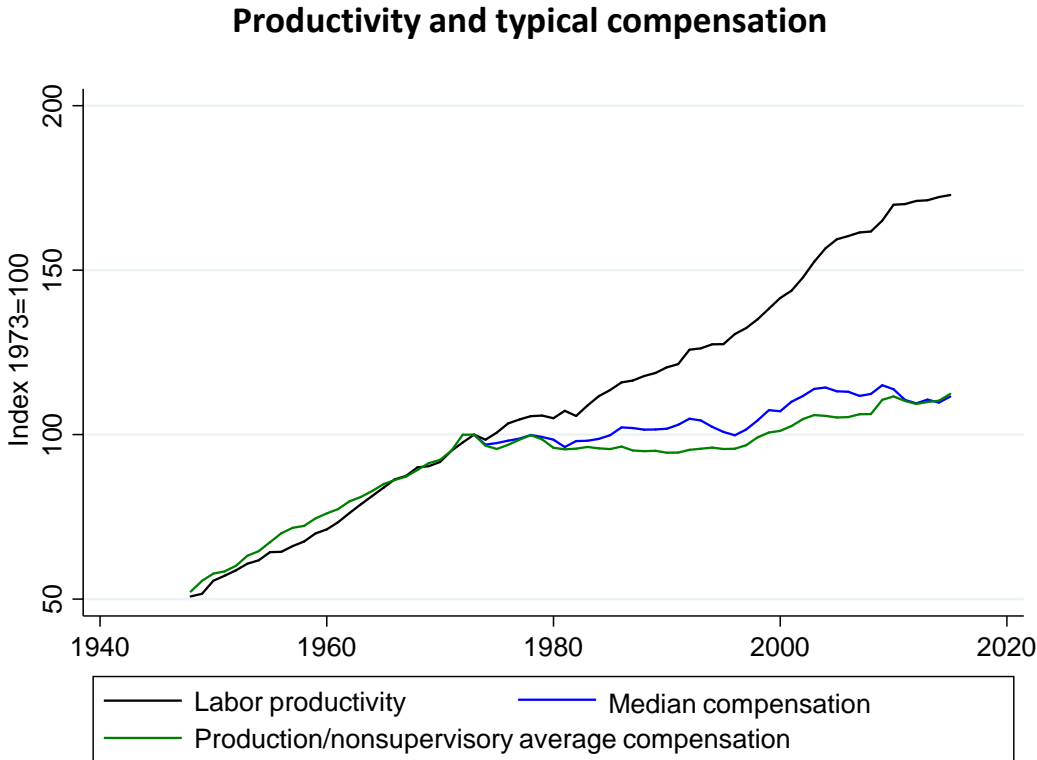


# Productivity and Pay: Is the link broken?

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November 2017

*Preliminary*

# Productivity and median compensation have diverged since 1973; the typical worker's compensation has stagnated



Data from BLS, BEA and Bivens and Mishel (2015)

## **Does this mean that raising productivity growth no longer raises average Americans' incomes?**

“although boosting productivity growth is an important long-run goal, this will not lead to broad-based wage gains unless we pursue policies that reconnect productivity growth and the pay of the vast majority” Bivens and Mishel (2015)

“productivity gains haven't translated into broadly shared gains for the entire workforce” Bunker (2015)

“there's no law that everybody's going to benefit from technology... Ever since the Industrial Revolution, we've experienced a rising tide that has helped most people but... those trends have diverged” Brynjolfsson (2015)

## Two views of the productivity-compensation divergence: “linkage” and “delinkage”

### “Delinkage”

Increases in productivity growth do not currently translate into additional growth in workers' compensation

### “Linkage”

Productivity growth does translate into pay, holding all other factors constant  
- but a variety of other orthogonal factors have been putting downward pressure on median workers' compensation even as productivity growth has been acting to lift it.

# Visually, productivity and compensation seem to move together – though compensation growth has been slower

Change in log productivity and compensation: 3 year moving avg.



Data from BLS, BEA and Mishel and Bivens (2015)

## An empirical test of the “linkage” and “delinkage” views

$$\Delta \log \text{compensation} = \alpha + \beta \Delta \log \text{productivity} + \gamma \Delta \text{unemployment} + \varepsilon$$

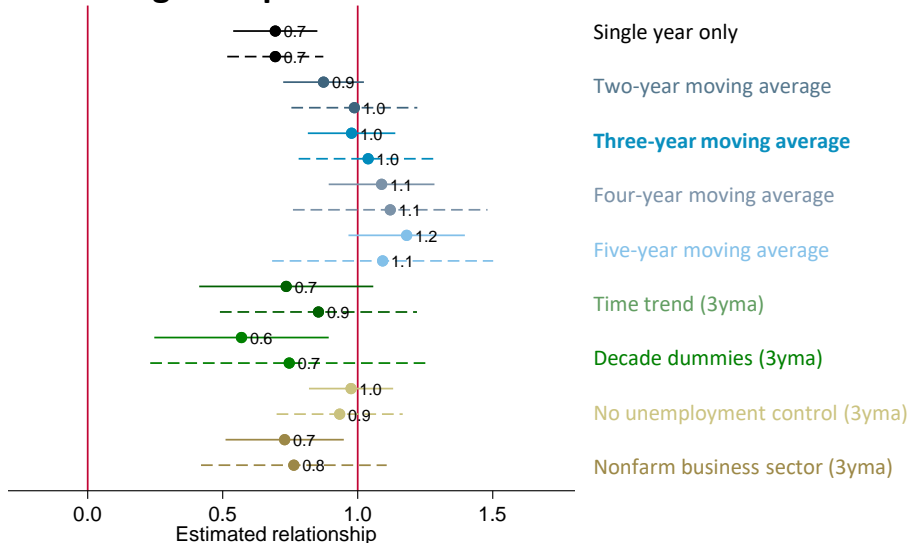
*Strong delinkage* :  $\beta = 0$       *Strong linkage* :  $\beta = 1$

Test with:

- Moving average specification (bandwidth of 1-5 years)
- Distributed lag specification (up to 4 lags)

# Results of various specifications: avg. and P/NS compensation

## Average compensation: 1948-2015



These charts show the coefficient estimates from various specifications

Lines represent 95% confidence intervals.

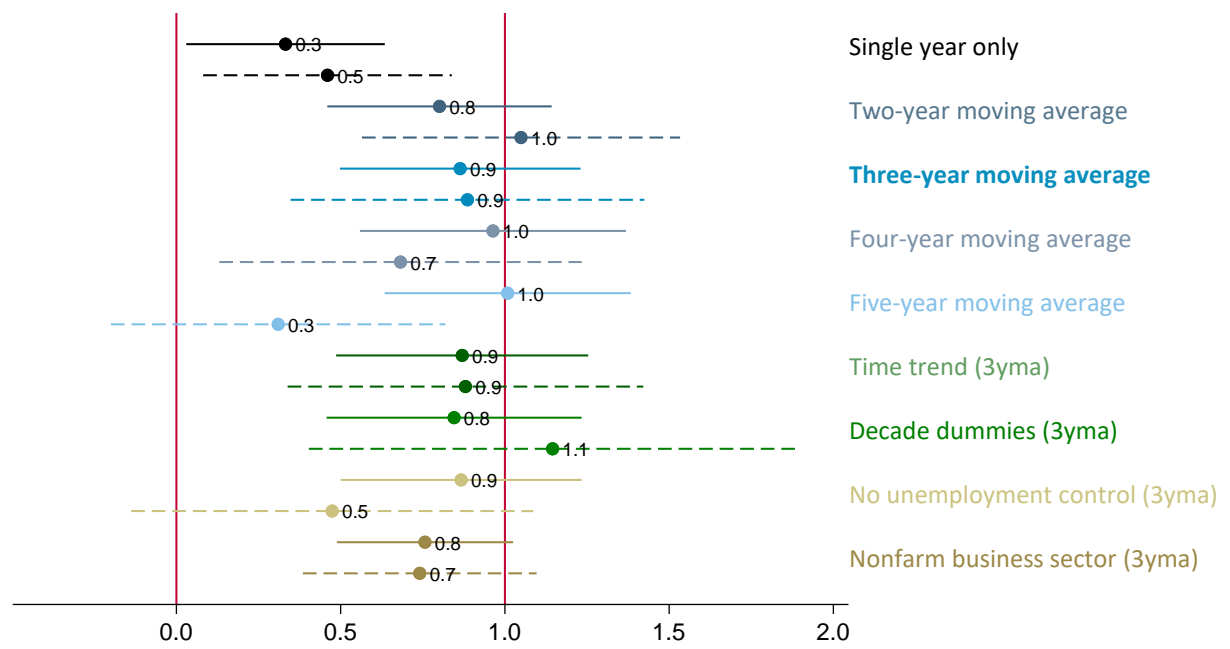
**Solid line:** moving average specification  
**Dashed line:** distributed lag specification

## Production/nonsupervisory compensation: 1948-2015



# Results of various specifications: median compensation

Median compensation: 1973-2015



These charts show the coefficient estimates from various specifications

Lines represent 95% confidence intervals.

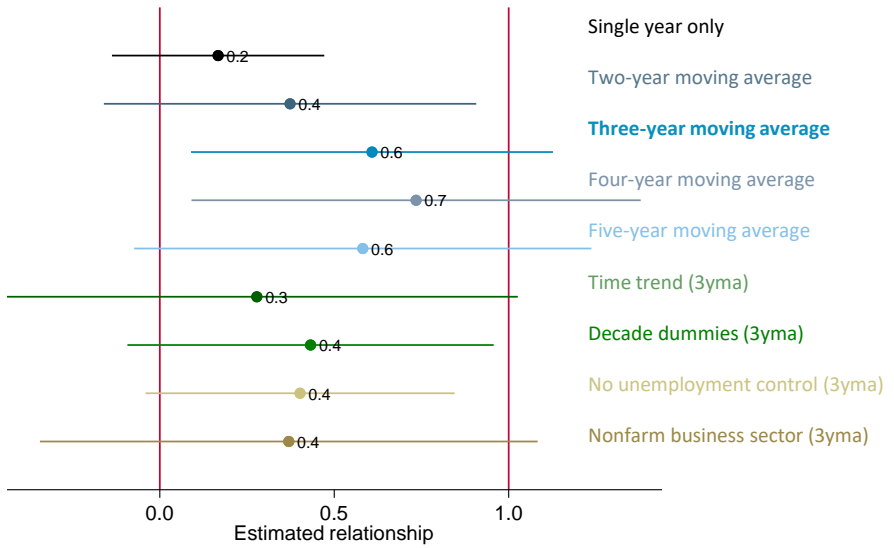
**Solid line:** moving average specification

**Dashed line:** distributed lag specification



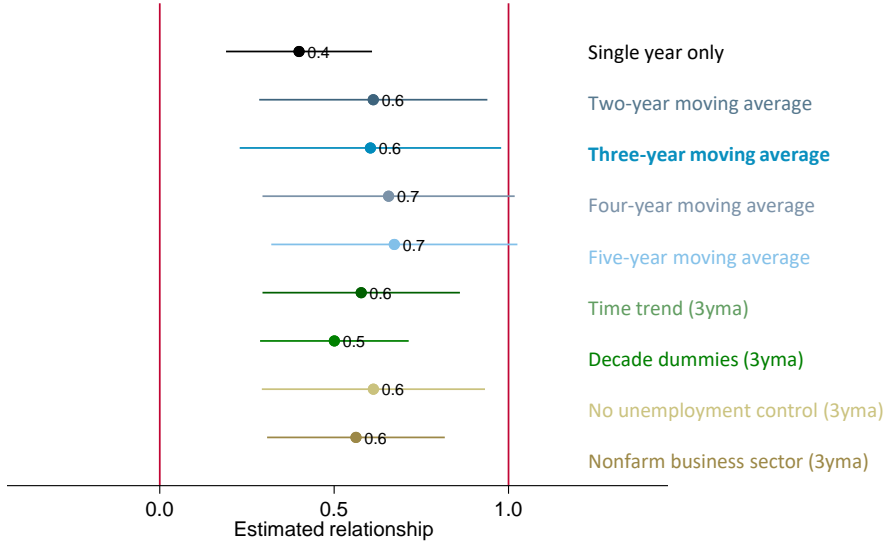
# Results of various specifications: sample split, P/NS comp.

## Production/nonsupervisory compensation: 1948-1973

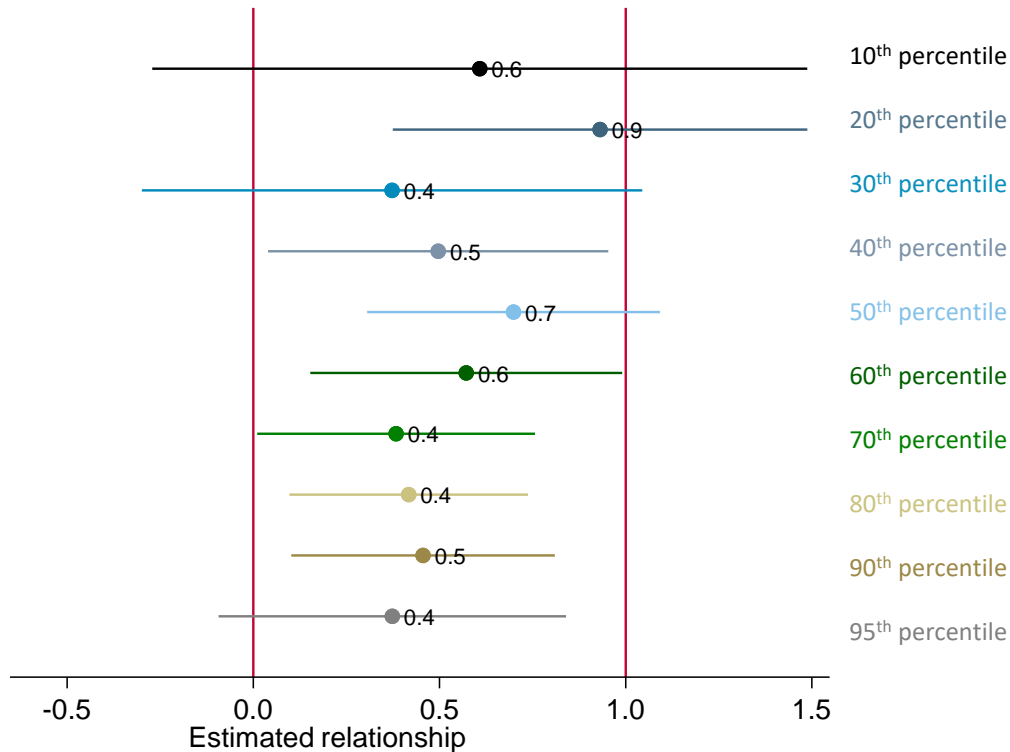


*These charts show the coefficient estimates from various specifications for regressions of **average production and nonsupervisory compensation on productivity**. Lines represent 95% confidence intervals.*

## Production/nonsupervisory compensation: 1973-2015



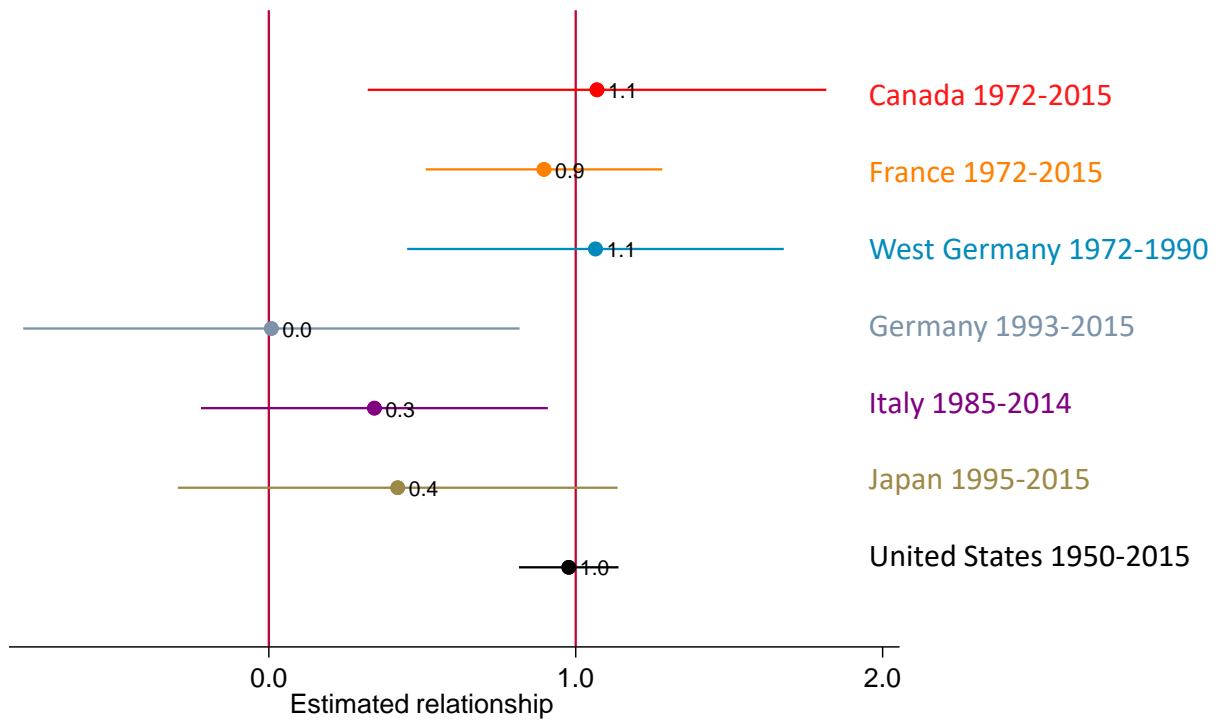
# Results: percentiles of the wage distribution



*These charts show the coefficient estimates from the baseline 3-year moving average regressions of **percentiles of the wage distribution on productivity**. Lines represent 95% confidence intervals.*

**Note:** this is **wage** data not **total compensation** data. Comparison with the median compensation regressions suggest that these may be underestimates.

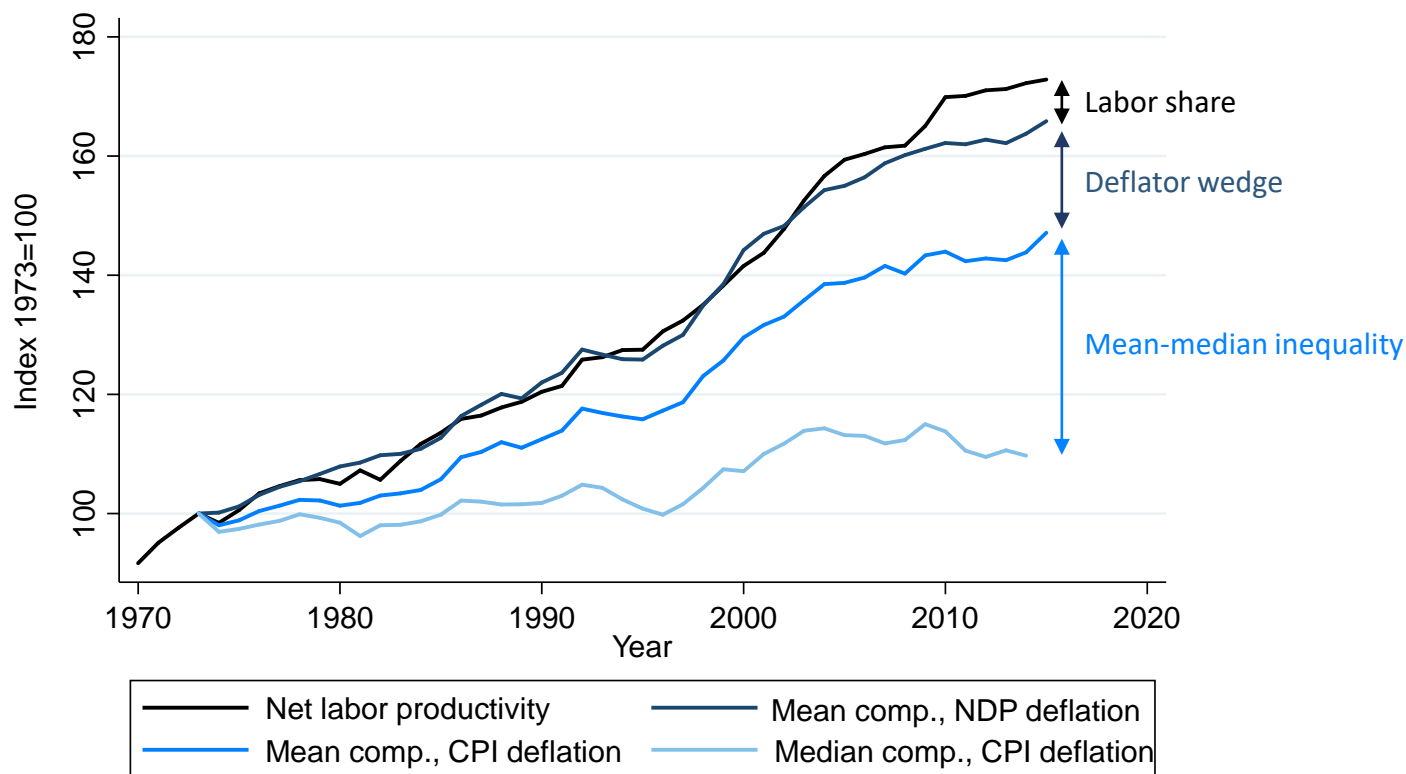
# Results: average compensation for advanced economies



*These charts show the coefficient estimates from the baseline 3-year moving average regressions of **average compensation on productivity in advanced economies.** Lines represent 95% confidence intervals.*

# The overall productivity-compensation gap is the result of three separate divergences

## Divergence decomposition (Bivens and Mishel 2015)



Data from BLS, BEA and Mishel and Bivens (2015)

## Technology-based theories have a natural implication: divergence is greater when productivity growth is faster

Assuming that greater technological progress implies faster productivity growth:

### Labor share:

$$\Delta \log \text{labor share} = \alpha + \beta \Delta \log \text{productivity} + \gamma \Delta \text{unemployment} + \varepsilon$$

$$H_1: \beta < 0$$

### Mean/median inequality:

$$\Delta \log \frac{\text{mean}}{\text{median}} \text{ compensation} = \alpha + \beta \Delta \log \text{productivity} + \gamma \Delta \text{unemployment} + \varepsilon$$

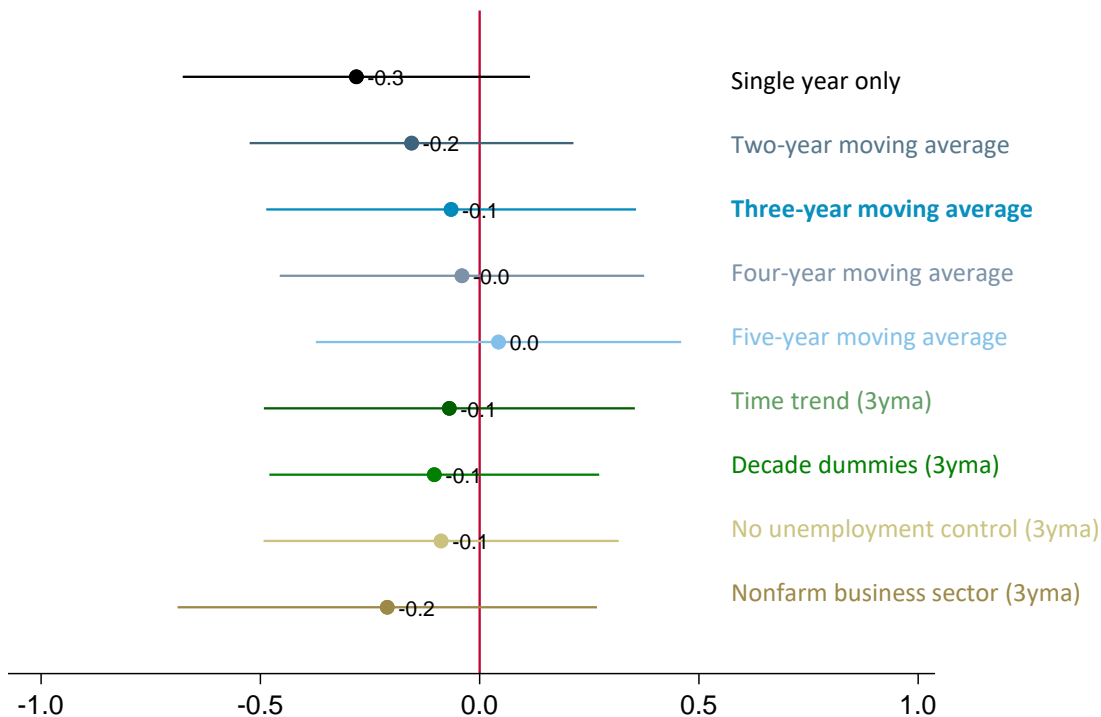
$$H_1: \beta > 0$$

# Divergences increased less during productivity booms than productivity slowdowns

	Average annual productivity growth	Annual change in labor share	Annual change in mean/median ratio
1948-1973	2.7%	-0.007%	.
1973-1996	1.2%	-0.1%	0.7%
1996-2003	2.3%	0.2%	0.2%
2003-2015	1.1%	-0.3%	0.8%

# Results: labor share and productivity

1973-2015



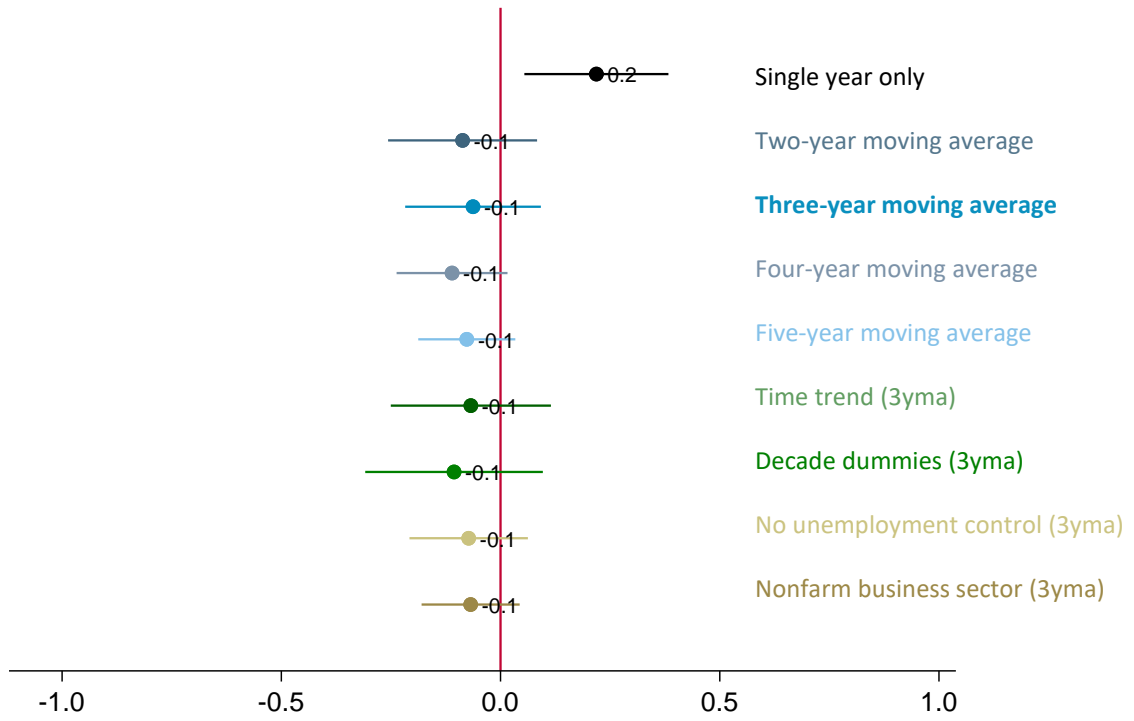
These charts show the coefficient estimates from various specifications  
 Lines represent 95% confidence intervals.

**Solid line:**  
 moving average specification

**Dashed line:**  
 distributed lag specification

# Results: mean/median compensation and productivity

1973-2015



*These charts show the coefficient estimates from various specifications*

*Lines represent 95% confidence intervals.*

**Solid line:**  
*moving average specification*

**Dashed line:**  
*distributed lag specification*



## A quick counterfactual: productivity growth and widening inequality

- If the **mean/median** compensation ratio had been the same in 2015 as it was in 1973, median compensation would have been around **32%** higher
- If the **productivity/mean compensation ratio** (labor share) had been the same in 2015 as it was in 1973, mean and median compensation would have been around **5%** higher
- If the rate of **productivity growth** had been the same over 1973-2015 as it was over 1948-1973, our estimates of the relationship between productivity and compensation suggest that mean compensation would have been around **59-76%** and median compensation **65-68%** higher in 2015.

## Conclusions:

The substantial variations in productivity growth that have taken place during recent decades have translated into significant positive changes in the compensation of middle income workers.

This suggests that if productivity accelerates holding other factors constant, the likely impact will be increased pay growth for middle income workers.

At the same time, there is little co-movement between productivity growth and widening inequality – either for the labor share, or the mean/median ratio.

This tends to imply that technology is not the key driver of changes in the labor share, or in the mean/median compensation gap. It instead suggests the importance of factors *not* associated with the rate of productivity growth in explaining the pay-productivity divergence.