

# Notes for a New Guide to Keynes

Jordi Galí

CREI, UPF and Barcelona GSE

EEA Congress, Málaga 2012

# **Notes for a New Guide to Keynes (I): Wages, Aggregate Demand and Employment**

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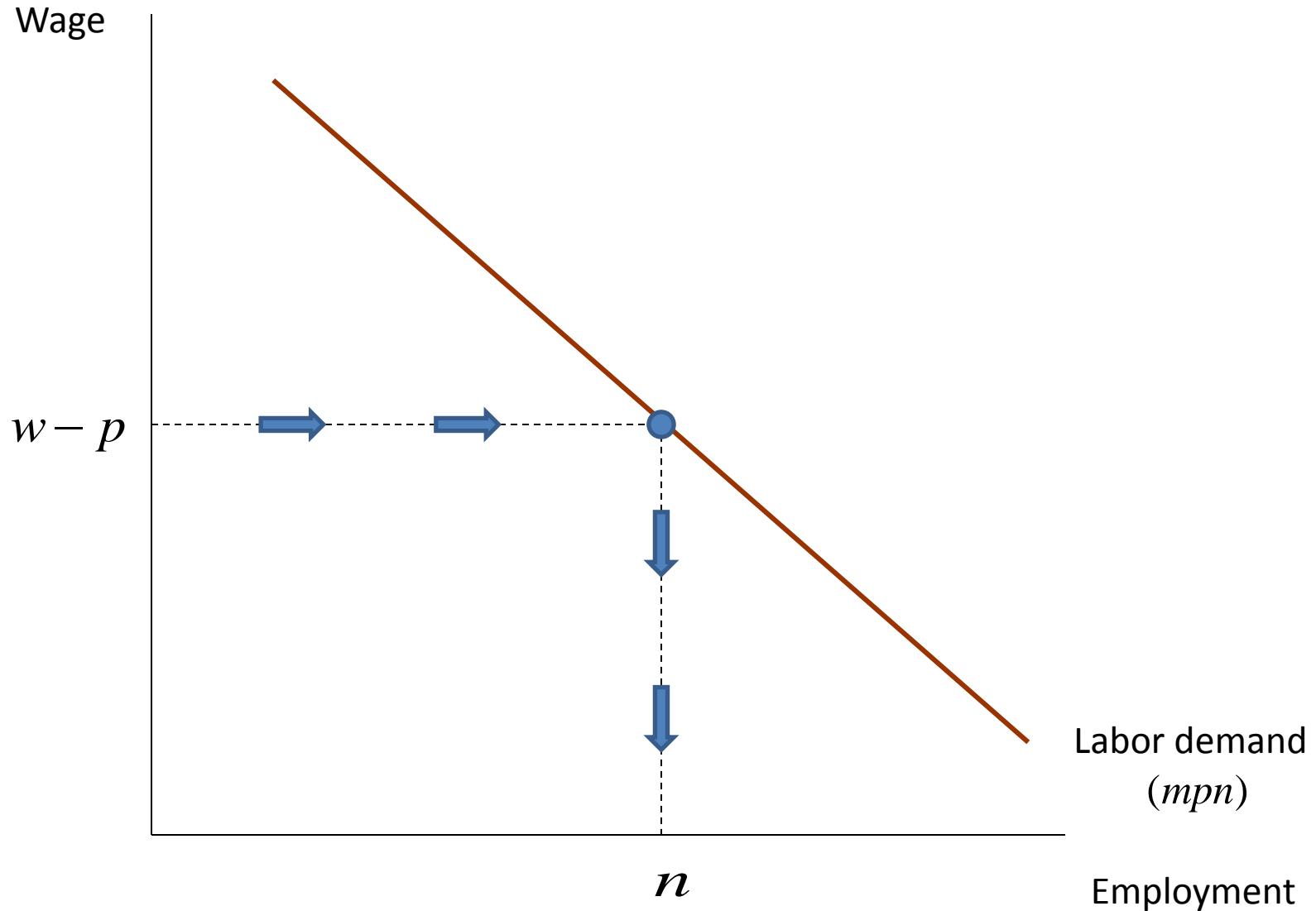
# Outline

- Keynes vs the Classics in the *General Theory*
  - The classical theory of employment
  - The Keynesian theory of employment
  - The nature of unemployment and its cure
- Keynes vs the Classics through the lens of the New Keynesian model
  - The standard New Keynesian model: main ingredients
  - Beyond the *General Theory*: two "new" insights
  - The gains from wage flexibility revisited
- Implications in the current policy environment

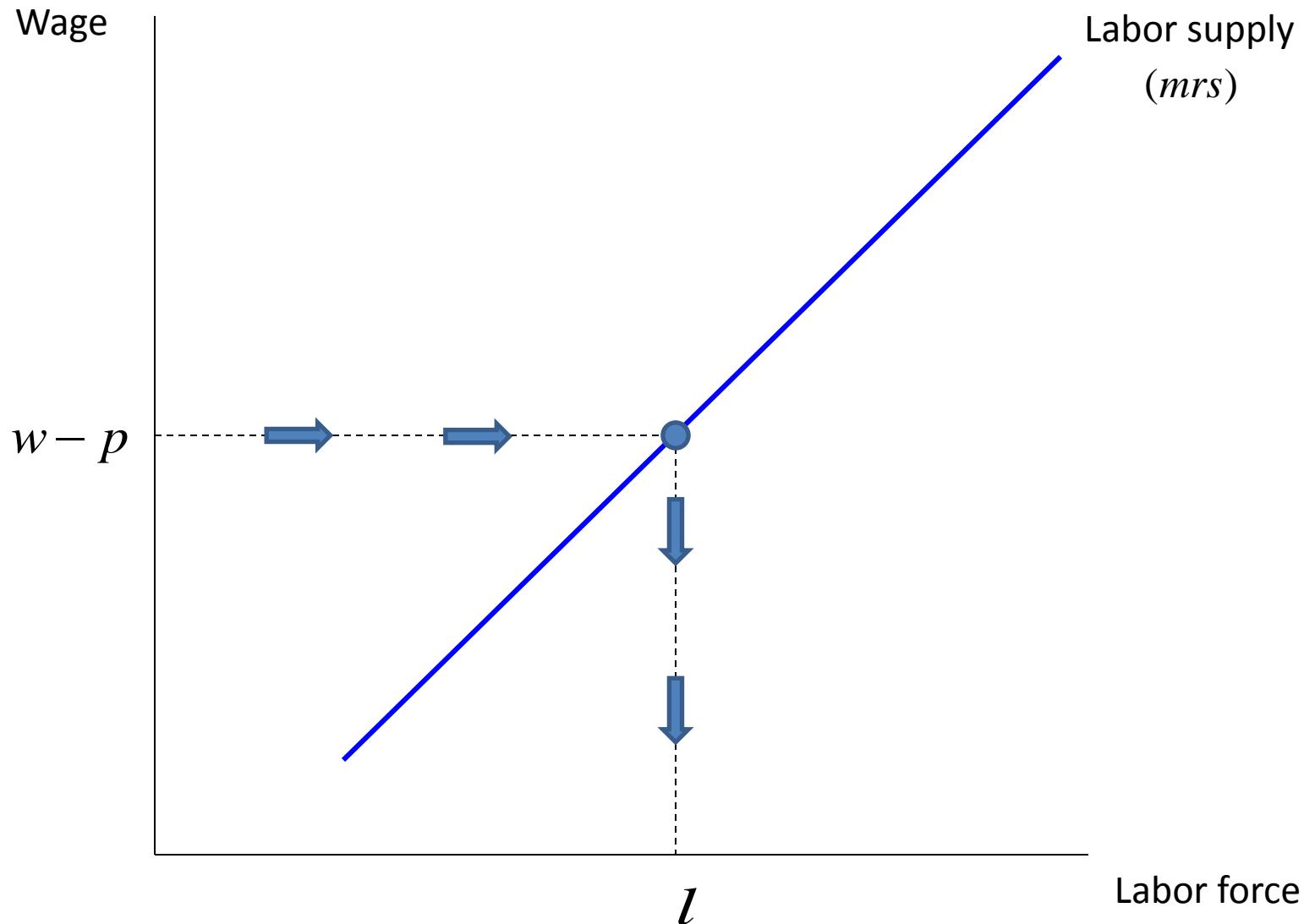
# Keynes vs the Classics in the General Theory

- The classical theory of employment

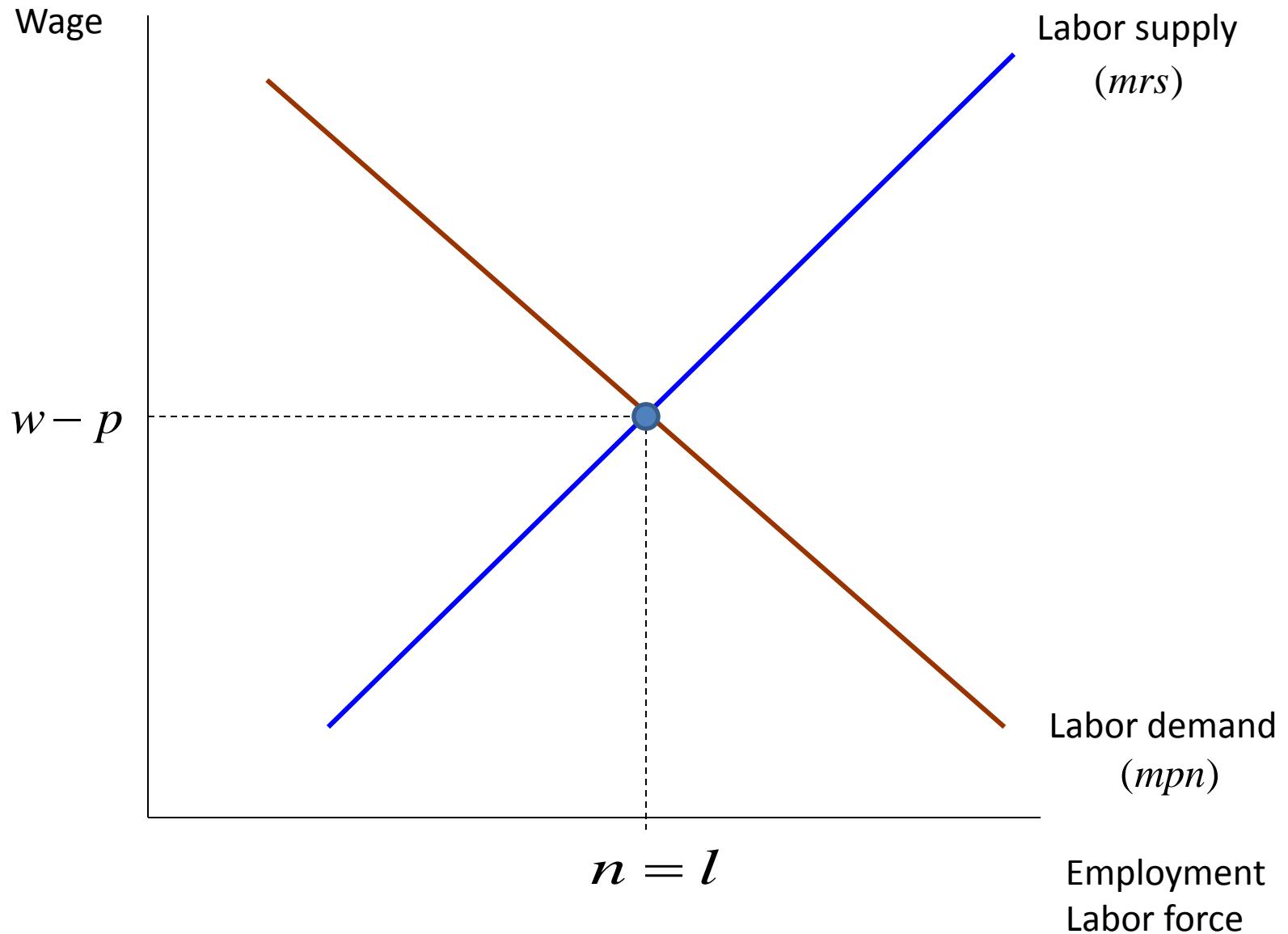
# The Classical Theory of Employment: Labor Demand



# The Classical Theory of Employment: Labor Supply



# The Classical Theory of Employment: Equilibrium



# Keynes vs the Classics in the General Theory

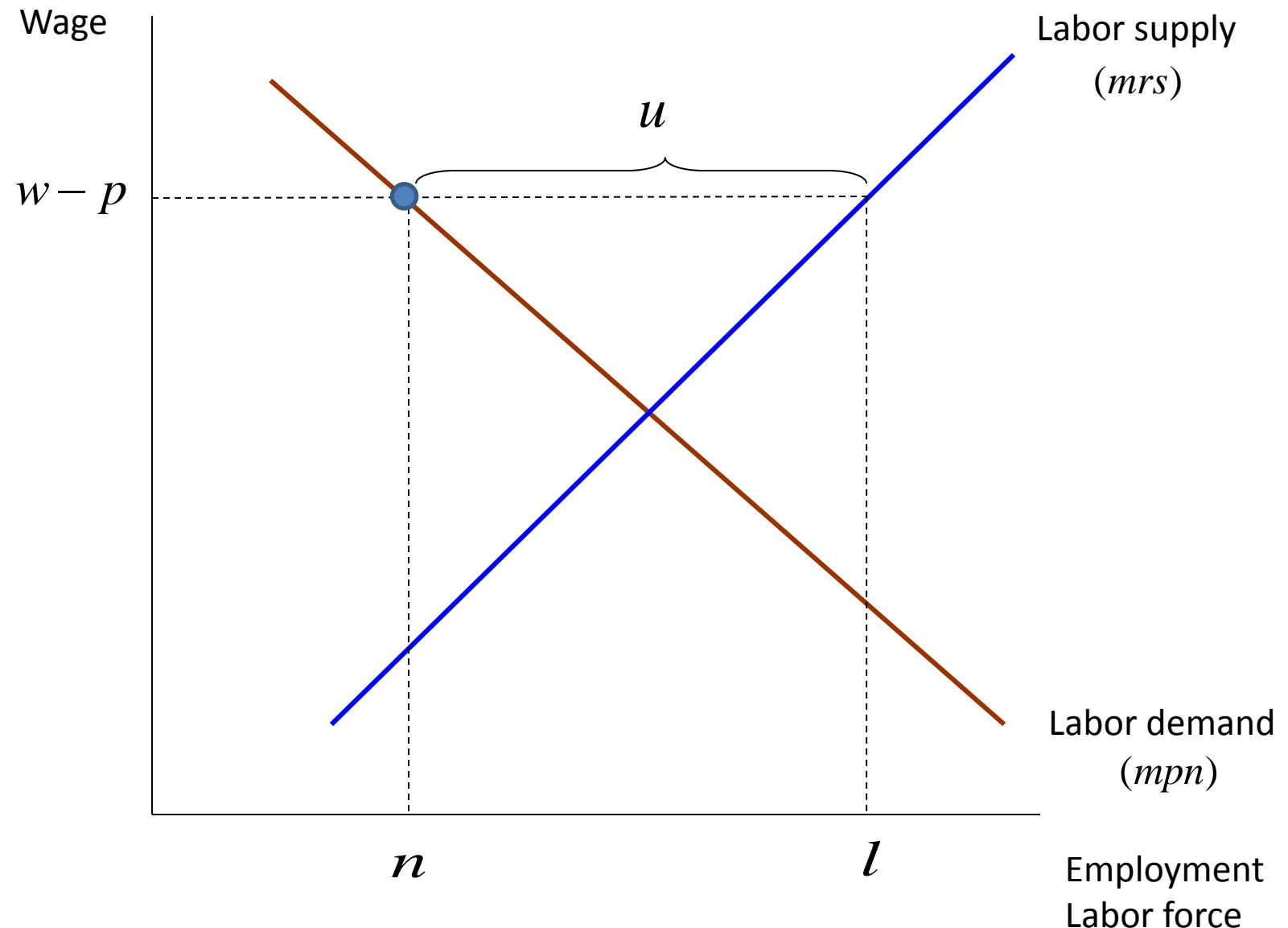
- The classical theory of employment

*"I. The wage is equal to the marginal product of labour."*

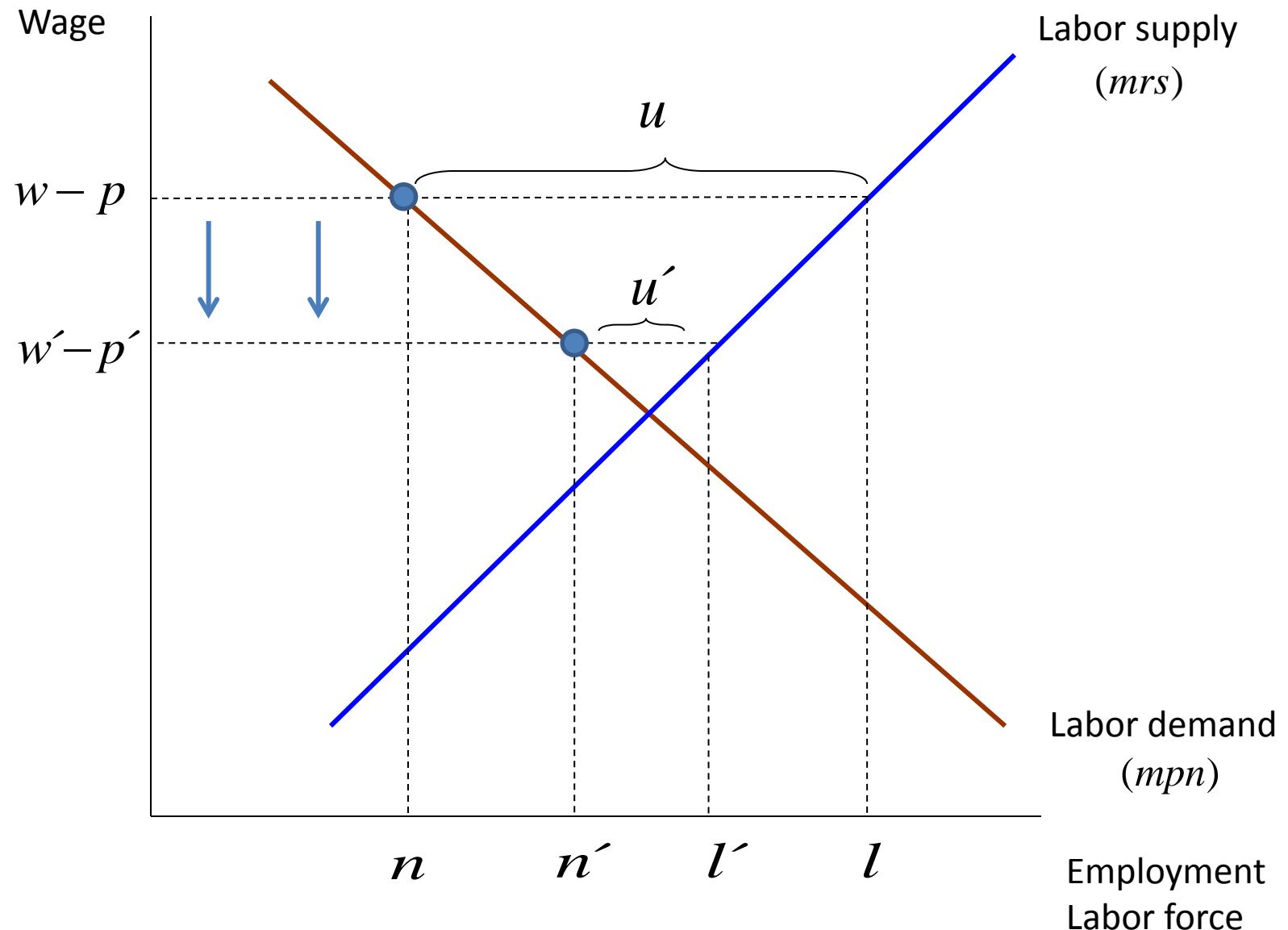
*"II. The utility of the wage when a given volume of labour is employed is equal to the marginal disutility of that amount of employment."*

Keynes (*GT*, chapter 2).

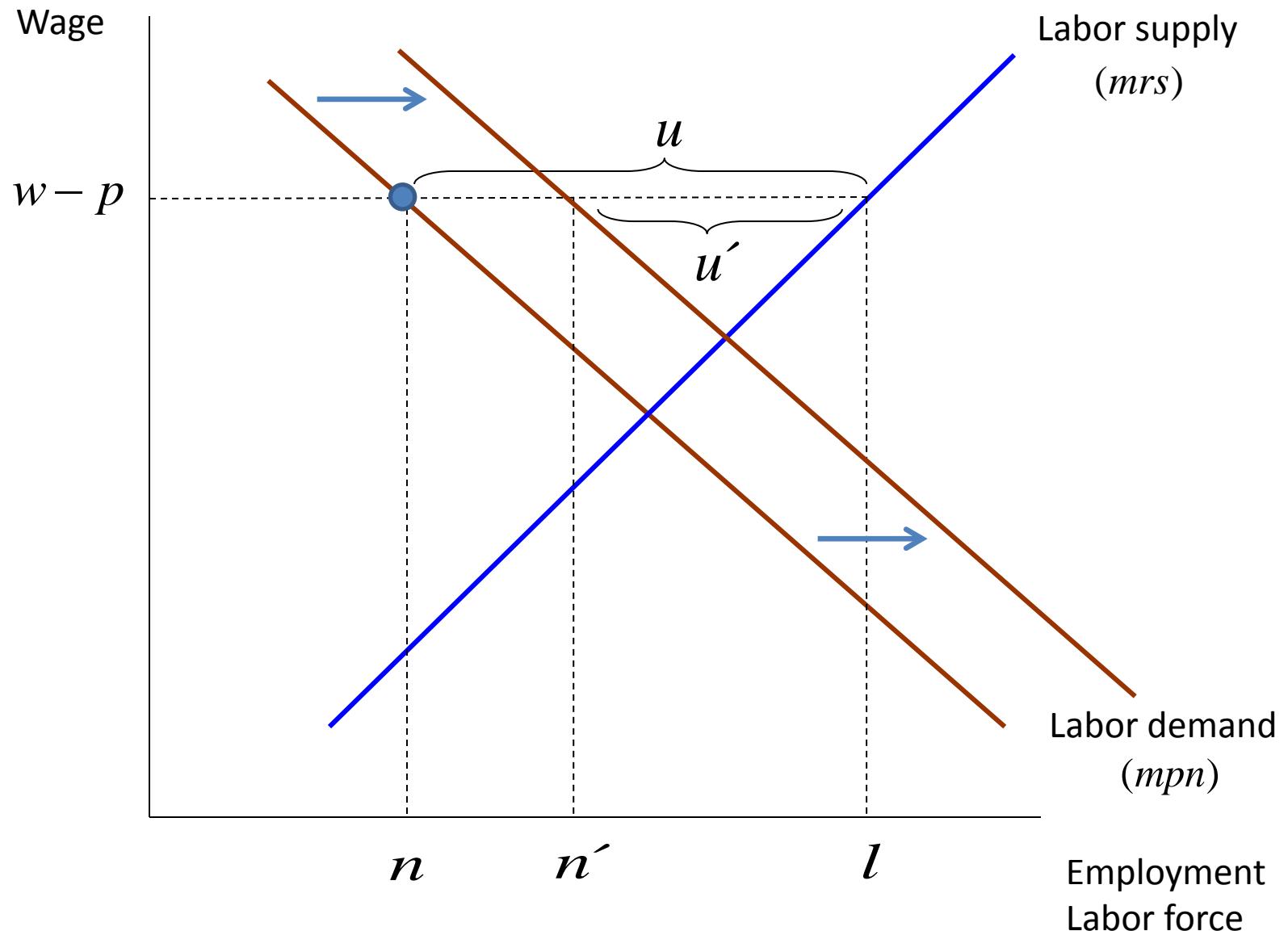
# Unemployment in the Classical Theory of Employment



# Classical Unemployment Cures (I): Real Wage Reduction



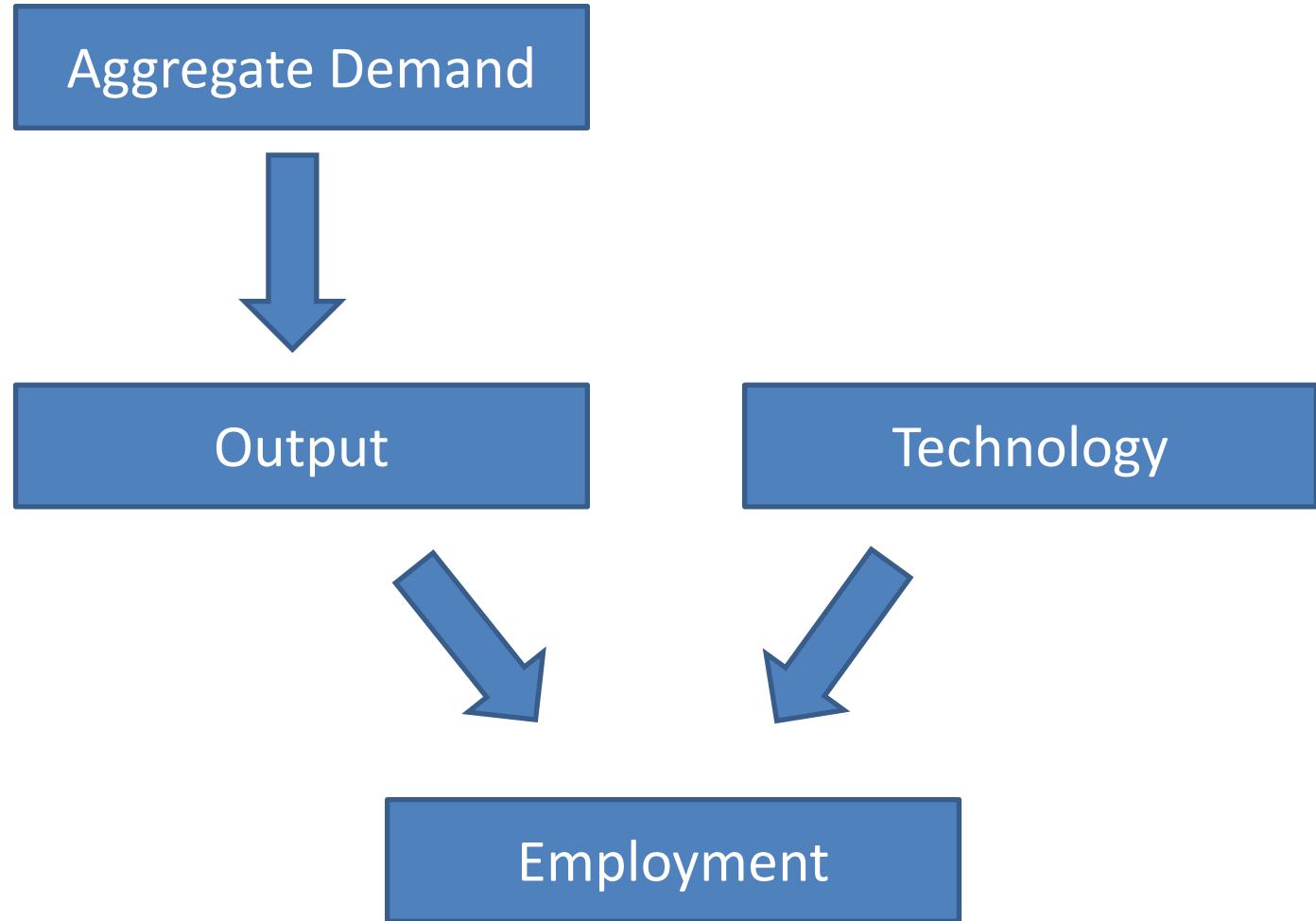
## Classical Unemployment Cures (II): Employment Subsidy



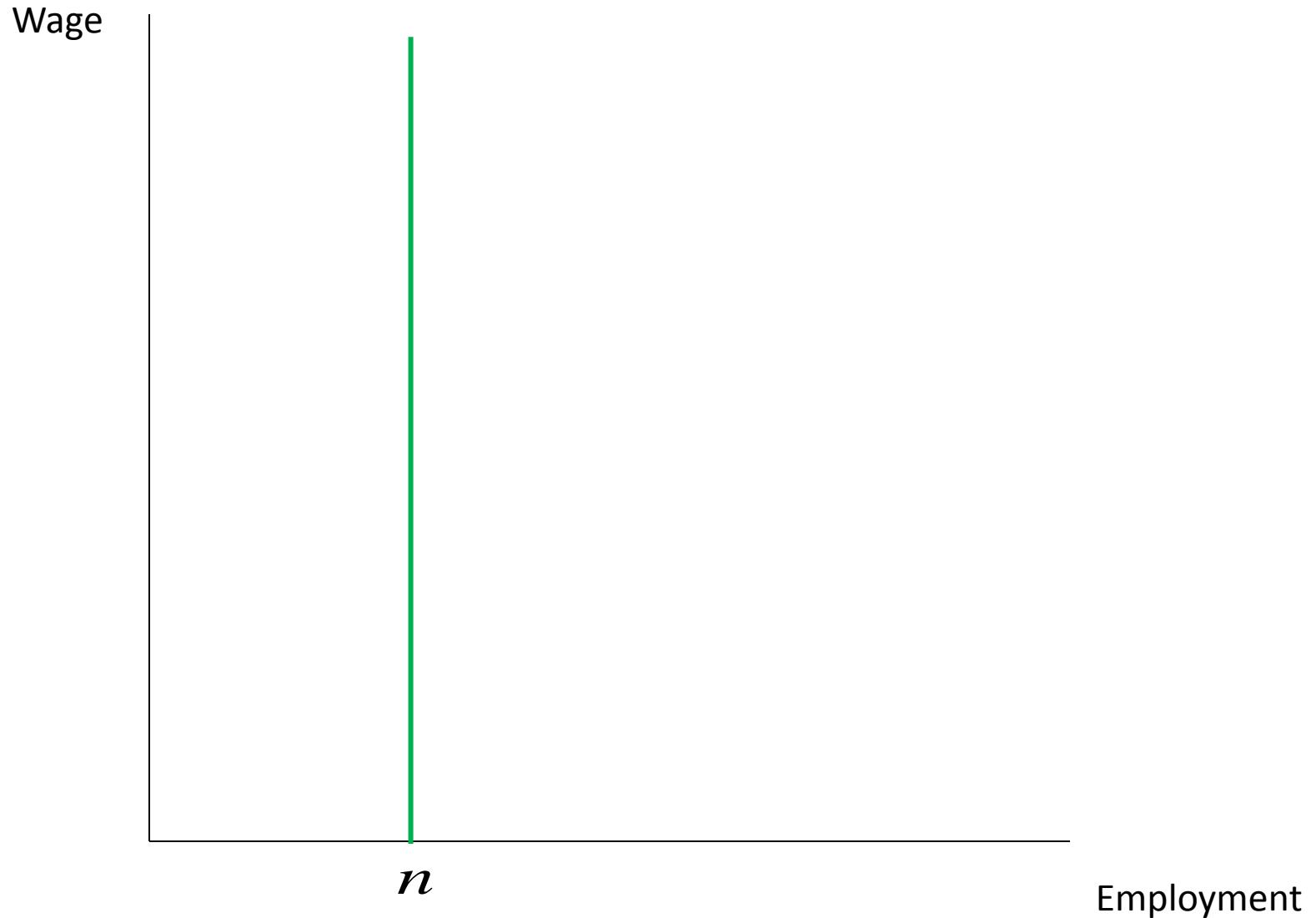
# Keynes vs the Classics in the General Theory

- The classical theory of employment
- The Keynesian theory of employment

# The Keynesian Theory of Employment



# The Keynesian Theory of Employment



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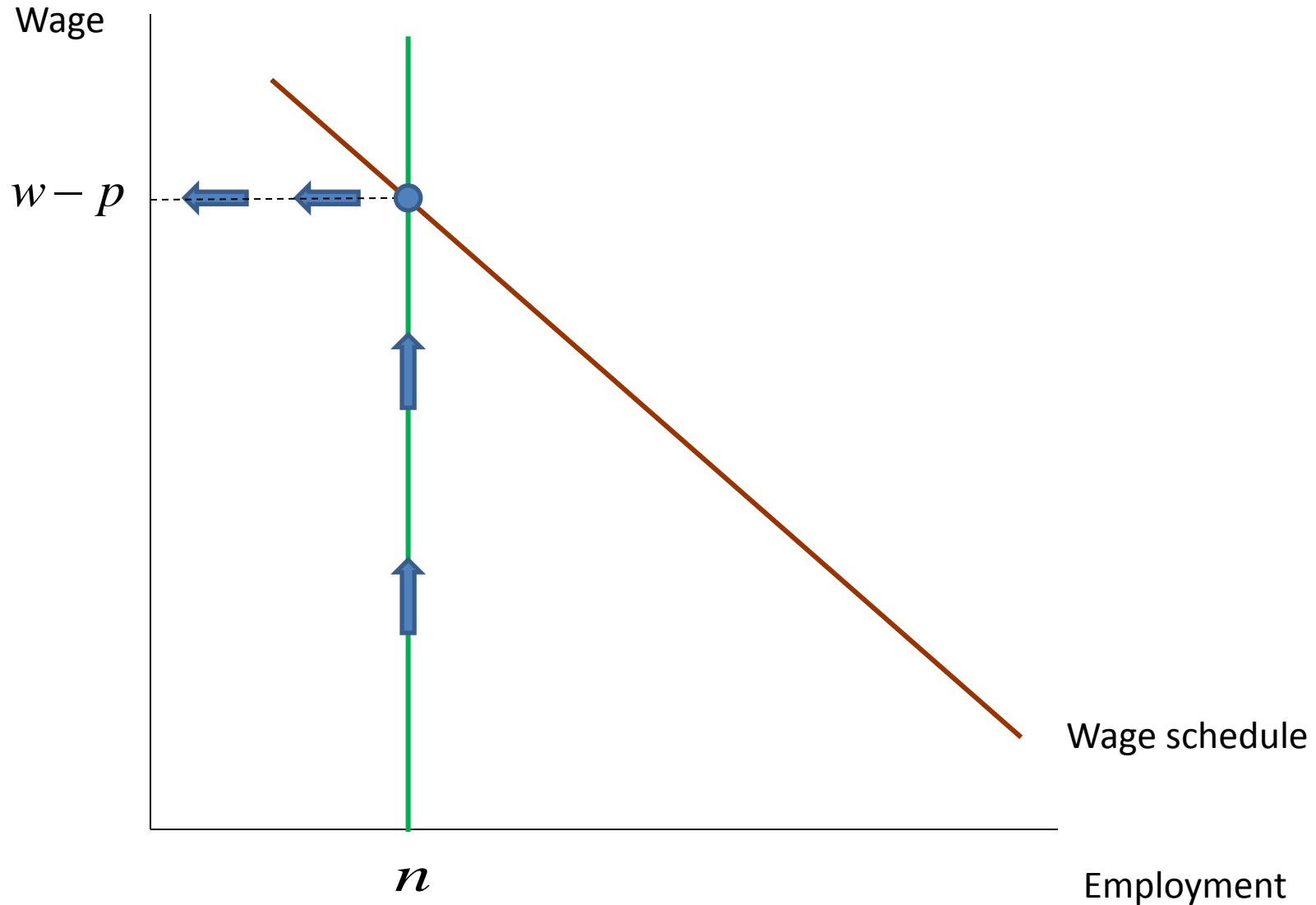
- The classical theory of employment
- The Keynesian theory of employment
  - Price setting by firms:

$$p_t = \mu^P + (w_t - mpn_t)$$

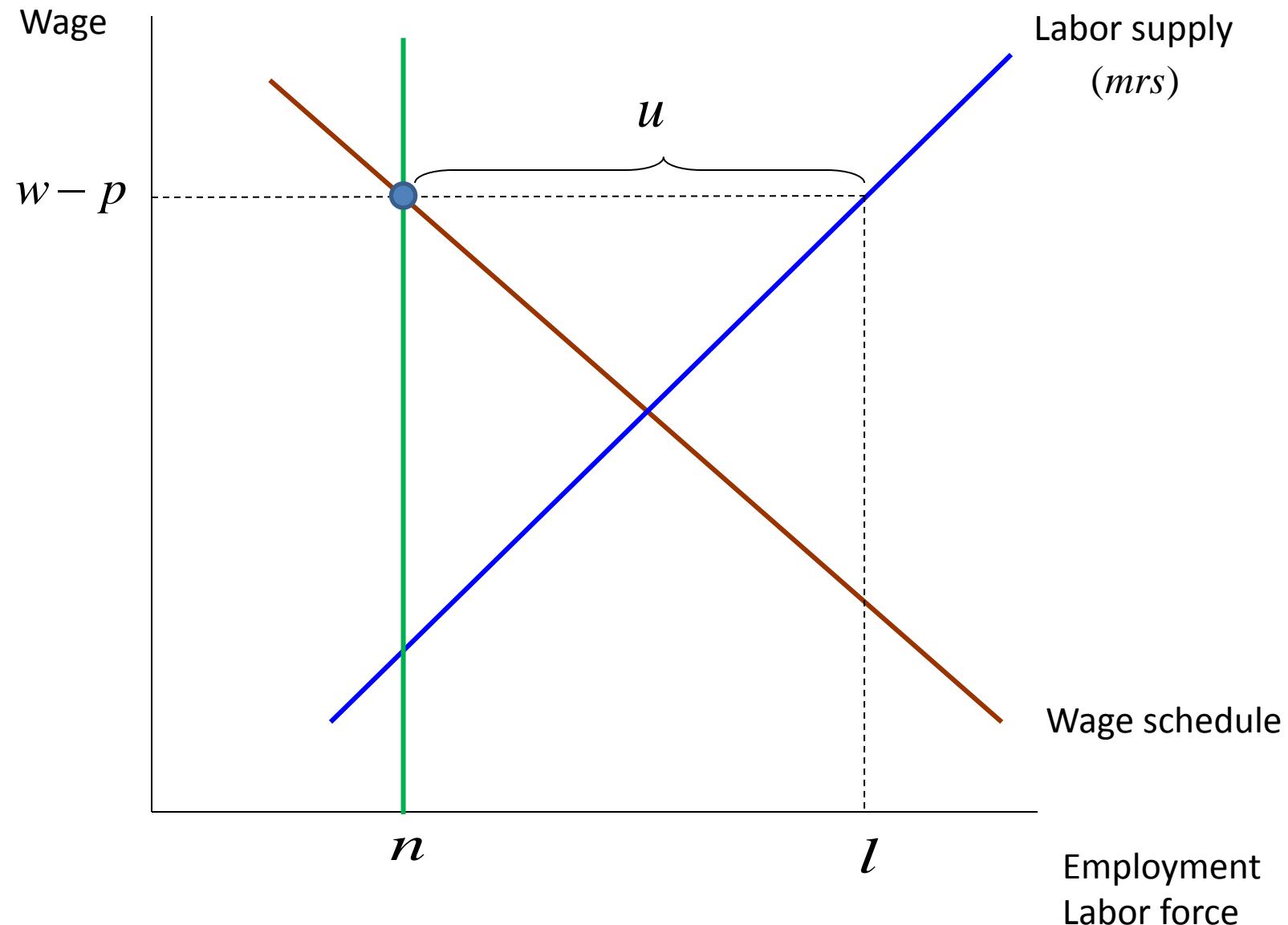
- Implied wage schedule:

$$w_t - p_t = mpn_t - \mu^P$$

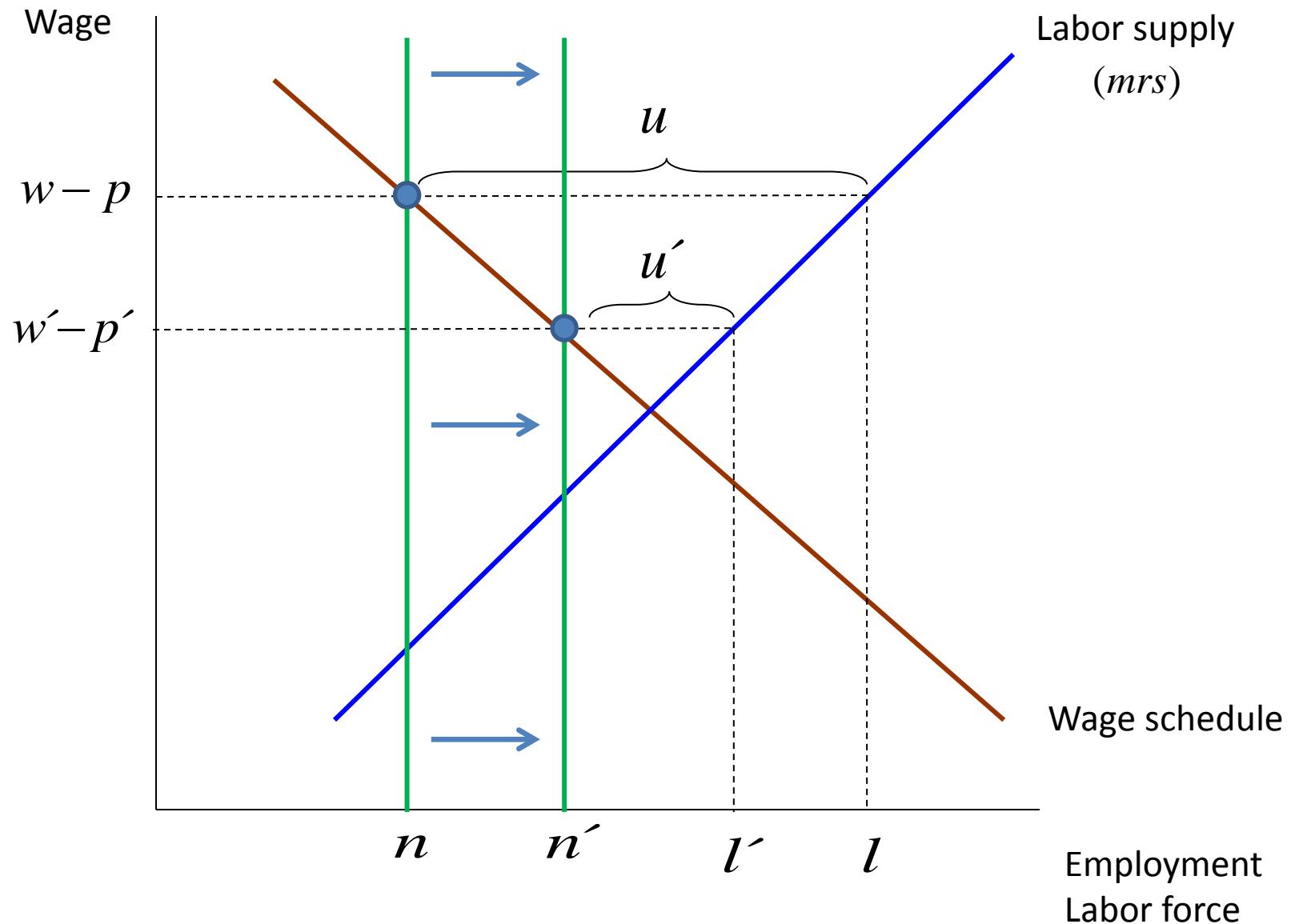
# The Keynesian Theory of Employment



# Unemployment in the Keynesian Theory of Employment



# Cure for Keynesian Unemployment: Aggregate Demand Expansion



# The Standard New Keynesian Model: Main Ingredients (I)

- Households/Preferences

$$E_0 \sum_{t=0}^{\infty} \beta^t U(C_t, N_t; X_t)$$

where

$$U(C_t, N_t; X_t) = \left( \log C_t - \frac{N_t^{1+\varphi}}{1+\varphi} \right) X_t$$

$$x_t = \rho_x x_{t-1} + \varepsilon_t^x$$

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- Firms/Technology

$$Y_t = A_t N_t^{1-\alpha}$$

where

$$a_t = \rho_a a_{t-1} + \varepsilon_t^a$$

# The Standard New Keynesian Model: Main Ingredients (II)

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where participation  $l_t$  is given by:

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- Monetary policy

$$i_t = \rho + \phi_\pi \pi_t + \phi_y y_t + v_t$$

where

$$v_t = \rho_v v_{t-1} + \varepsilon_t^v$$

# The Standard New Keynesian Model: Main Ingredients (III)

- Simplifying assumptions
  - no fiscal sector
  - closed economy
  - no endogenous capital accumulation

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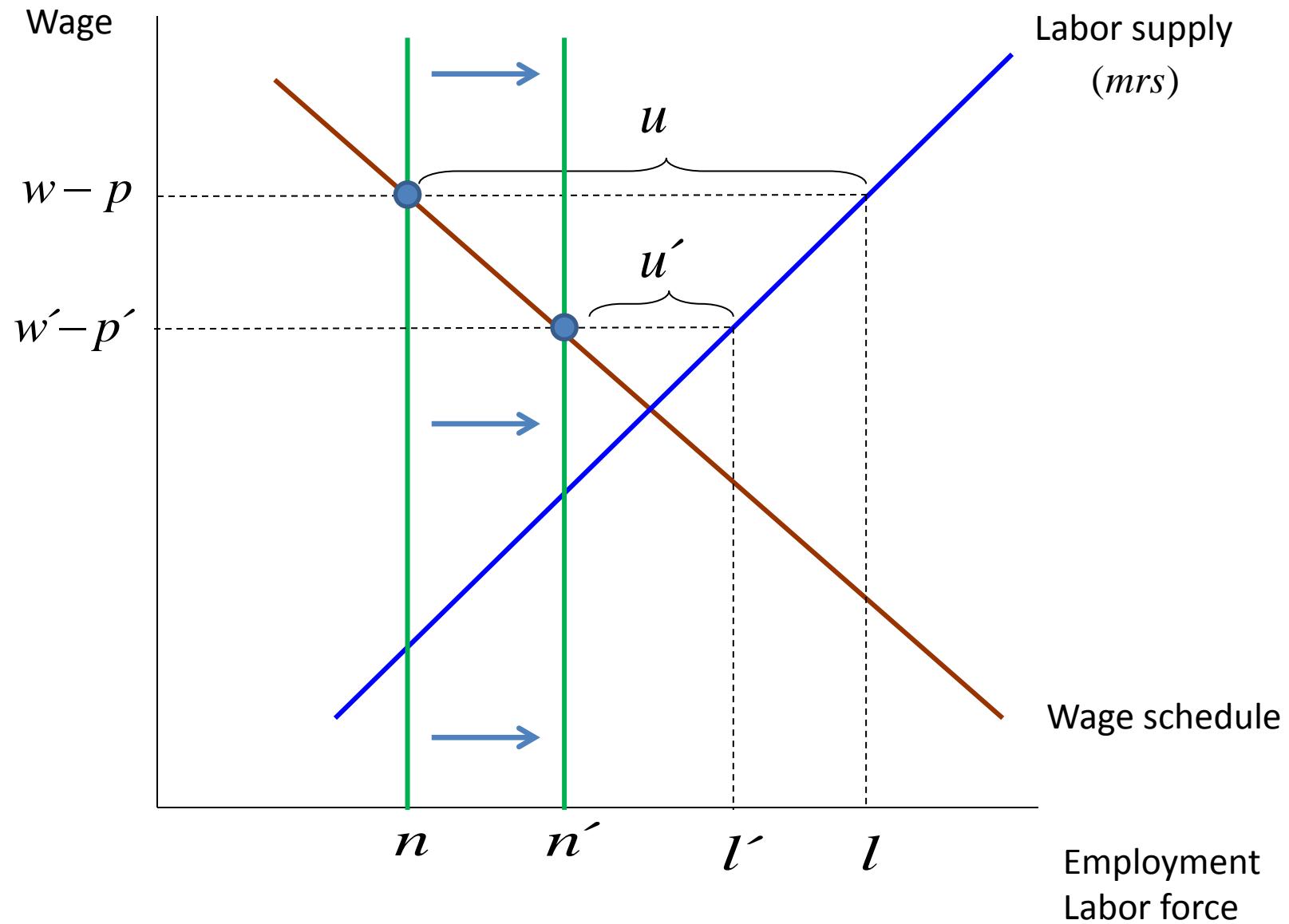
- Efficient allocation

$$n_t^e = \frac{\log(1 - \alpha)}{1 + \varphi} \equiv n^e$$

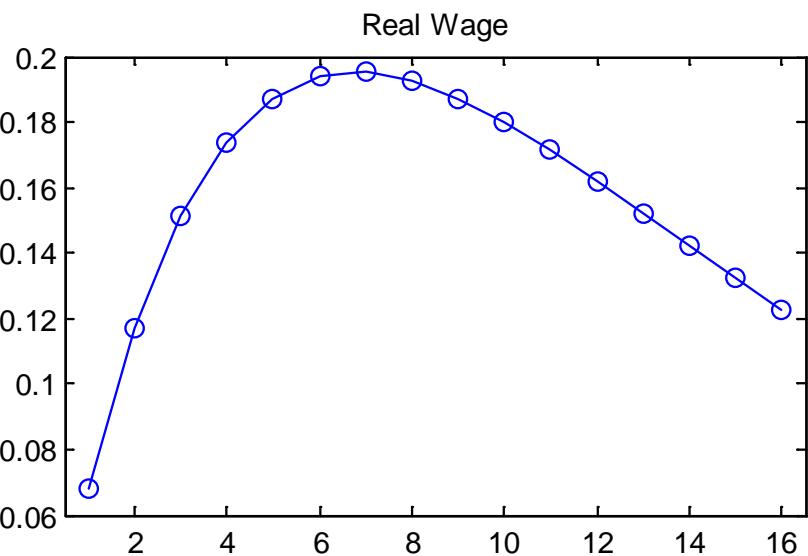
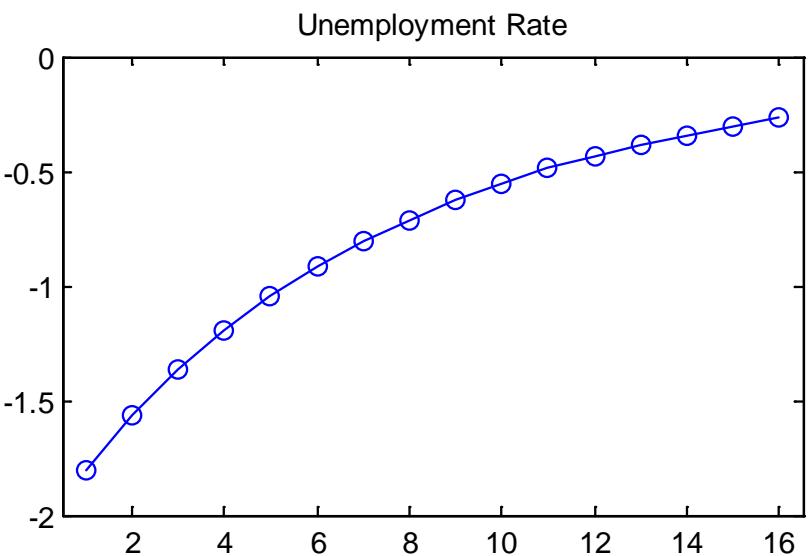
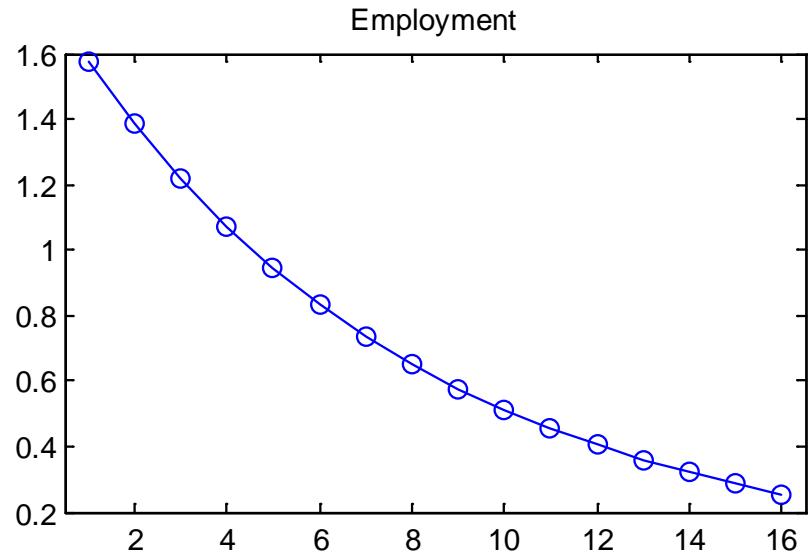
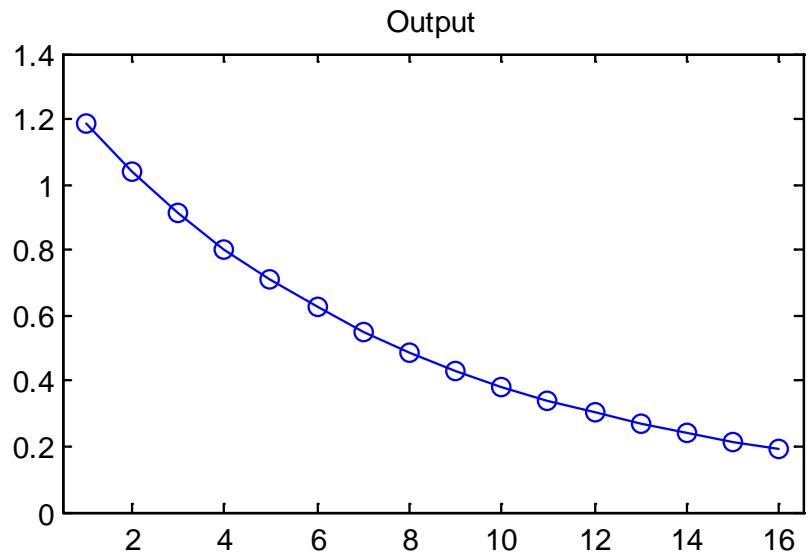
$$y_t^e = a_t + (1 - \alpha)n^e$$

# Beyond the *General Theory* (I): Cyclical Behavior of Wages

# The Effects of an Aggregate Demand Expansion in the General Theory



# Dynamic Responses to an Aggregate Demand Shock in the NK Model



## Beyond the *General Theory* (I): Cyclical Behavior of Wages

- The wage schedule with flexible prices (General Theory)

$$w_t - p_t = mpn_t - \mu^P$$

$$\uparrow n \Rightarrow \downarrow mpn_t \Rightarrow \downarrow (w_t - p_t)$$

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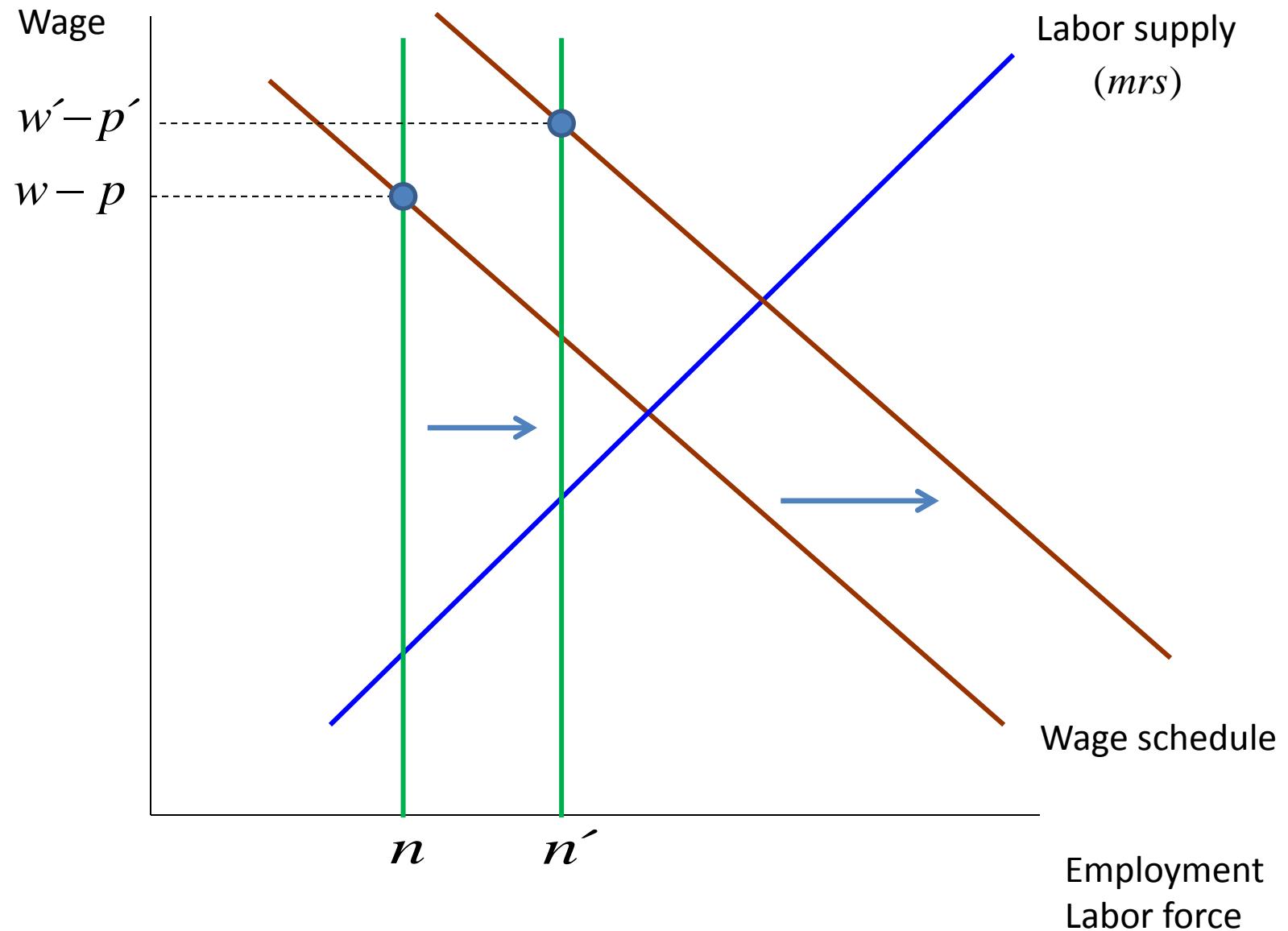
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- The wage schedule with sticky prices (NK model)

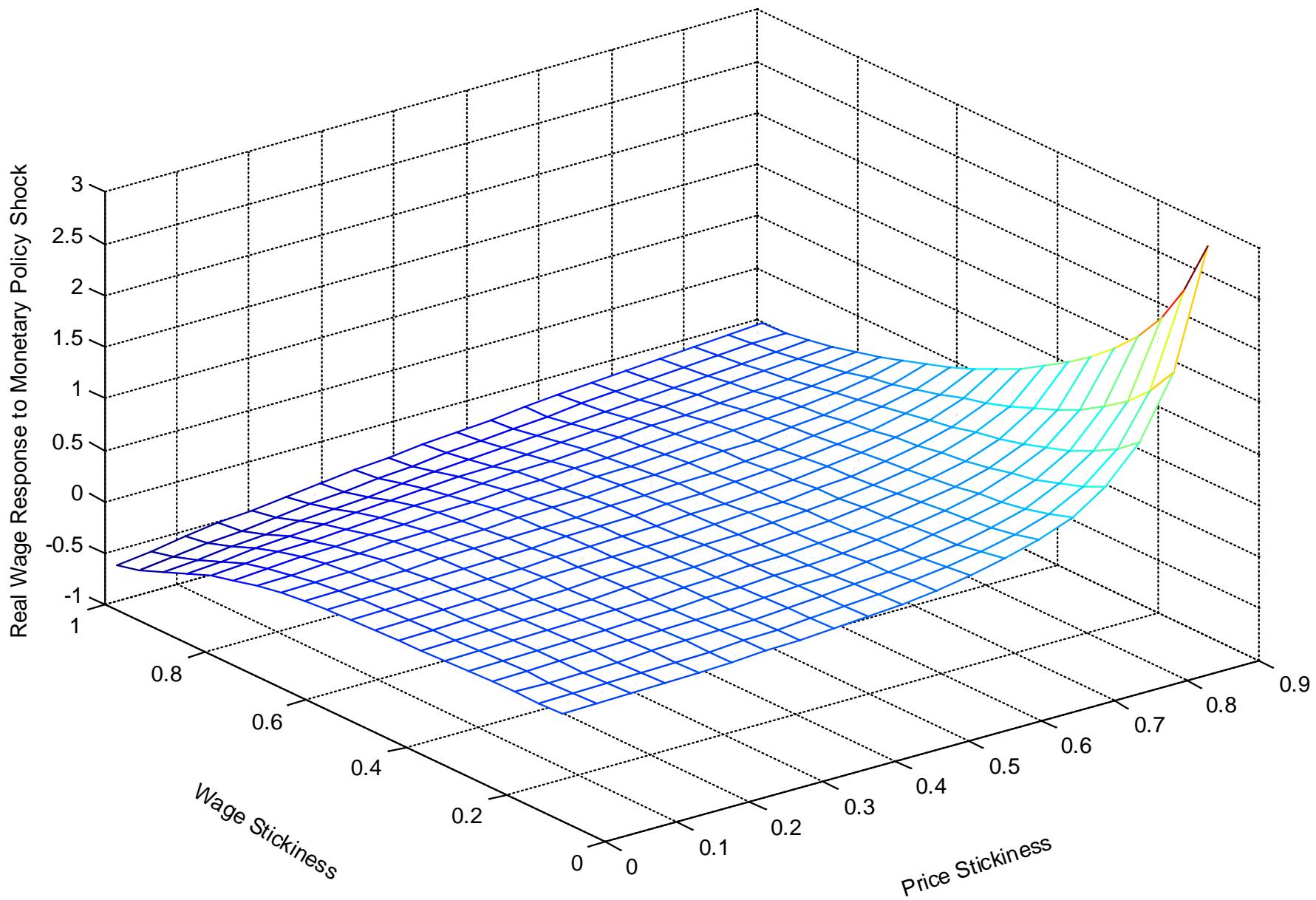
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# The Effects of an Aggregate Demand Expansion with Sticky Prices

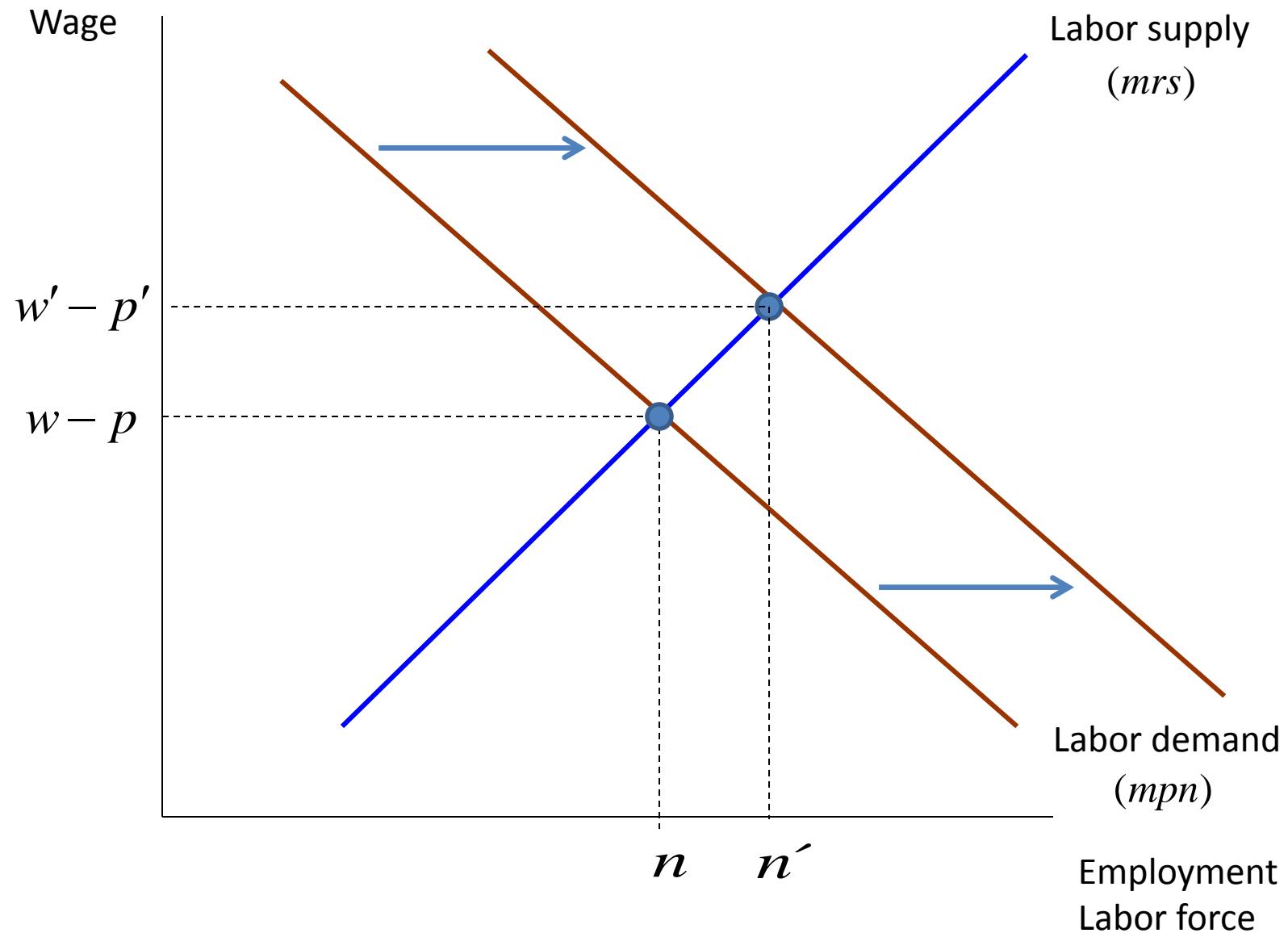


# Impact Response of the Real Wage to an Aggregate Demand Shock in the NK Model

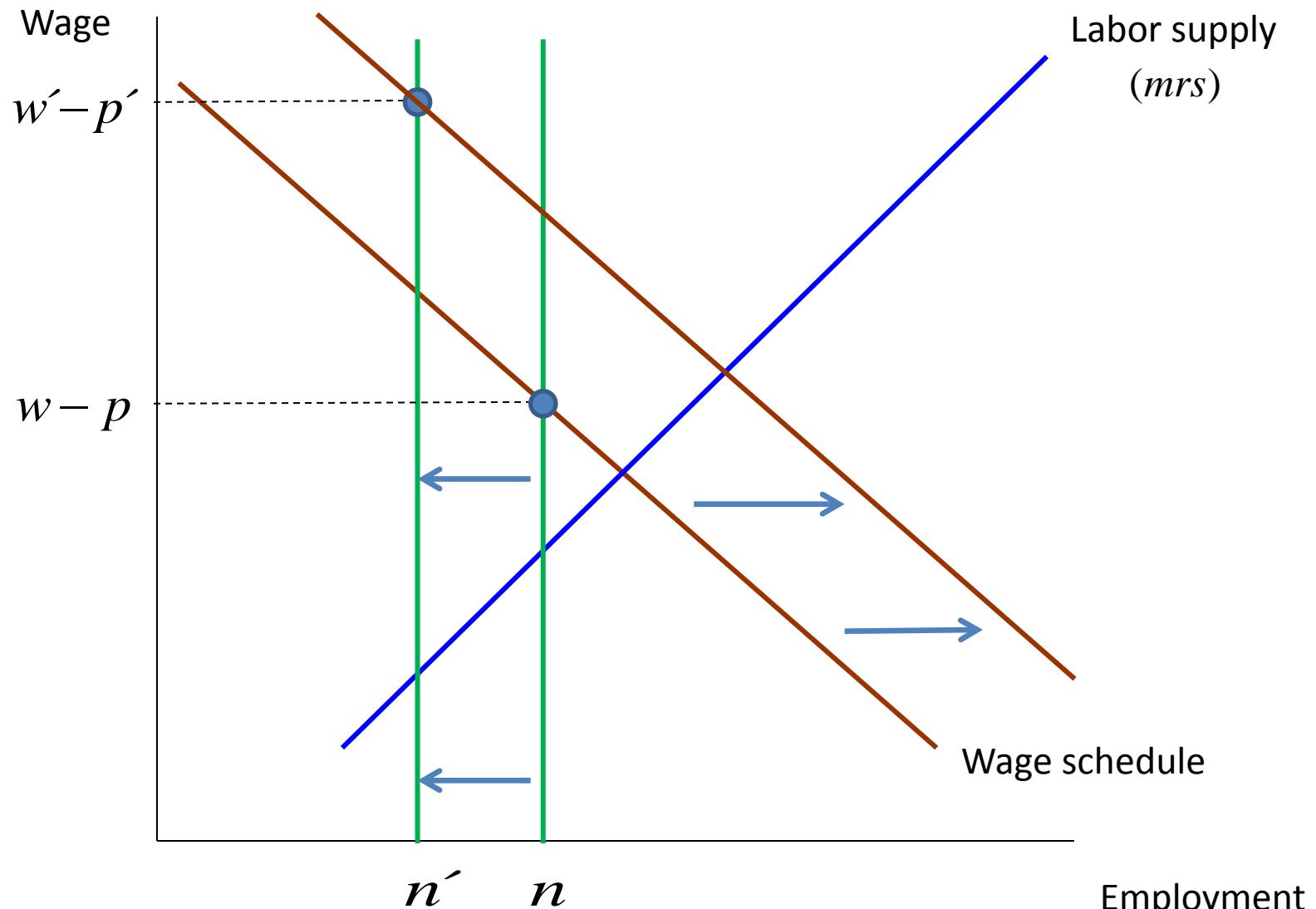


# Beyond the *General Theory* (II): The Effects of Technology Shocks on Employment

# The Effects of Technology Shocks on Employment: the Classical Model



# The Effects of Technology Shocks on Employment: the Keynesian Model



## Beyond the *General Theory* (II): The Effects of Technology Shocks on Employment

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$$n_t = \frac{1}{1-\alpha} (y_t - a_t)$$

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$$y_t = E_t\{y_{t+1}\} - (i_t - E_t\{\pi_{t+1}\}) + (1 - \rho_x)x_t$$

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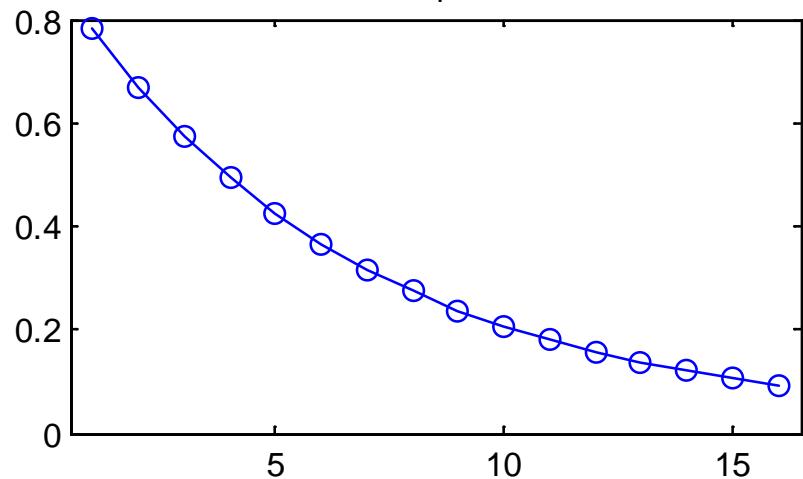
Thus,

$$n_t = \frac{1}{1-\alpha} \left( x_t - E_t \left\{ \sum_{k=0}^{\infty} (i_{t+k} - E_t\{\pi_{t+1+k}\}) \right\} - a_t \right)$$

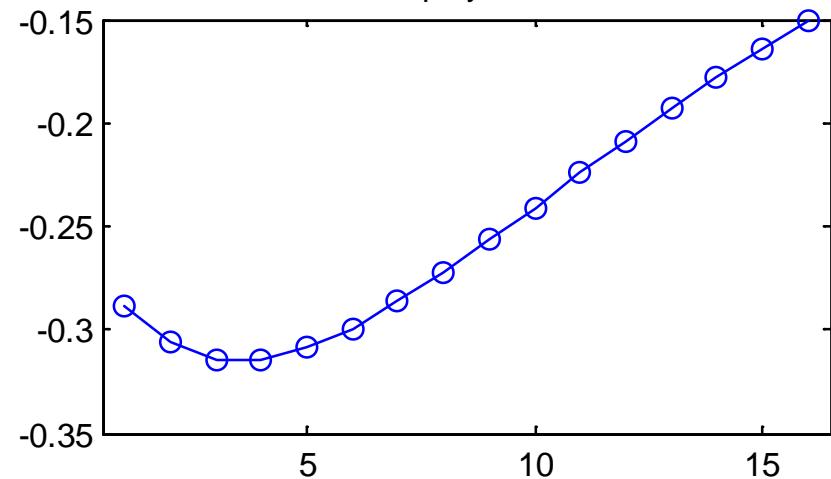
⇒ key role for endogenous response of monetary policy

# Dynamic Responses to a Technology Shock in the NK Model

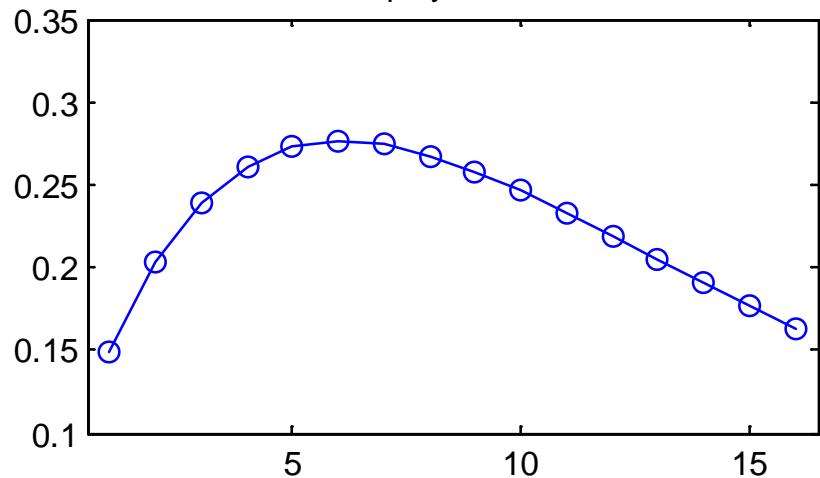
Output



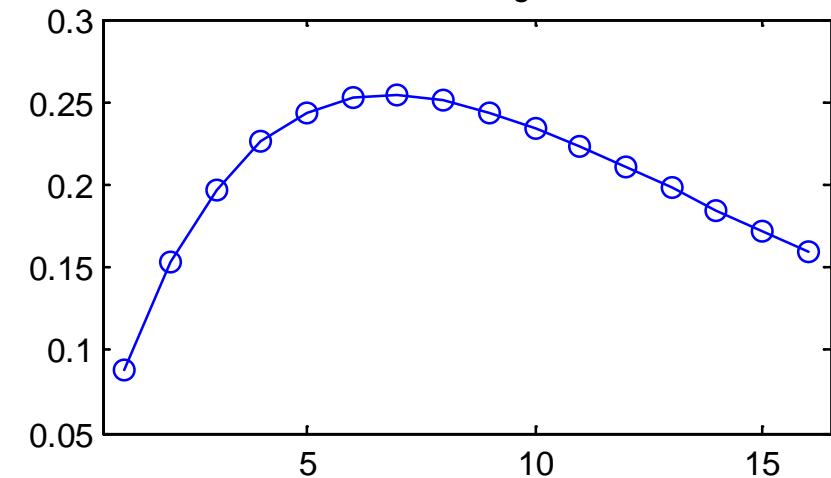
Employment



Unemployment Rate



Real Wage



## Beyond the *General Theory* (II): The Effects of Technology Shocks on Employment

- Basic evidence on the effects of aggregate technology shocks
  - Galí (AER 1999)
  - Basu, Fernald and Kimball (AER 2006)
  - Francis and Ramey (JME 2005)
  - Barnichon (JME 2010)
  - ...
- Evidence on the impact of changes in monetary policy on the effects of technology shocks
  - Galí, López-Salido and Vallés (JME 2003)
  - Fisher (JPE 2006)
  - ...
- Evidence based on estimated DSGE models
  - Galí and Rabanal (NBER MA 2004)
  - Smets and Wouters (JEEA 2003, AER 2007)

# Gains from Wage Flexibility in the New Keynesian Model

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- Key message:

- no direct impact of wage adjustments on labor demand and employment
- indirect effect:

$$\downarrow w \Rightarrow \downarrow \pi \Rightarrow \downarrow i \Rightarrow \downarrow r \Rightarrow \uparrow y \Rightarrow \uparrow n$$

$\Rightarrow$  importance of endogenous monetary policy response ("policy rule")

# Gains from Wage Flexibility in the New Keynesian Model

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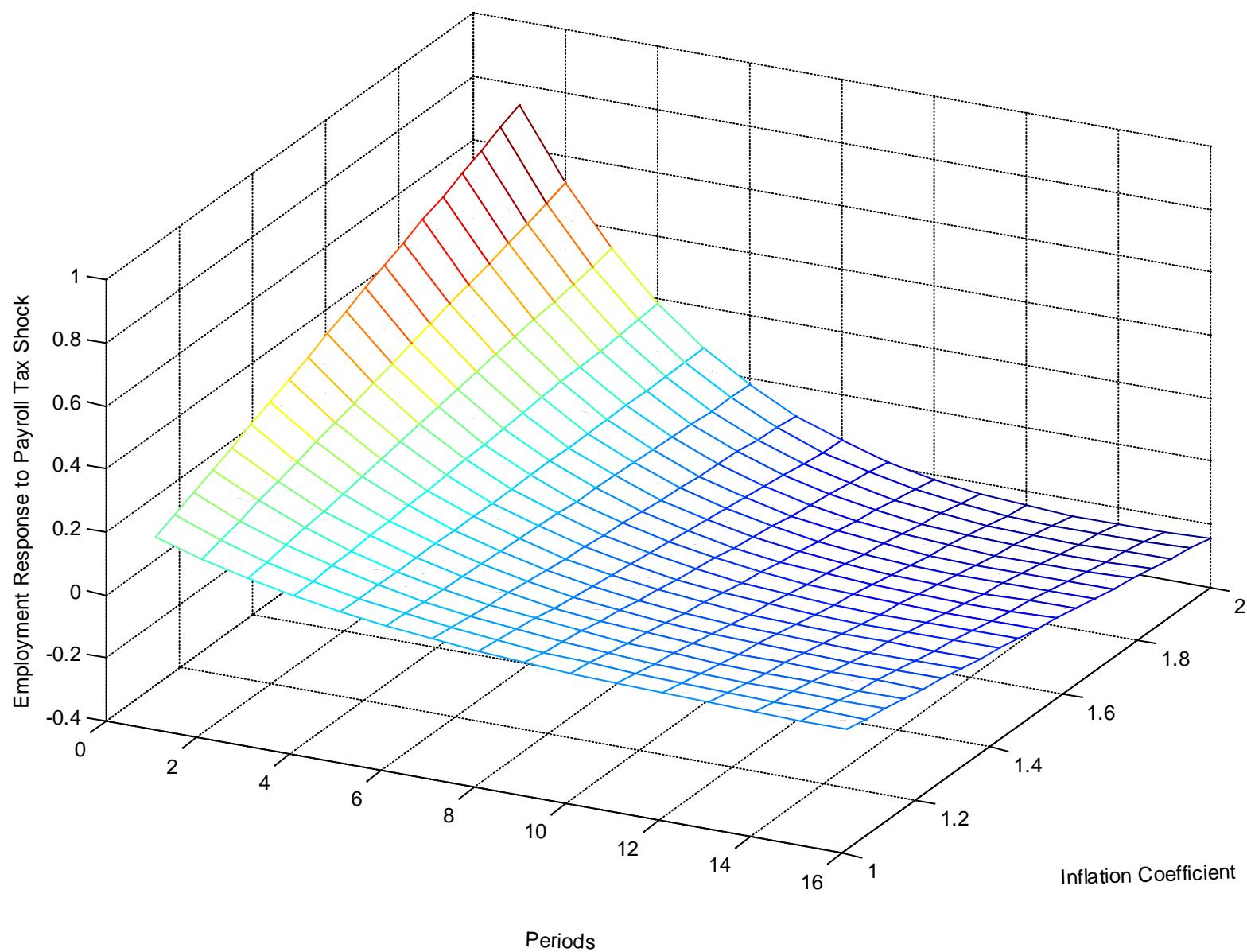
$$\downarrow w \Rightarrow \downarrow \pi \Rightarrow \downarrow i \Rightarrow \downarrow r \Rightarrow \uparrow y \Rightarrow \uparrow n$$

$\Rightarrow$  importance of endogenous monetary policy response (policy rule)

- Illustration: Effects of a payroll tax shock on employment

$$\tau_t = \rho_\tau \tau_{t-1} + \varepsilon_t^\tau$$

# Dynamic Responses of Employment to a Payroll Tax Shock



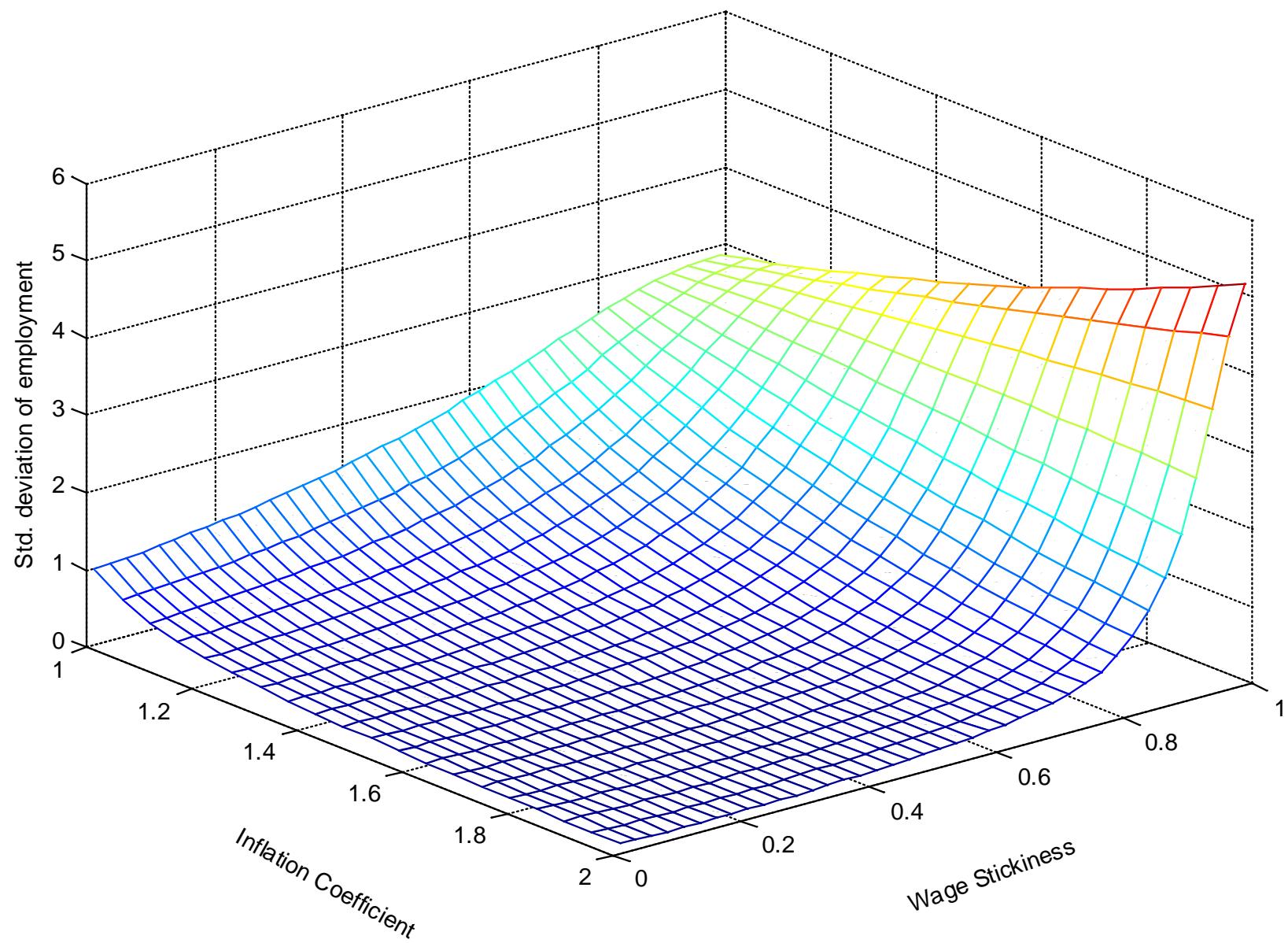
# Gains from Wage Flexibility in the New Keynesian Model: Some Simulations

- Two "exogenous factors":
  - Wage stickiness:  $\theta_w \in (0, 1)$
  - Policy responsiveness to inflation:  $\phi_\pi \in (1, 2]$
- Effects on employment volatility  $[\sigma(n_t)]$
- Effects on welfare

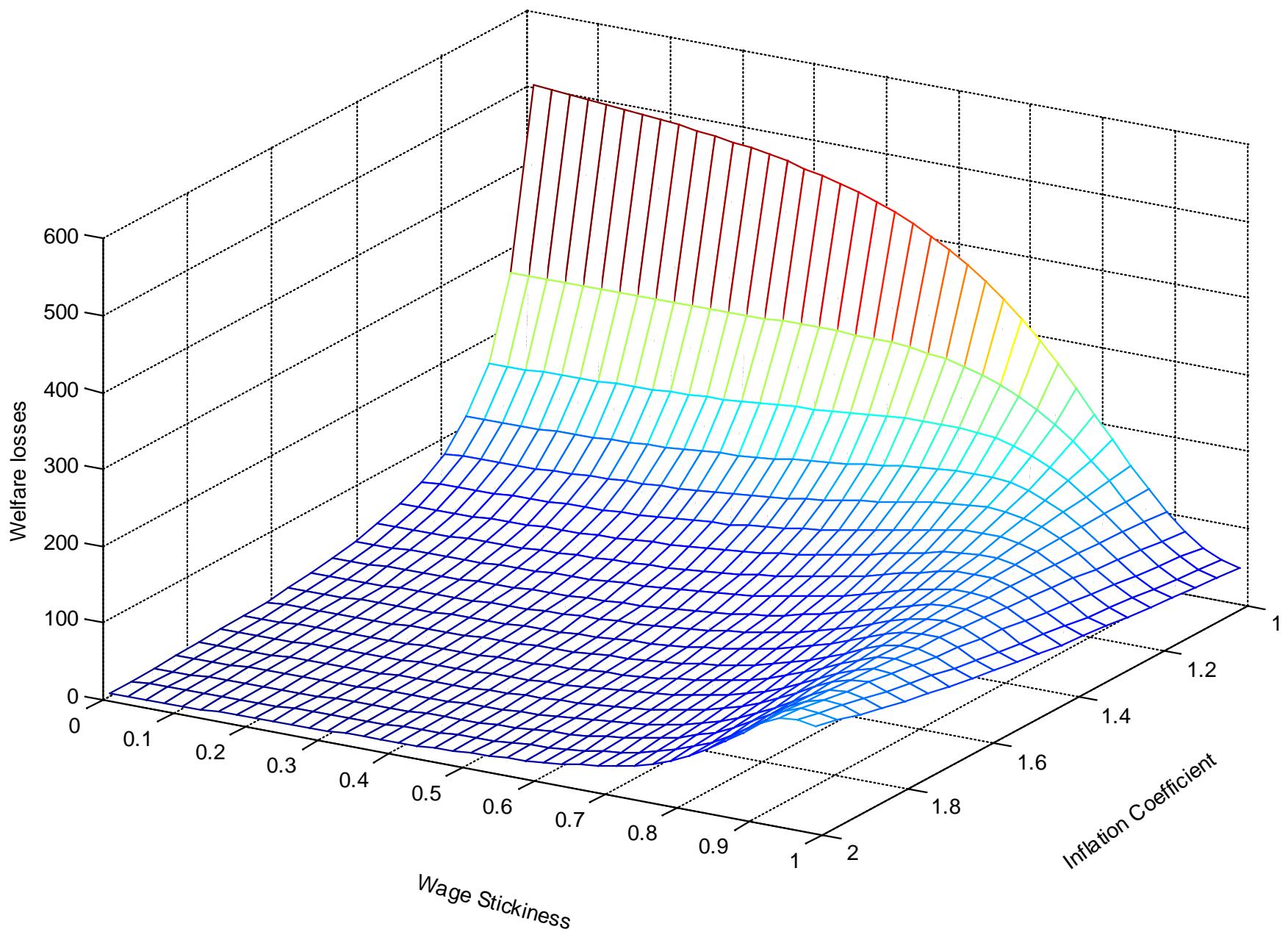
$$\mathbb{L} \sim (1 + \varphi) \operatorname{var}(n_t) + \left( \frac{\epsilon_p}{\lambda_p(1 - \alpha)} \right) \operatorname{var}(\pi_t^p) + \left( \frac{\epsilon_w}{\lambda_w} \right) \operatorname{var}(\pi_t^w)$$

- Conditional analysis:
  - (i) technology shocks
  - (ii) preference shocks

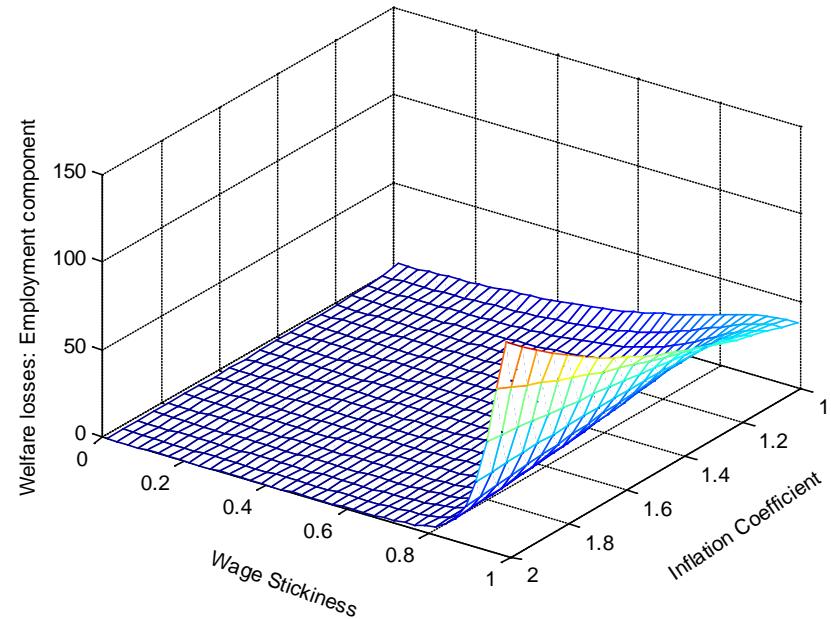
# Wage Flexibility, Monetary Policy and Employment Volatility (I): *Technology Shocks*



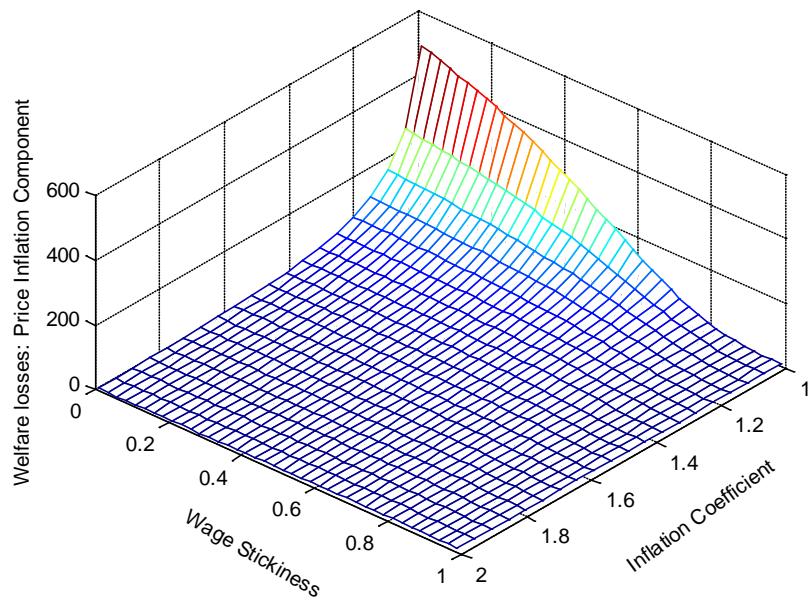
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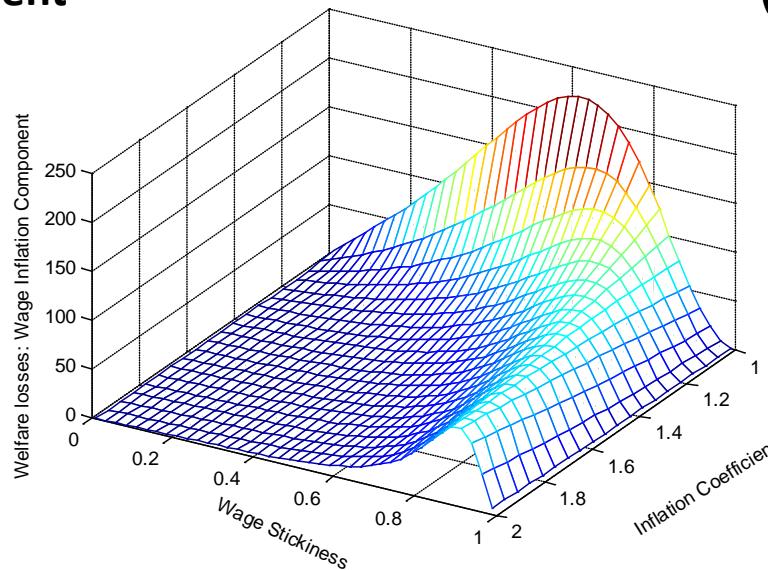
## Decomposition of Welfare Losses (I): *Technology Shocks*



**(i) Employment**

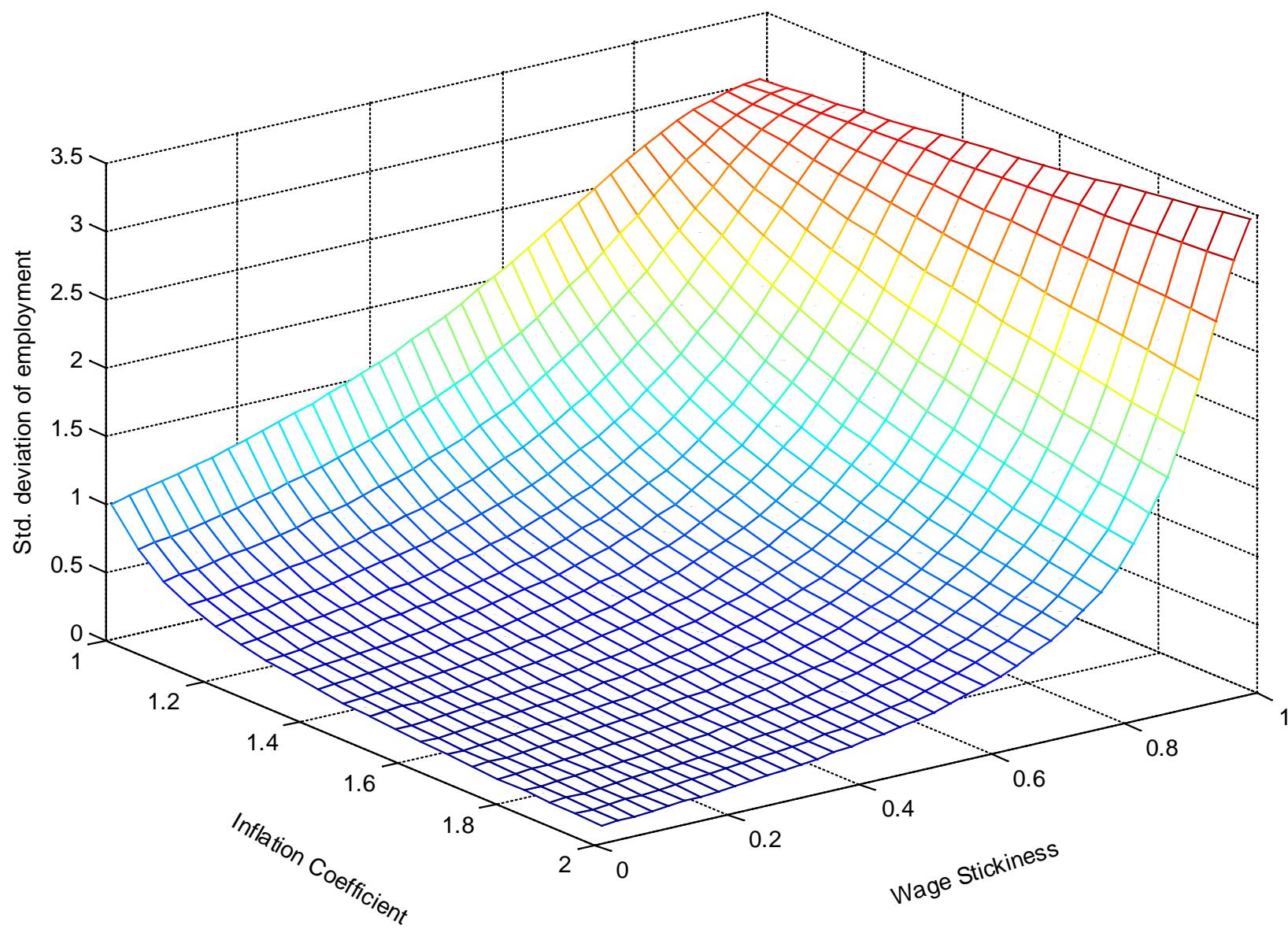


**(ii) Price Inflation**

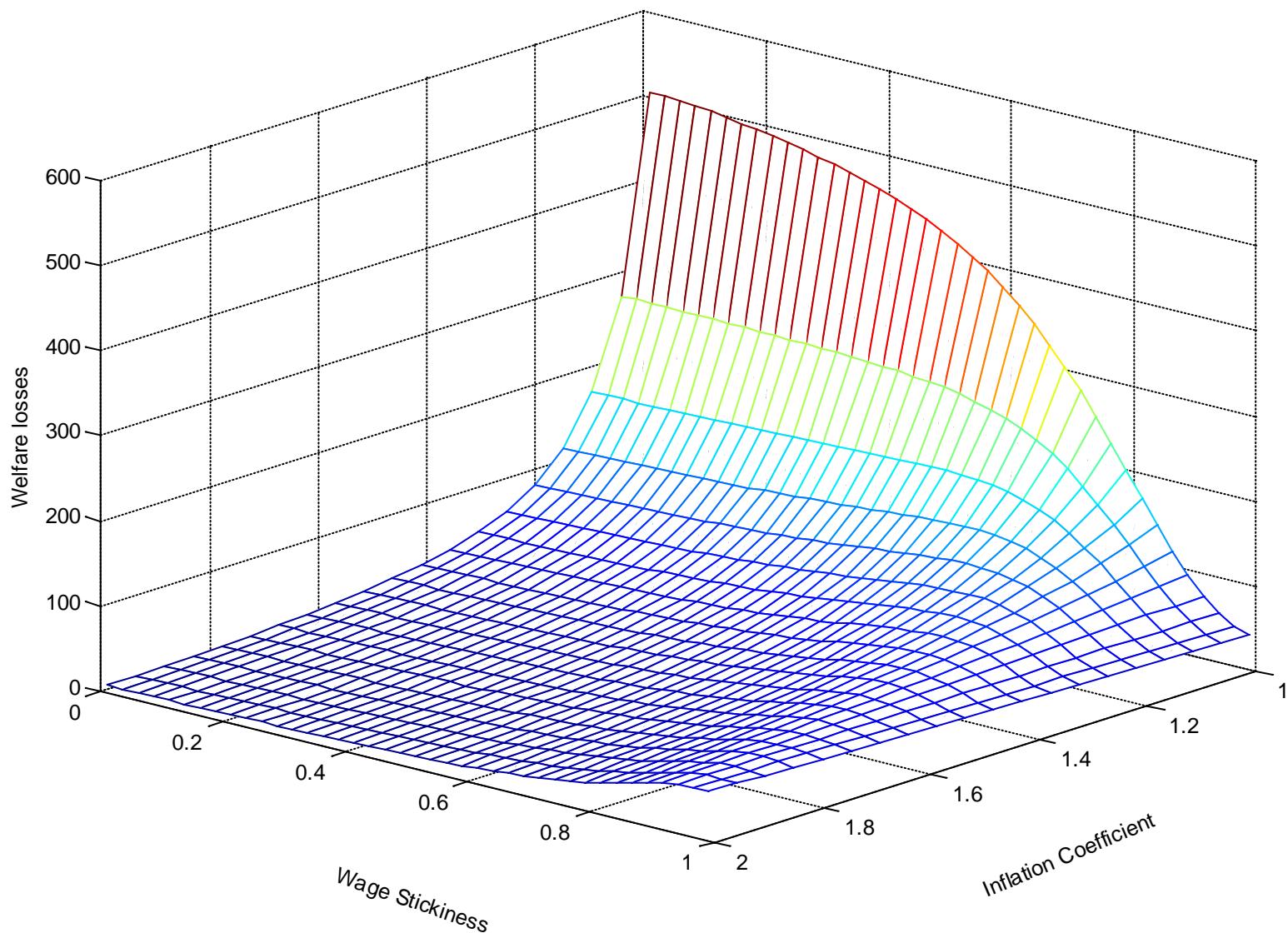


**(iii) Wage Inflation**

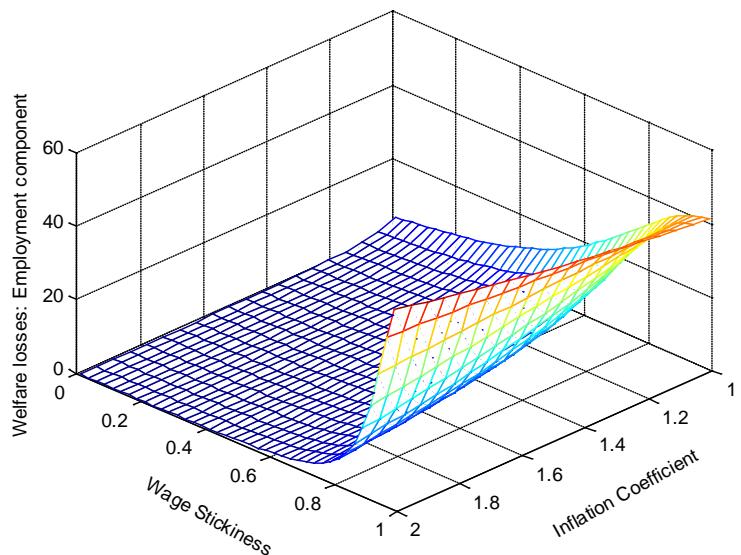
## Wage Flexibility, Monetary Policy and Employment Volatility (II): *Preference Shocks*



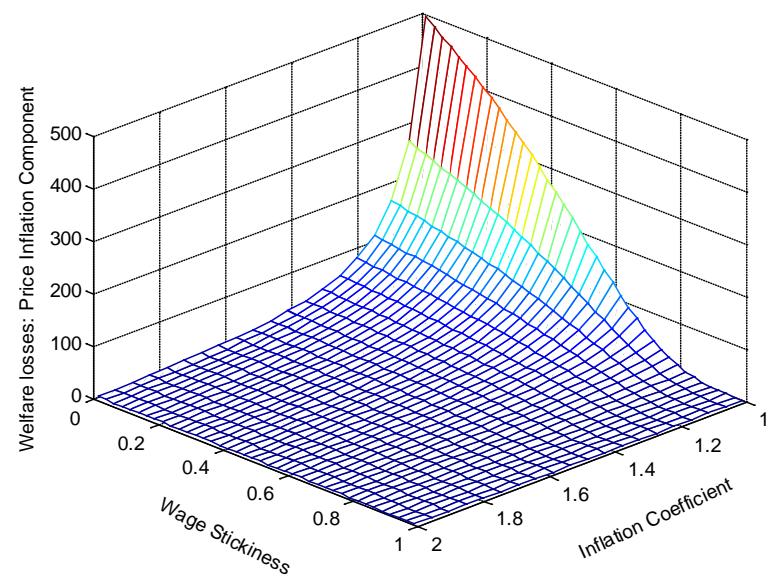
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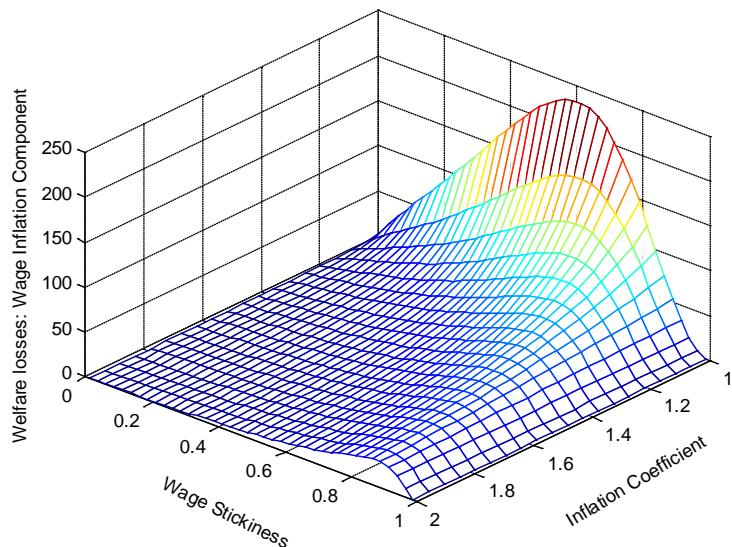
## Decomposition of Welfare Losses (III): *Preference Shocks*



**(i) Employment**



**(ii) Price Inflation**



**(iii) Wage Inflation**

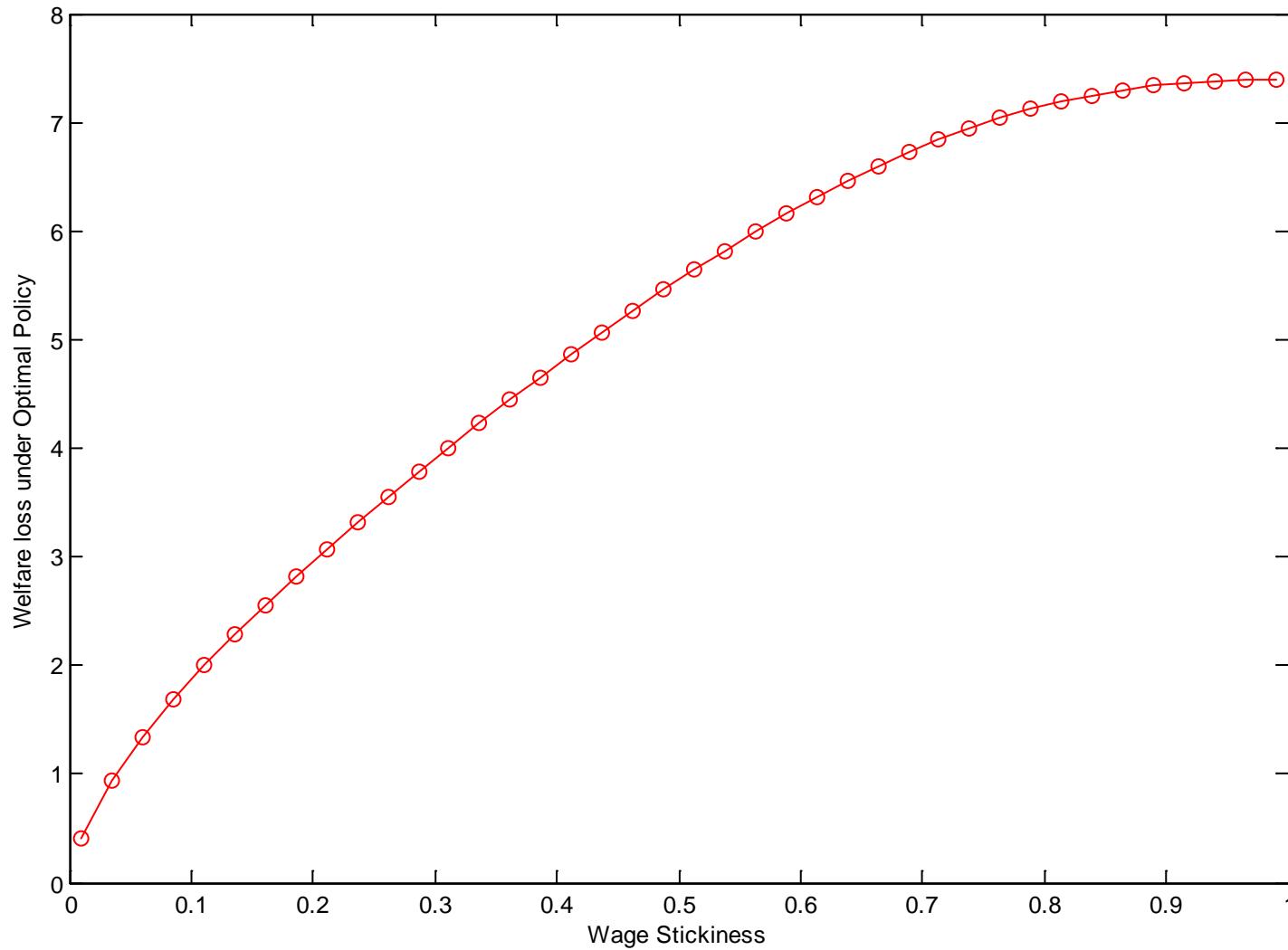
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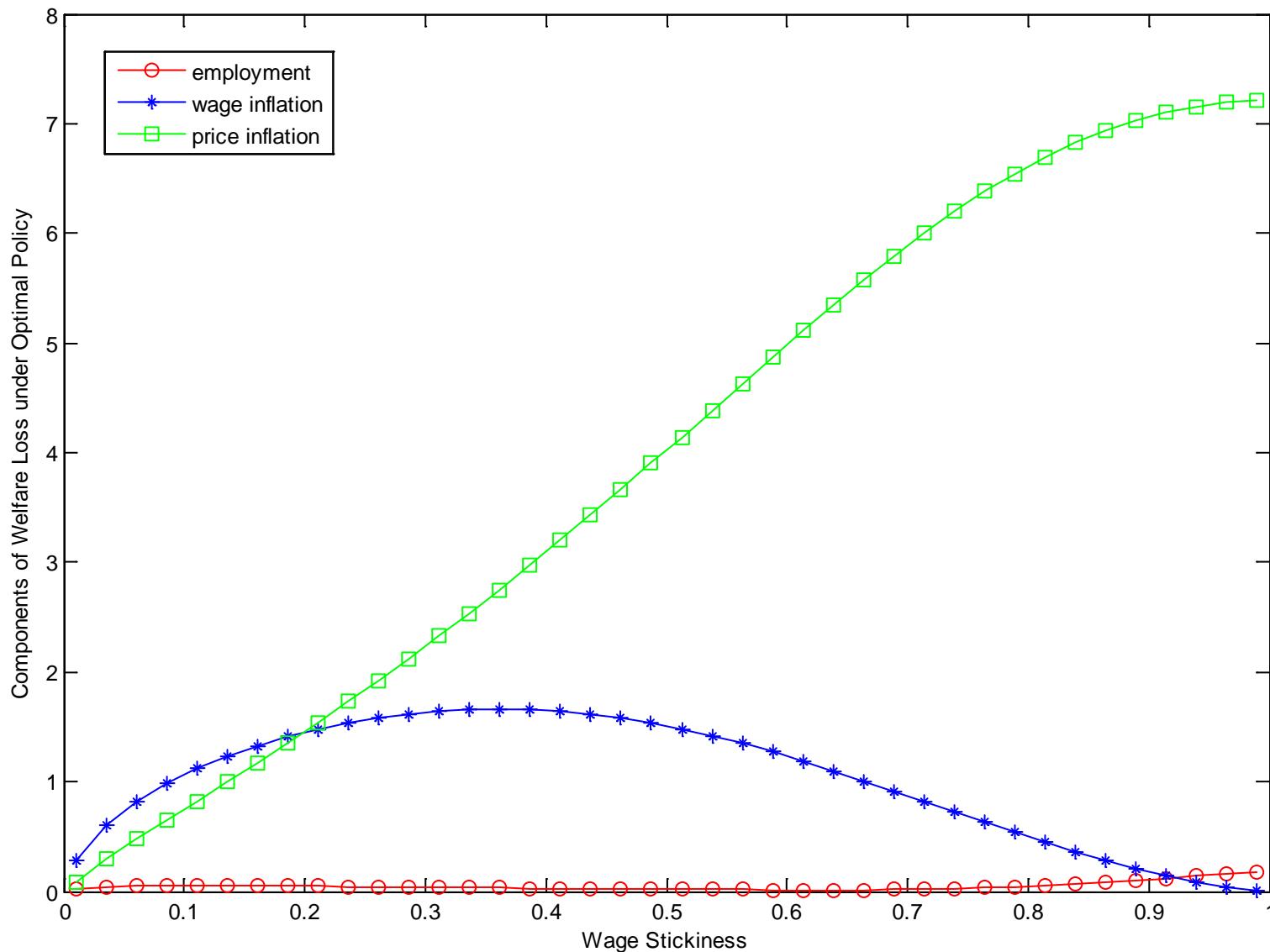
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- Conditional analysis:
  - (i) technology shocks
  - (ii) preference shocks
- Gains from wage flexibility under the optimal monetary policy

# Wage Flexibility and Welfare under the Optimal Monetary Policy



# Decomposition of Welfare Losses under the Optimal Monetary Policy



## Some Caveats

- Closed economy assumption: no room for "competitiveness channel"

$$\downarrow w \Rightarrow \downarrow p \Rightarrow \uparrow q \Rightarrow \uparrow y \Rightarrow \uparrow n$$

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However:

- impact on terms of trade not invariant to monetary policy response
- beggar-thy-neighbor policy
- effectiveness depends on degree of pass-through (if pricing to market)

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- Offsetting channel (II): additional channel with *non-Ricardian* households:

$$\downarrow w \Rightarrow \downarrow c \Rightarrow \downarrow y \Rightarrow \downarrow n$$

## Concluding Remarks

- Current environment: persistently high unemployment, though large heterogeneity across countries
- Recurring calls for structural reforms to make labor markets more flexible

*"...Further significant reductions in unit labor costs and excess profit margins are particularly urgent, especially in countries where unemployment is very high. To achieve this, first, **flexibility in the wage determination process has to be strengthened**, for example, where relevant, by relaxing employment protection legislation, abolishing wage indexation schemes, lowering minimum wages and permitting wage bargaining at the firm level..." (ECB, Monthly Bulletin, August 2012)*

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However:

- *Monetary policy*: zero lower bound (US, UK, Japan, euro area) or unavailable (euro area countries)
- *Fiscal policy*: emphasis on fiscal consolidation, especially in countries with worse employment performance
- *External demand*: global slowdown

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  - *Fiscal policy*: emphasis on fiscal consolidation, especially in countries with worse employment performance
  - *External demand*: global slowdown
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- **Challenge**: how to stimulate aggregate demand in high unemployment countries without amplifying existing imbalances (public and private debt, external,...)