Downward Wage Rigidity in a Liquidity Trap

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Outline

➢ Explore the relationship between downward wage rigidity and the severity of the recession.

➢ Incorporate downward wage rigidity into a standard new Keynesian model and study its implications.

➢ Find that downward wage rigidity exacerbates the severity of mild recessions but mitigates the severity of liquidity traps.

Empirical evidence

➢ During the Great Depression, nominal wages barely changed initially and then fell much less than the price level. Data Source: FRED.

– Nominal wage: index of manufacturing wage rates for United States, Jan 1929=100/100

– Price Level: gross domestic product (implicit price deflator), Jan 1929=100/100

– Shaded area: NBER-dated recession
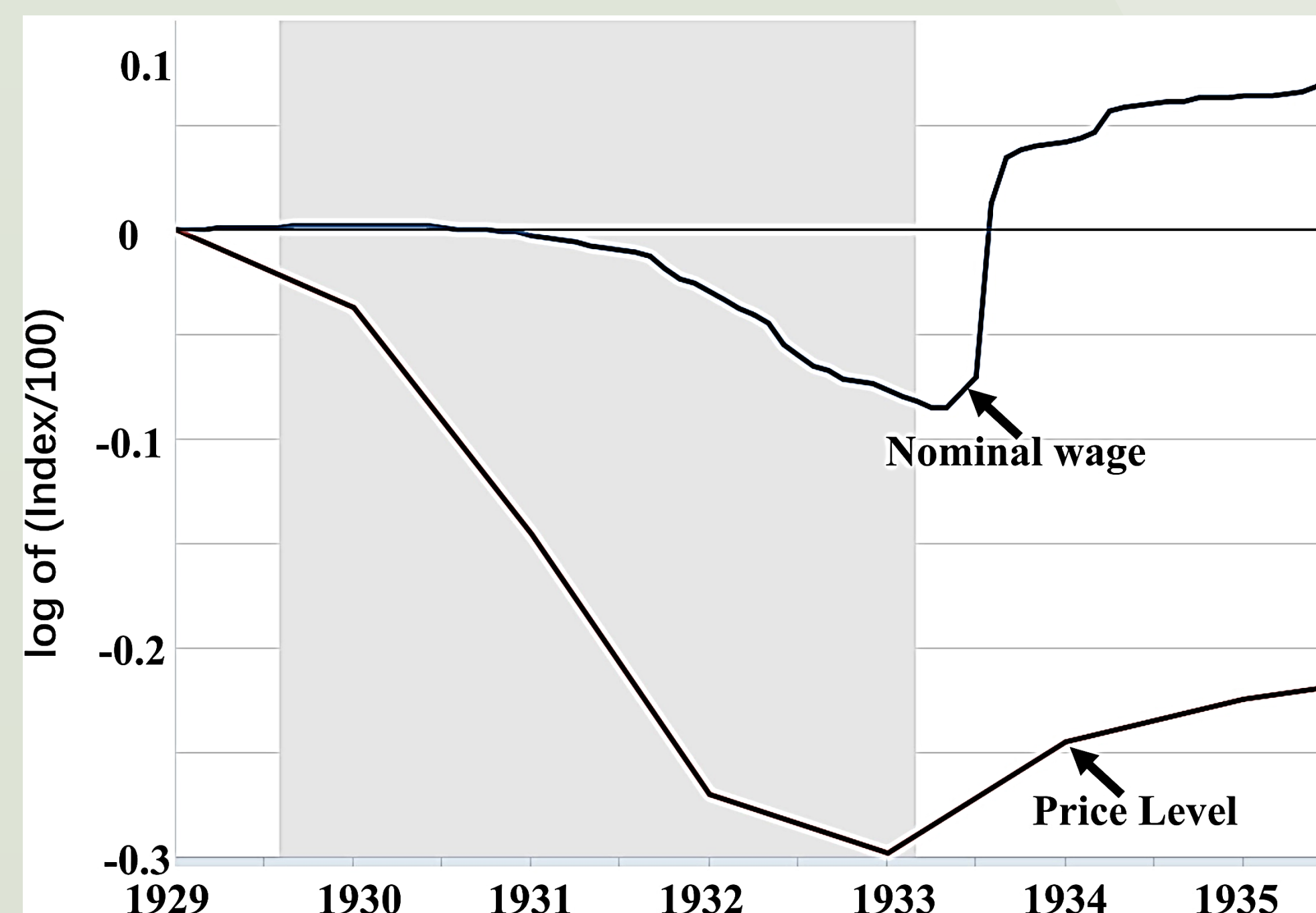
Motivation

➢ Rises in real wages due to downward wage rigidity affect the economy through two channels:

– Lower labor demand:

• Exacerbate the decline in output and employment

• Example: Hoover's "wage-fixing" policies at the onset of the Great Depression were believed to be contractionary (Eichengreen and Sachs, 1985; Bernanke, 1995; Bernanke and Carey, 1996; Cole and Ohanian, 2001; Ohanian, 2009; Rose, 2010)

– Raise firms' marginal costs and consumers' purchasing power:

• Raise inflation expectations

➢ The effects of the second channel on the economy haven't been studied.

Model

➢ A standard new Keynesian model by Galí (2015):

$$y_t = E_t y_{t+1} - \frac{1}{\sigma}(i_t - E_t \pi_{t+1} - r_t^n)$$
$$\pi_t = \beta E_t \pi_{t+1} + \kappa y_t$$
$$i_t = \max(0, \rho + \phi_\pi \pi_t + \phi_y y_t)$$

where i_t denotes the nominal interest rate, r_t^n the natural rate of interest, y_t output, π_t inflation. σ, β, κ, ρ, ϕ_π, and ϕ_y are structural parameters. The max operator ensures that the nominal interest rate cannot fall below the zero lower bound. In this model, nominal wages are fully flexible and the labor market is cleared by equating labor demand and supply.

➢ Follow Schmitt-Grohé and Uribe (2017) and Shen and Yang (2018) in modeling downward wage rigidity:

$$W_t \geq \gamma(u_t) W_{t-1}$$

where W_t denotes nominal wages, u_t the unemployment rate, and $\gamma(u_t) = \gamma_0 (1 - u_t)^{\gamma_1}$ with $\gamma_0 \geq 0$ and $\gamma_1 \geq 0$. γ_1 governs the degree of downward wage rigidity. When $\gamma_1 = 0$, nominal wages are fixed and cannot go downward at all. When $\gamma_1 = \infty$, nominal wages are fully flexible. Whenever the economy falls into a recession, this constraint becomes binding and the labor market is cleared by equating this binding constraint and labor demand. Labor supply drops out of the dynamic system.

➢ Incorporate downward wage rigidity into the standard new Keynesian model:

– The same IS curve

– The modified Phillips curve

– A law of motion for real wages

– The same monetary policy reaction function

The revised new Keynesian model:

$$y_t = E_t y_{t+1} - \frac{1}{\sigma}(i_t - E_t \pi_{t+1} - r_t^n)$$
$$\pi_t = \beta_1 E_t \pi_{t+1} + \kappa_1 y_t + \frac{\lambda}{1+\lambda} w_{t-1}$$
$$w_t = \frac{\gamma_1}{1-\alpha} y_t + w_{t-1} - \pi_t$$
$$i_t = \max(0, \rho + \phi_\pi \pi_t + \phi_y y_t)$$

where $\beta_1 = \beta/(1+\lambda)$ and $\kappa_1 = \lambda(\gamma_1 + \alpha)/[(1+\lambda)(1-\alpha)]$. γ_0 is dropped during log-linearization.

➢ Consider two types of recessions:

– A mild recession: the monetary authority can stabilize the economy

– A liquidity trap: the monetary authority is constrained by the zero lower bound on the nominal interest rate

All else equal, compare the severity of the recession with and without downward wage rigidity.

Results

A Mild Recession

➢ Assume that in period 0, the natural rate of interest (r_t^n) falls by 0.2%, and its impact lasts for 10 quarters.

➢ Downward wage rigidity raises real wages, which:

– Lowers labor demand, exacerbating the decline in output and employment - a contractionary effect

– Raises inflation expectations, weakening monetary policy's response - a contractionary effect

➢ Compared with the economy without downward wage rigidity, the recession worsens.
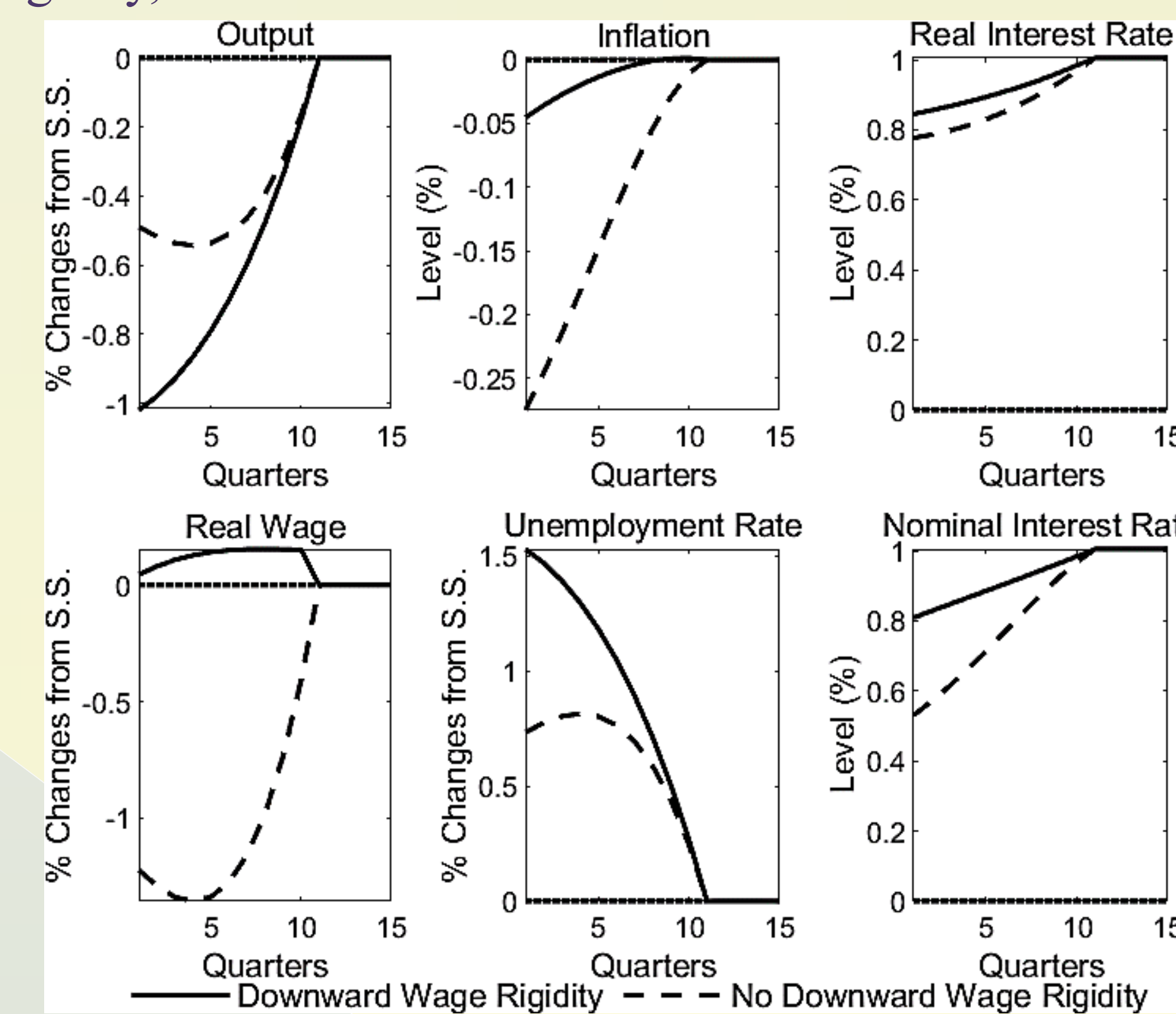
A Liquidity Trap

➢ Assume that in period 0, the natural rate of interest (r_t^n) falls by 2%, and its impact lasts for 10 quarters.

➢ Downward wage rigidity raises real wages, which:

– Lowers labor demand, exacerbating the decline in output and employment - a contractionary effect

– Raises inflation expectations, lowering the real interest rate at the zero lower bound - an expansionary effect

➢ Compared with the economy without downward wage rigidity, the second effect more than offsets the first so that the liquidity trap improves.
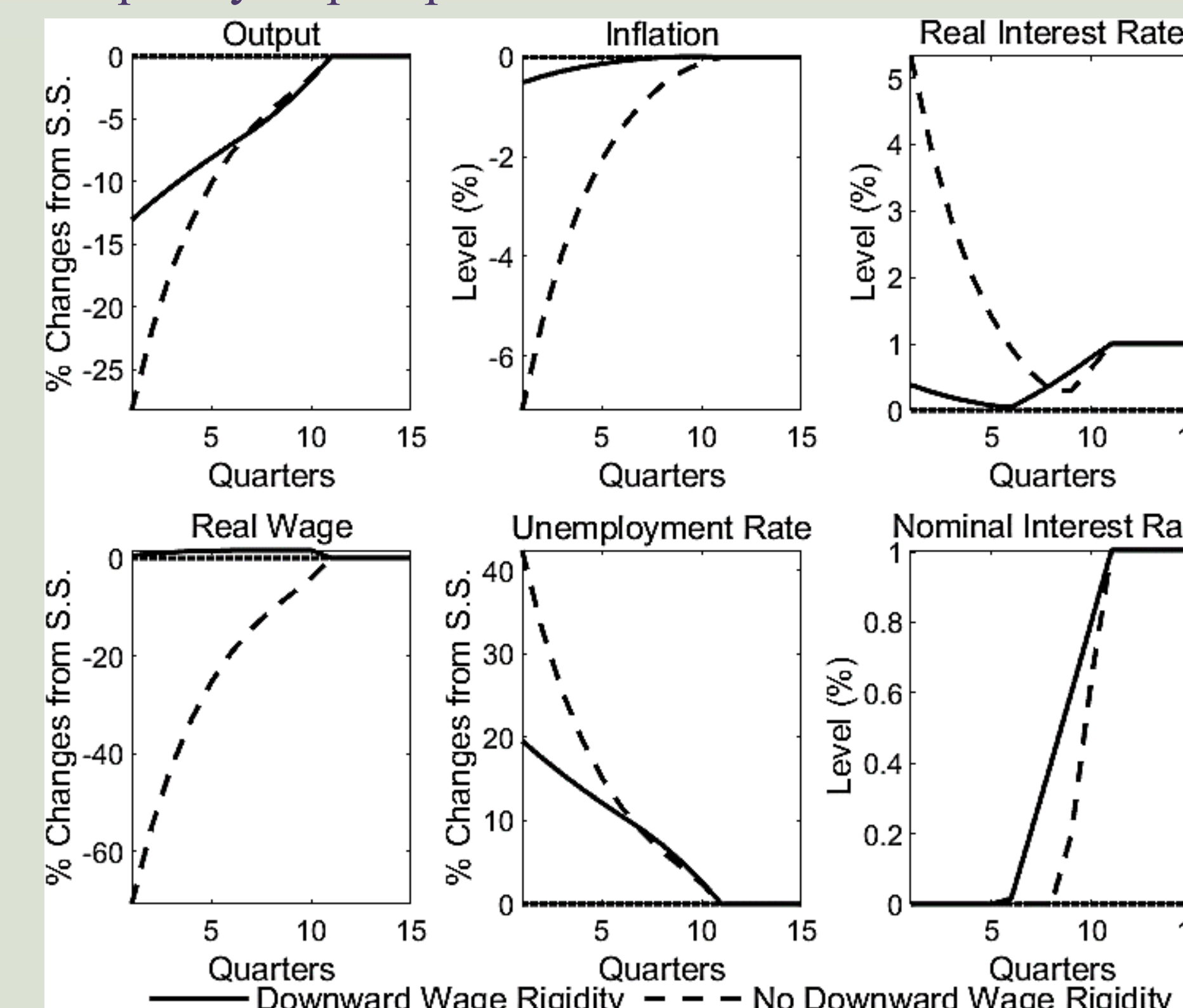
Contributions

➢ Reveal that the rise in real wages caused by downward wage rigidity can affect the severity of recession through two different channels.

➢ Incorporate downward wage rigidity into a standard new Keynesian model. Examine the effects of these two channels on the economy in a mild recession and a liquidity trap, respectively.

➢ In a mild recession, the monetary authority can stabilize the economy by adjusting nominal interest rates. In this case, the effects of both channels are contractionary. Downward wage rigidity exacerbates the severity of the recession.

➢ In a liquidity trap, the nominal interest rate is at its zero lower bound and thus cannot be lowered further to stabilize the economy. In this case, the two channels have opposite effects on the economy and their net effect is expansionary. Downward wage rigidity mitigates the severity of the recession.

➢ It is a paradox: downward wage rigidity worsens recessions – unless the recession is bad enough to push the economy into a liquidity trap.

References

[1] Bernanke, Ben S., 1995. "The Macroeconomics of the Great Depression: A Comparative Approach," *Journal of Money, Credit, and Banking*, 27(1): 1-28.

[2] Bernanke, Ben S., and Kevin Carey, 1996. "Nominal Wage Stickiness and Aggregate Supply in the Great Depression," *Quarterly Journal of Economics*, 111(3): 853-83.

[3] Cole, Hal, and Lee Ohanian, 2001. "Re-examining the Contribution of Money and Banking Shocks to the U.S. Great Depression," *NBER Macroeconomics Annual 2000*, 183-227.

[4] Eichengreen, Barry, and Jeffrey Sachs, 1985. "Exchange Rates and Economic Recovery in the 1930s," *Journal of Economic History*, 45(4): 925-46.

[5] Galí, Jordi, 2015. *Monetary Policy, Inflation, and the Business Cycle: An Introduction to the New Keynesian Framework and Its Applications*, Princeton University Press, edition 2, volume 1, number 10495.

[6] Ohanian, Lee O., 2009. "What or Who Started the Great Depression?" *Journal of Economic Theory*, 144: 2310–2335.

[7] Rose, Jonathan D., 2010. "Hoover's Truce: Wage Rigidity in the Onset of the Great Depression," *Journal of Economic History*, 70(4): 843-870.

[8] Schmitt-Grohé, Stephanie, and Martín Uribe, 2017. "Liquidity Traps and Jobless Recoveries," *American Economic Journal: Macroeconomics*, 9(1): 165-204.

[9] Shen, Wenyi, and Shu-Chun S. Yang, 2018. "Downward nominal wage rigidity and state-dependent government spending multipliers," *Journal of Monetary Economics*, 98: 11–26.

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