

# Revisiting the Optimal Inflation Rate with Downward Nominal Wage Rigidity: The Role of Heterogeneity

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## Research question

✓ How does the optimal inflation rate change in the presence of worker heterogeneity in an economy with downward nominal wage rigidity (DNWR)?

- Previous studies find it is close to zero in a rep. agent (RA) New Keynesian (NK) model.

## Approach

✓ Develop a heterogeneous agent (HA) NK model with asymmetric wage adj. cost.

✓ Estimate the adj. cost according to U.S. micro wage data.

## Key findings

✓ U.S. micro wage data implies substantial DNWR.

✓ DNWR causes cross-sectional misallocation of labor as well as inefficient dynamics.

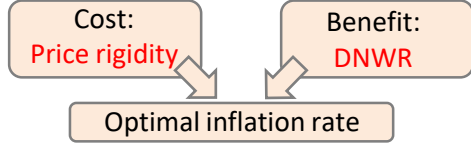
- Welfare cost in a 2% inflation economy: RA model: 0.20% → HA model: 0.97% of consumption.

✓ The optimal inflation rate becomes higher due to worker heterogeneity.

- Larger “grease the wheels” effect of inflation.

## Model overview

✓ Cost and benefit of inflation

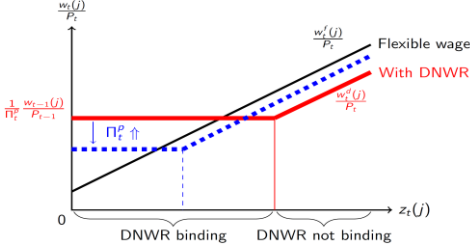


✓ Wage setting with DNWR (stylized example)

$$\frac{w_t(j)}{P_t} = \max \left\{ \frac{w_t^d(j)}{P_t}, \frac{1}{\Pi_t^p} \frac{w_{t-1}(j)}{P_{t-1}} \right\}$$

$$\frac{w_t^d(j)}{P_t} = \mu_w z_t(j) m r s_t(j) - \beta E_t [\psi_{t+1}(j)] (u_{c,t}(j) \frac{\theta_w h_t(j)}{w_t^d(j)})^{-1}$$

where  $w^d$ : desired wage,  $\psi$ : shadow value of DNWR



- DNWR leads to both upward and downward deviation from flexible wage.

## Estimation

✓ Quantitative model with asymmetric wage adj. (fixed+linear) cost.

- SMM according to U.S. micro wage data.

- 46 data moments\* vs. 10 model param.

\*Data moments are those reported by Grigsby, J., E. Hurst and A. Yildirimaz, "Aggregate Nominal Wage Adjustments: New Evidence from Administrative Payroll Data," NBERWP No.25628, 2019.

Moment	Quarterly changes		Yearly changes	
	Data	Model	Data	Model
<b>Job-stayers</b>				
Probability of positive wage changes	0.185	0.187	0.639	0.638
Probability of negative wage changes	0.009	0.011	0.024	0.035
Median size of positive wage changes	0.033	0.041	0.035	0.046
Median size of negative wage changes	-0.077	-0.074	-0.066	-0.072
Mean size of positive wage changes	0.057	0.055	0.063	0.067
Mean size of negative wage changes	-0.087	-0.080	-0.073	-0.080
Median of unconditional wage changes	0.000	0.000	0.024	0.035
Mean of unconditional wage changes	0.010	0.010	0.039	0.040
S.D. of unconditional wage changes	0.037	0.029	0.065	0.056
<b>Job-changers</b>				
Probability of positive wage changes	0.527	0.589	0.568	0.610
Probability of negative wage changes	0.374	0.402	0.380	0.371
Median size of positive wage changes	0.167	0.191	0.185	0.202
Median size of negative wage changes	-0.136	-0.173	-0.158	-0.161
Mean size of positive wage changes	0.235	0.209	0.261	0.223
Mean size of negative wage changes	-0.165	-0.187	-0.185	-0.178
Median of unconditional wage changes	0.023	0.043	0.046	0.065
Mean of unconditional wage changes	0.063	0.048	0.080	0.070
S.D. of unconditional wage changes	0.259	0.238	0.293	0.238

## Welfare analysis

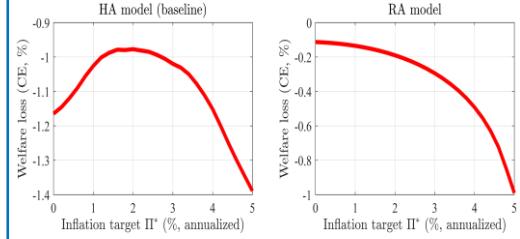
✓ Welfare loss in a 2% inflation economy

- Cross-sectional misallocation of labor enlarge welfare loss in the HA model.

	With wage rigidity		Without wage rigidity	
	HA model (baseline)	RA model	HA model	RA model
Welfare loss (CE, %)	-0.97	-0.20	-0.27	-0.22
$\sigma_j(\ln w_t(j))$ (%)	17.21	—	21.05	—
$\rho_j(\ln w_t(j), \ln z_t(j))$	0.98	—	1.00	—

✓ Optimal inflation rate  $\Pi^*$

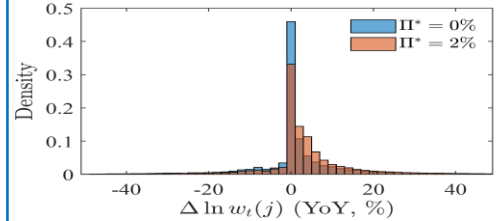
- HA model  $\approx 2\%$ , RA model  $< 0\%$



## Cross-sectional distribution and $\Pi^*$

✓ Wage change distribution

- Higher  $\Pi^*$  increases wage flexibility, but still substantial heterogeneity.



## Sensitivity analysis

✓ Key determinants of optimal  $\Pi^*$  include

- Trend productivity growth,  
- Size of idiosyncratic shock,  
- Labor supply/demand elasticity.

✓ Results are robust to

- Rebating adj. cost,  
- Alternative monetary policy rule, etc.