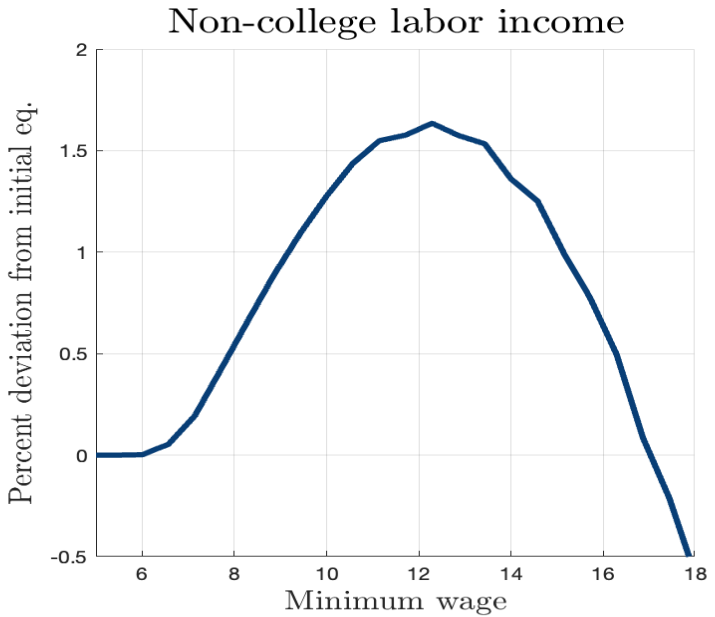
Distributional Effects of Minimum Wage in the *Long Run*



- **Result 1:** Peak of *type-specific Laffer curve* depends on individual productivity z
- **Result 2:** Single minimum wage is blunt policy tool: only helps those already earning close to it.

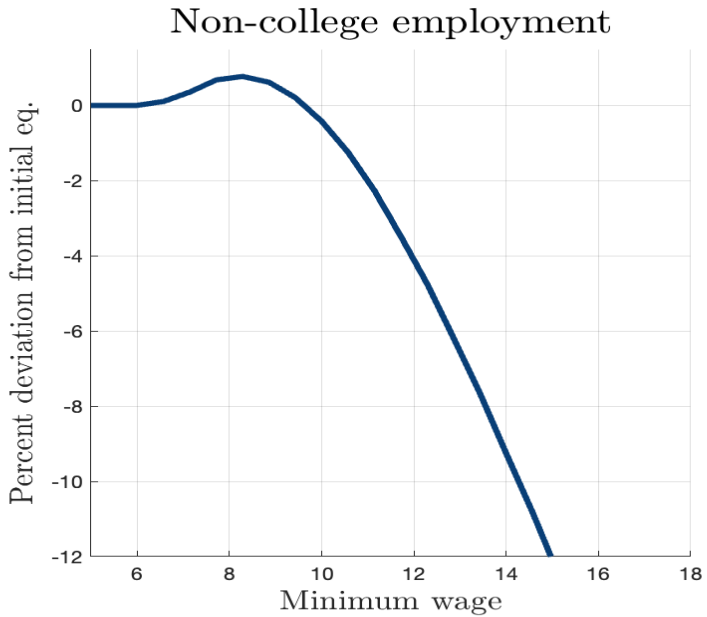
Aggregate Effects of Minimum Wage in the *Long Run*

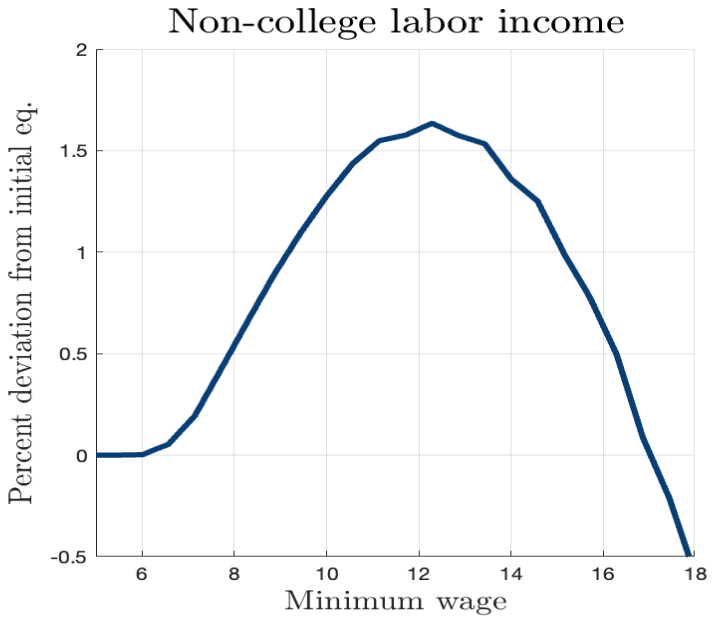




- **Result 3: Non-monotone effect of minimum wage change on employment and labor income of non-college workers.**

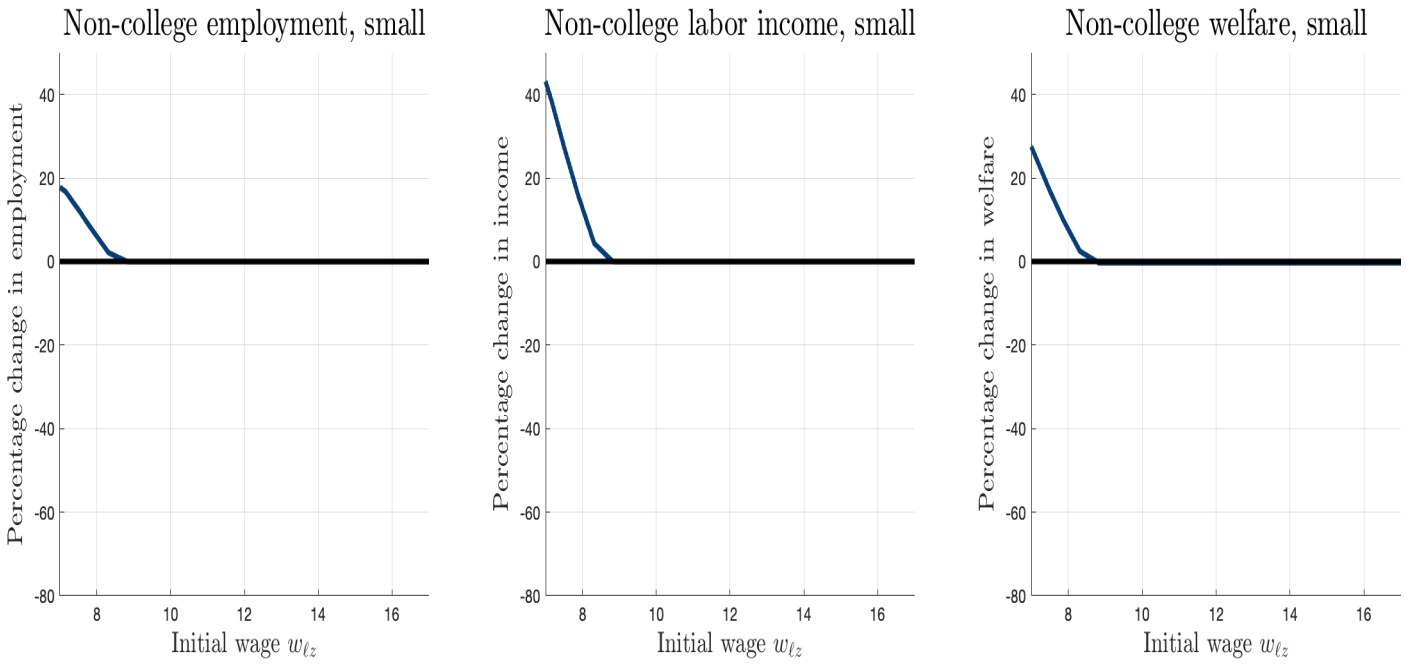
Aggregate Effects of Minimum Wage in the *Long Run*





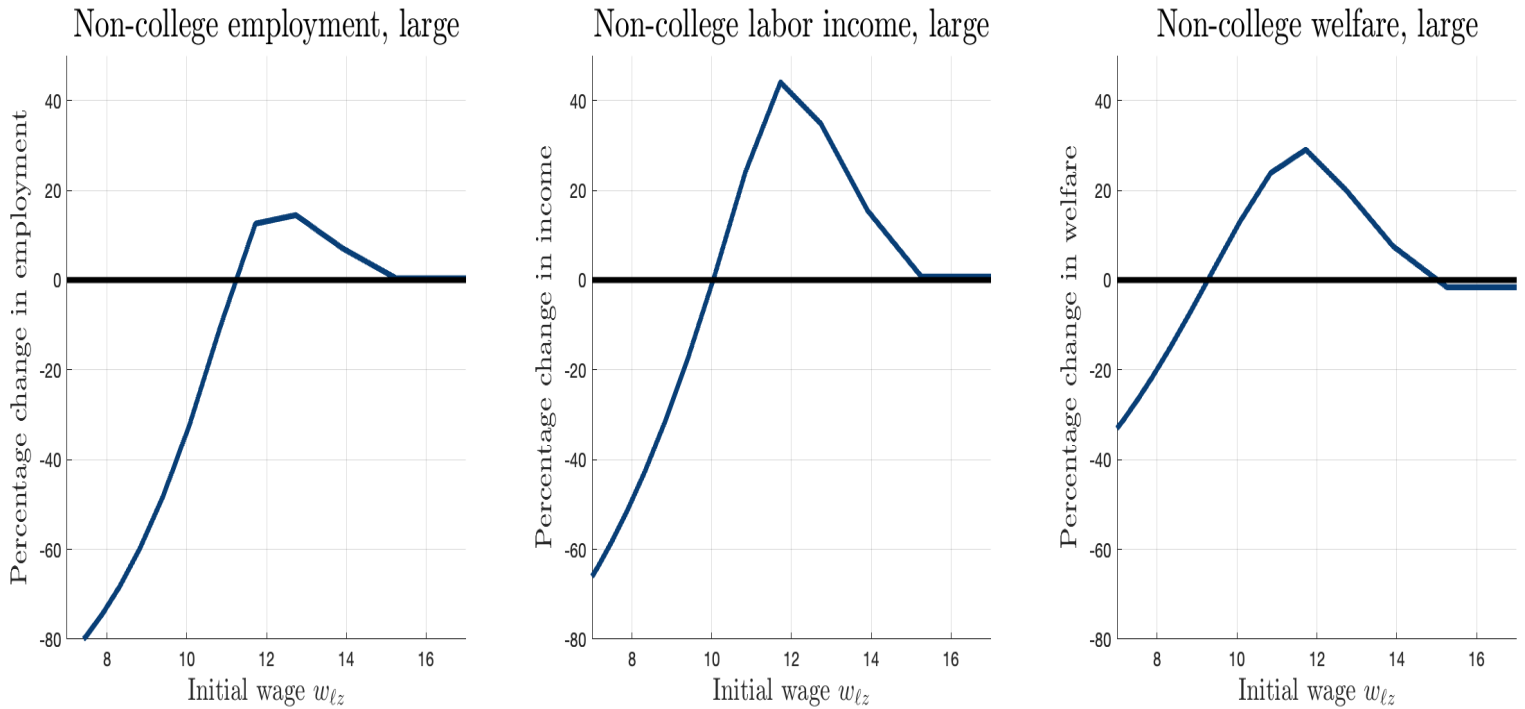
- **Result 4:** **Size Matters…Inappropriate to predict the long-run effects of *large* minimum wage changes using long-run effects of *small* minimum wage changes.**

Distributional Effects of $8.50 Minimum Wage (Non-College)



- **Result 5: Small minimum wage changes can *increase* employment and income of initially low wage non-college workers in long-run.**

Distributional Effects of $15.00 Minimum Wage (Non-College)



- **Result 6: Large minimum wage *decreases* income and earnings of initially low wage non-college workers in long-run.**

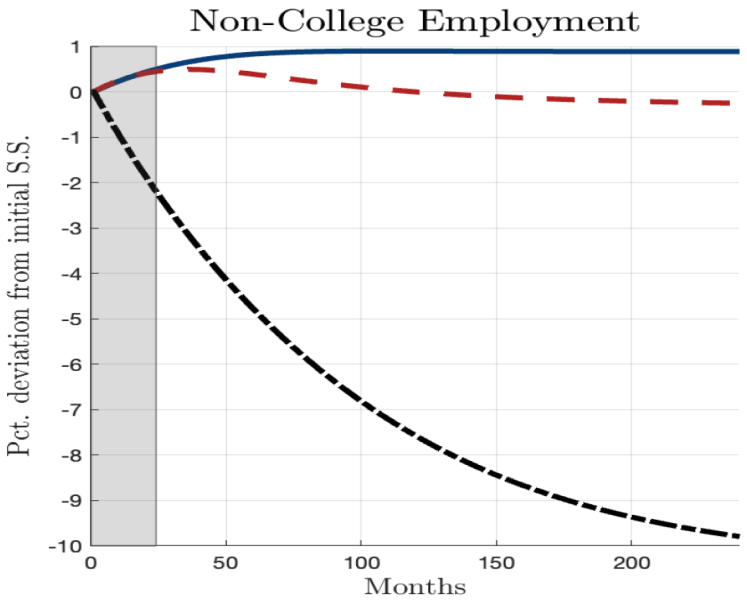
Robustness of Long-Run Employment Response to $15 Minimum Wage: The Role of Key Parameters

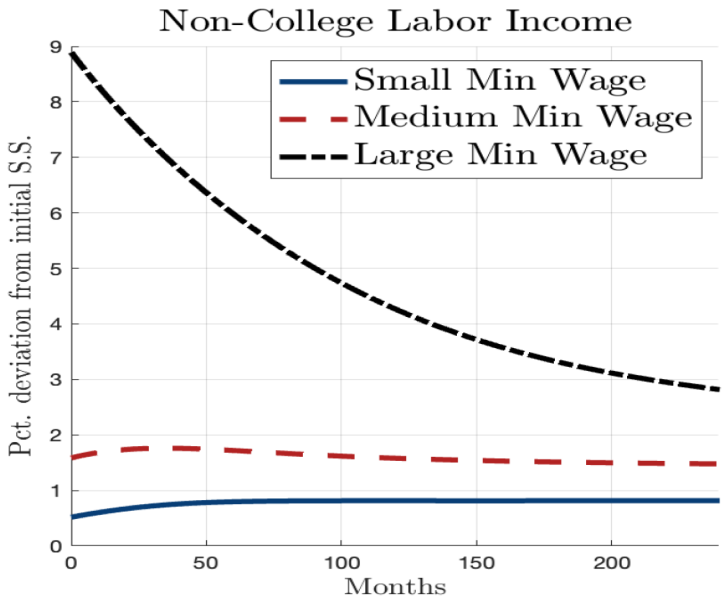
	Targeted Wage Markdown		
ϕ	0.6	0.75	0.9
2	-0.05%	-6.3%	-6.4%
4	-8.9%	-12.1%	-17.4%
6	-14.4%	-19.4%	-20.0%

- **Result 7: The long-run employment declines of large minimum wage changes diminish if monopsony power is large (big wage markdowns) and/or the elasticity of substitution is small.**

Short Run Effects of the Minimum Wage: Permanent Real Change

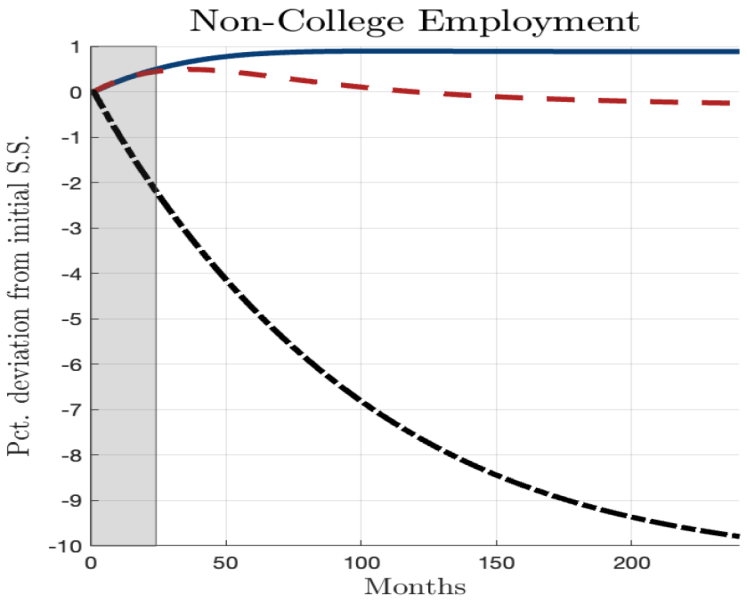
Transition Dynamics of Various Sized Min Wage Changes

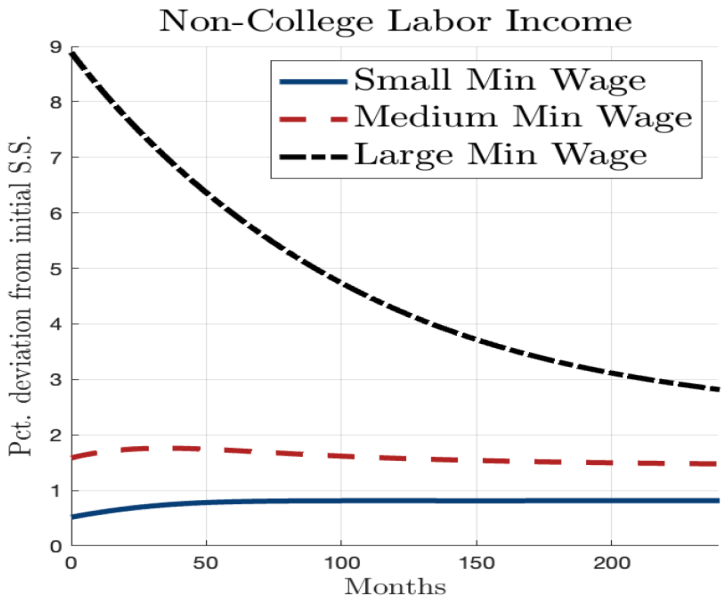




- **Result 8: In the short run, changes in the minimum wage lead to only very small changes in employment, *regardless of the size* of the change.**

Transition Dynamics of Various Sized Min Wage Changes





- **Result 9: In paper, convert employment responses into "employment elasticities" and show that our model matches the consensus estimates from the literature.**

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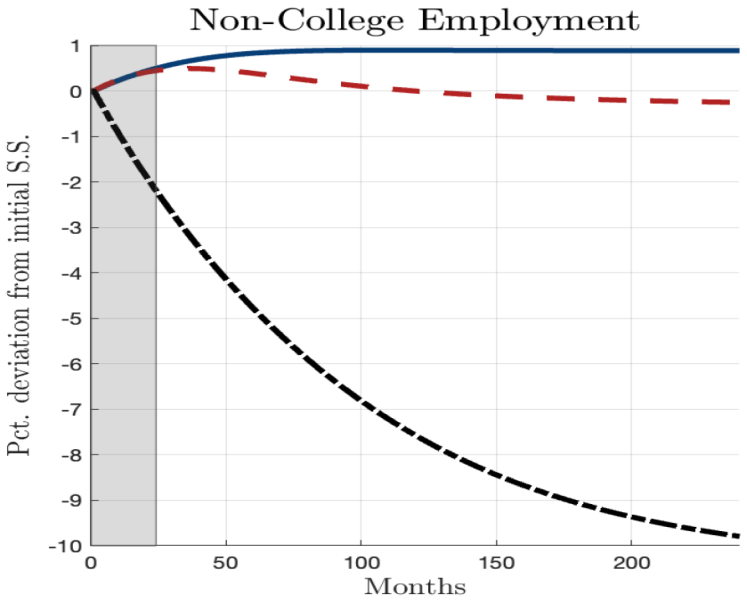
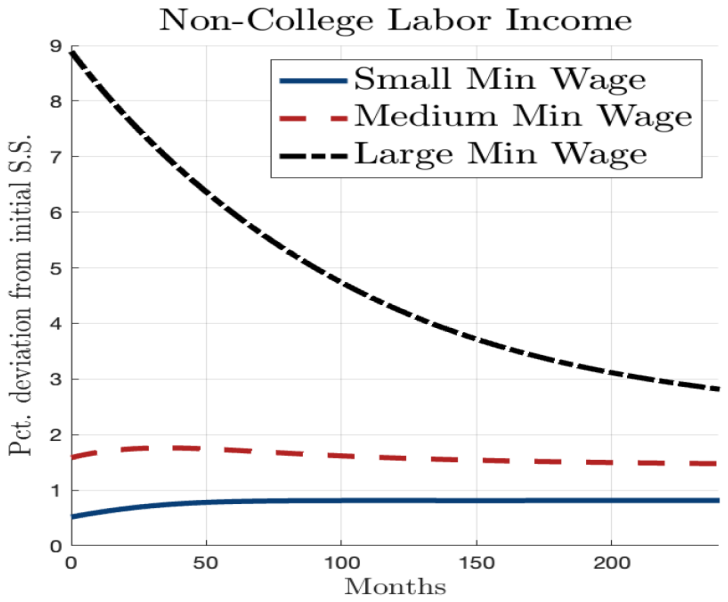
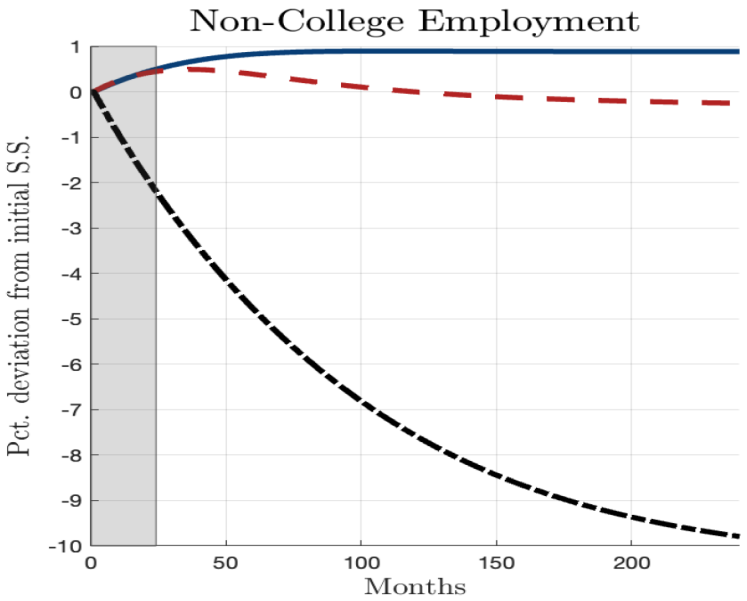
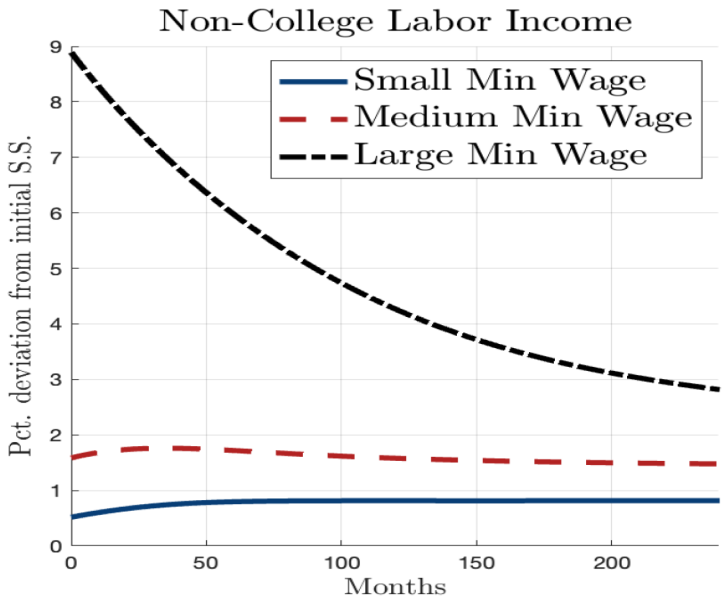




- **Result 10: Small and medium sized minimum wage changes converge to new steady state *quickly***

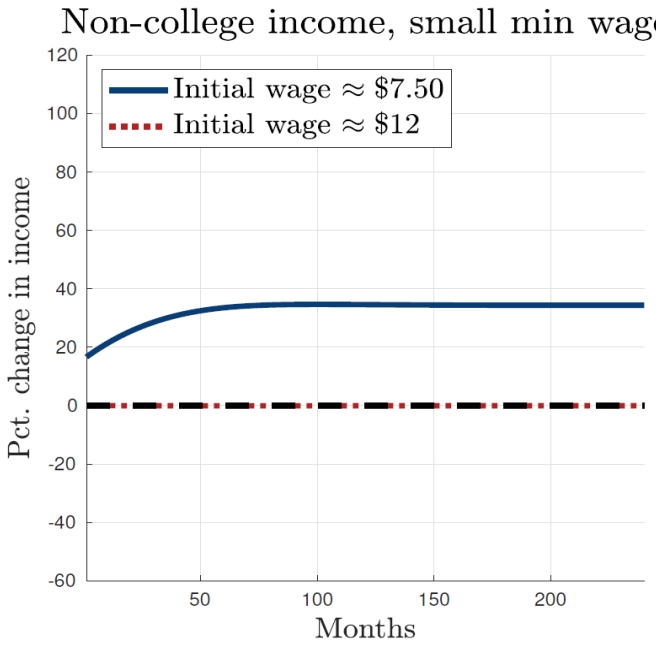
Transition Dynamics of Various Sized Min Wage Changes

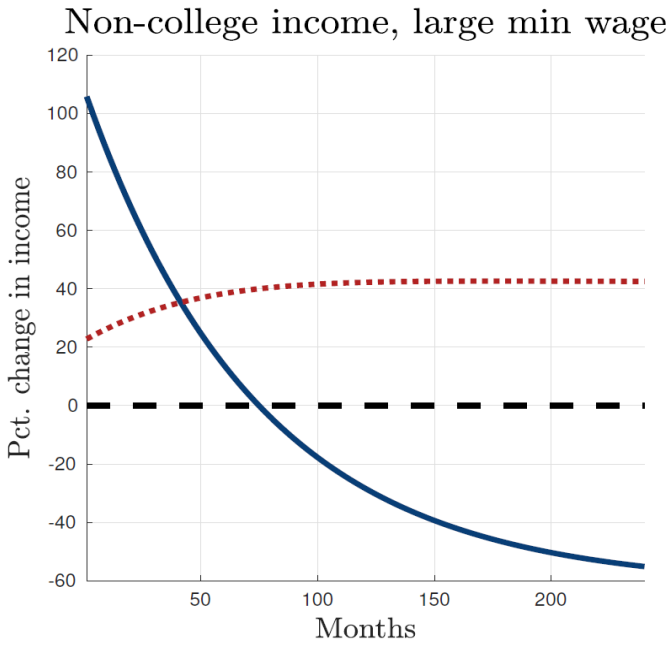




- **Result 11: The larger the minimum wage change, the *larger the difference* between the short-run and the long-run labor market response.**

Transition Dynamics for Different Worker Types

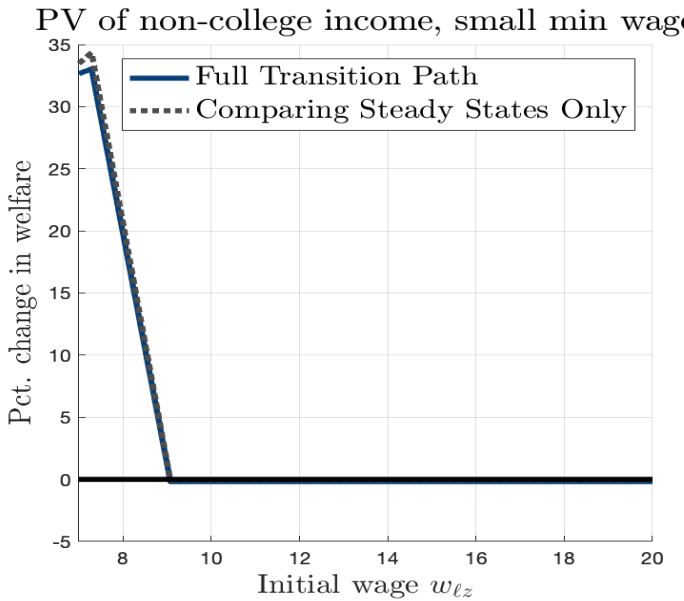


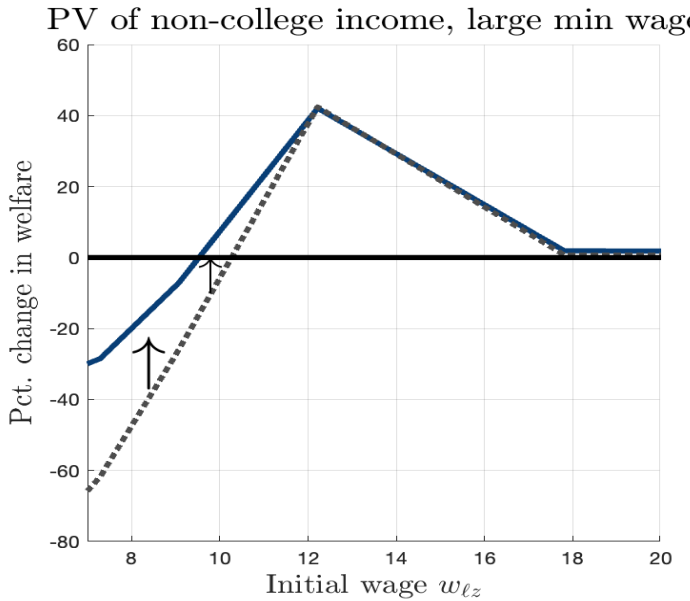


- **Result 12: Larger minimum wage changes provide large short-run gains to initially low wage workers. The costs accrue only over time.**

Transition Dynamics of the Minimum Wage: Permanent Real Change

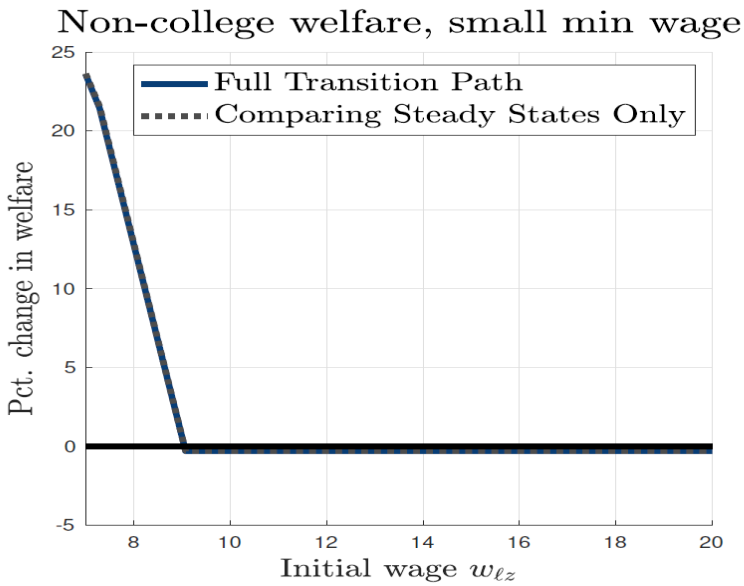
Present Value of Income: Total Transition vs Long Run

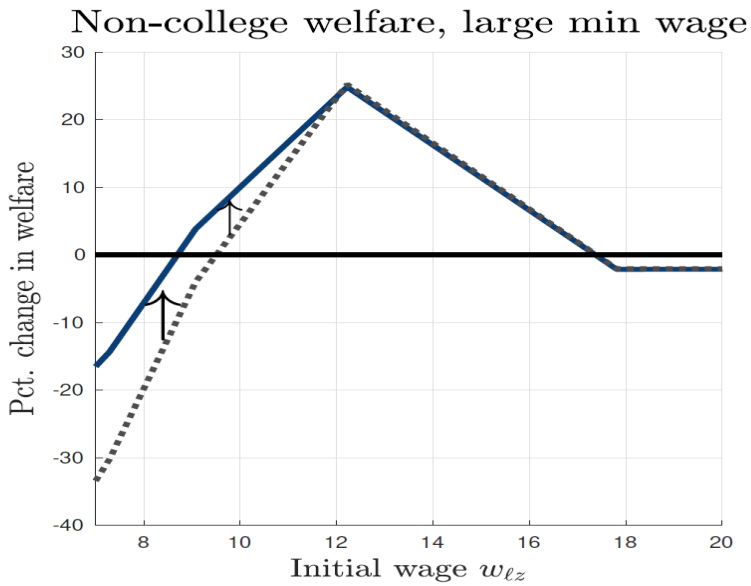




- **Result 12a: Long run steady-state analysis (dashed line) *overstates* income losses to low wage workers from large minimum wage changes because it ignores gains that accrue during the short-run (solid line).**

Lifetime Welfare: Total Transition vs Long Run

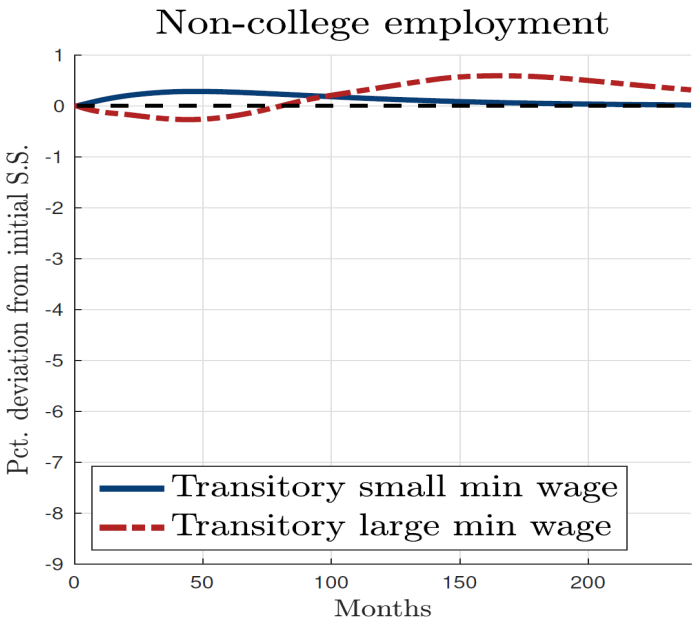


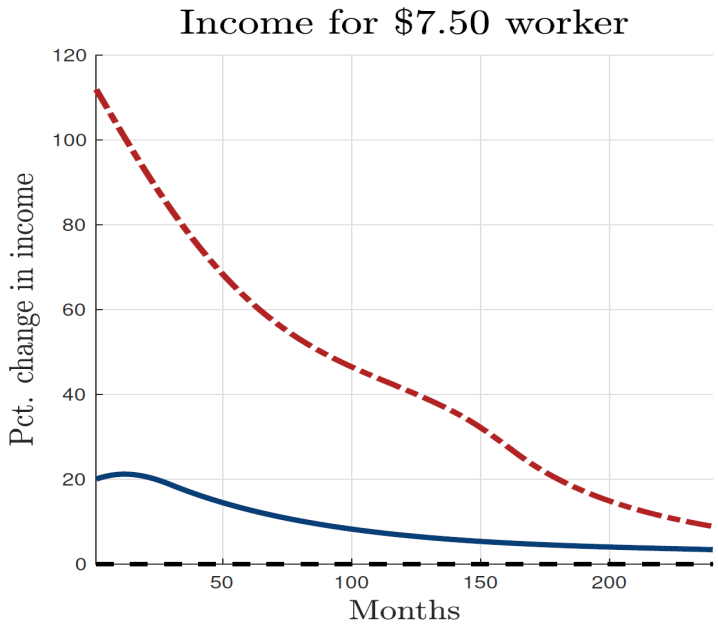


- **Result 12b: Long run steady-state analysis (dashed line) *overstates* welfare losses to low wage workers from large minimum wage changes because it ignores gains that accrue during the short-run (solid line).**

Permanent Change in Nominal Minimum Wage (Temporary Change in Real)

Nominal Minimum Wage Change With 5% Inflation



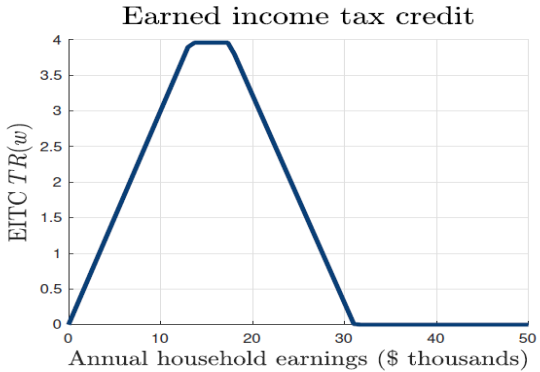


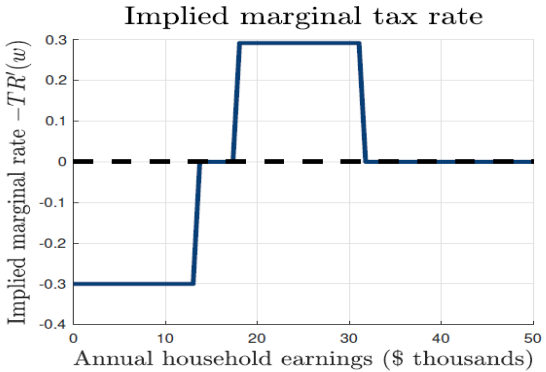
- **Result 13: Temporary changes in real minimum wage strictly increases welfare for low wage workers; firms face no incentive to adjust input mix**

Minimum Wage vs. EITC

Modeling a Stylized Earned Income Tax Credit (EITC)

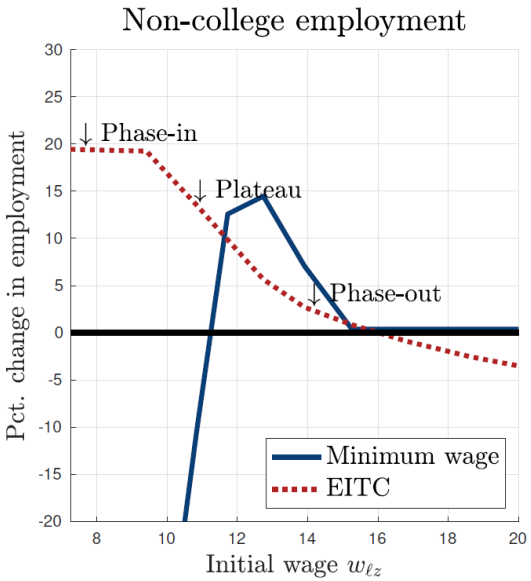
- Model EITC using a transfer schedule $TR(w_i)$, conditional on working
- Finance with corporate profits tax; set corporate tax rate s.t. revenues = loss in profits from a $15 minimum wage.

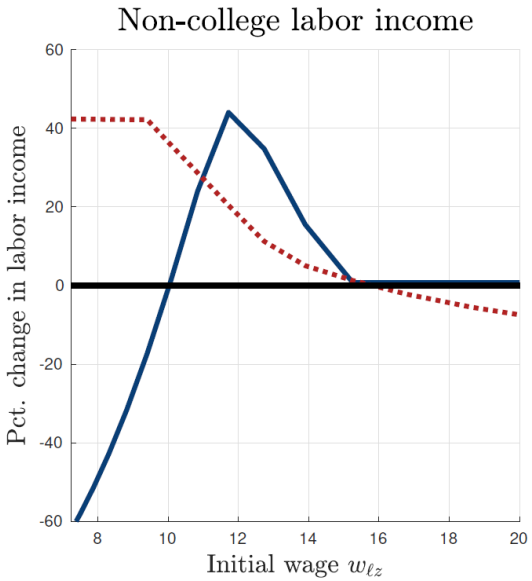


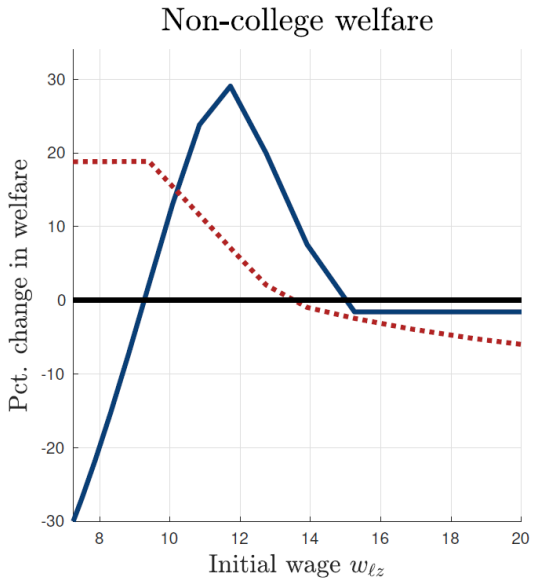


- EITC has three regions: Phase-in region (with negative marginal tax rate), plateau region (with zero marginal rate), and phase out region (with positive marginal rate).

Long-Run Effects of EITC vs. Minimum Wage

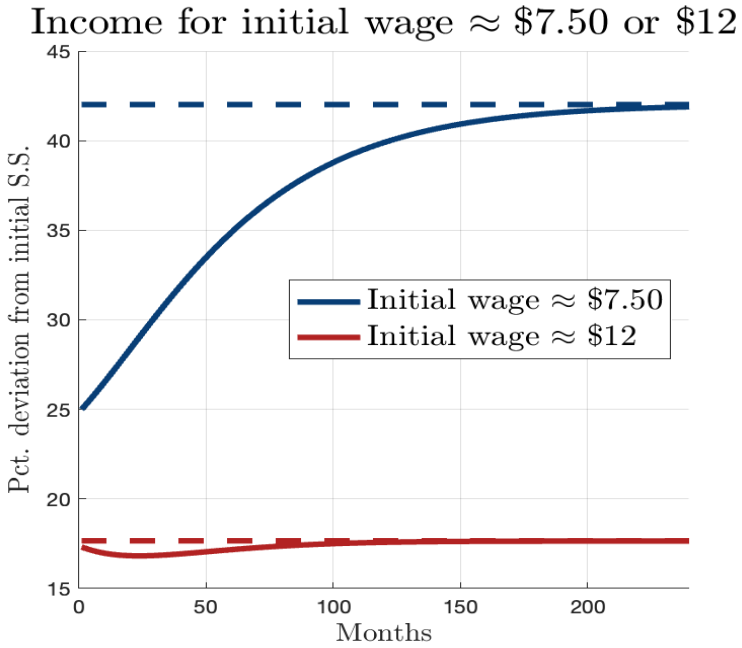


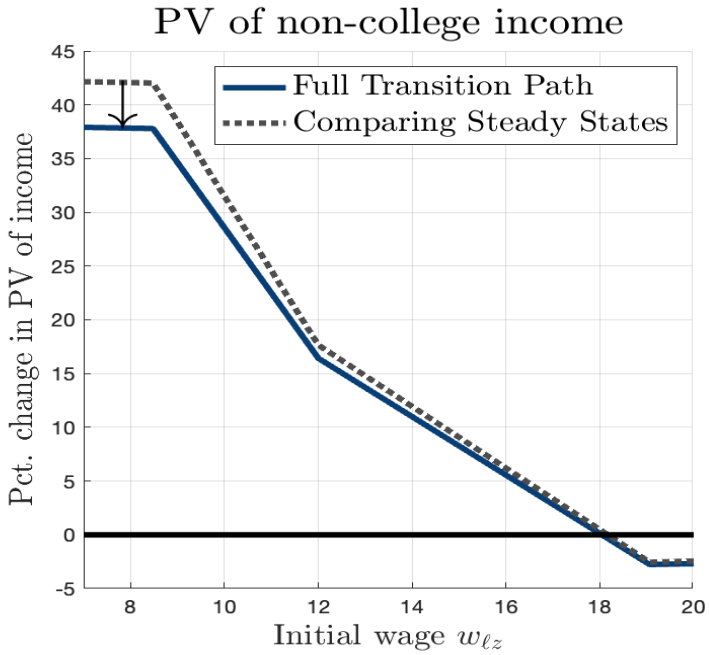




- EITC helps low wage workers much more than a $15 minimum wage.
- EITC gives no incentive to firms to switch away from low wage workers.

Transition Dynamics of Large EITC Change





Result 14: For $7.50 worker, *much larger* wage increase in long-run;

Firms adjust their input mix over time to use *more* of these workers.

Conclusion

Conclusion

- Transition dynamics are important when thinking about the welfare effects of labor market policies.
- Our framework reconciles a tension in labor literature with small short run labor-labor elasticities but large long run elasticities.
- Non-monotonic labor market effects given that monopsony power – implies that it is inappropriate to project effects from small policy changes to learn about larger policy changes.
- Fundamentals of the transition dynamics differ across policies.
- Need to bring in economic theory when assessing the dynamic welfare effects of labor market policies.

Extra Slides

Employment Elasticities of Various Sized Min Wage Changes

Minimum Wage Change	All Non-College Workers	Non-College Workers Initially Earning < $15	Non-College Workers Initially Earning < $10
$1.00 Increase (13.8%)	0.04	0.09	0.19
$1.50 Increase (20.7%)	0.02	0.05	0.10
$2.00 Increase (27.6%)	0.01	0.03	0.06
$2.50 Increase (34.5%)	0.01	0.03	0.07

- **Small employment elasticities to minimum wage changes – consistent with recent survey of Neumark and Shirley (2022).**