Notes for a New Guide to Keynes

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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

![Graph showing the relationship between wage (w - p) and employment (n), with labor demand (mpn) as the outcome.](image-url)
The Classical Theory of Employment: Labor Supply

Wage

Labor supply $(mrs)$

$w - p$

Labor force
The Classical Theory of Employment: Equilibrium

\[ w - p \]

\[ n = l \]
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

Wage

Labor supply

$mrs$

Labor demand

$mpn$

$w - p$

$u$

$n$

$l$

Employment

Labor force
Classical Unemployment Cures (I): Real Wage Reduction

Diagram showing the relationship between wage and employment. The diagram illustrates the shift in labor demand and supply due to a real wage reduction. The wage is represented on the y-axis, and employment on the x-axis.

Key points:
- $w - p$: Initial wage and price level.
- $w' - p'$: Lower wage and price level after real wage reduction.
- $n$, $n'$, $l'$, $l$: Employment levels before and after the real wage reduction.
- $u$, $u'$: Unemployment levels before and after the real wage reduction.

The diagram demonstrates how a real wage reduction can lower unemployment by shifting the labor demand curve to the right, increasing employment from $n$ to $n'$ and reducing unemployment from $u$ to $u'$.
Classical Unemployment Cures (II): Employment Subsidy

\[
\begin{align*}
\text{Labor supply} \\
(mrs) \\
\text{Labor demand} \\
(mp) \\
\end{align*}
\]

\[
\begin{align*}
\text{Wage} \\
\text{Employment} \\
\text{Labor force} \\
\end{align*}
\]

\[
\begin{align*}
w - p \\
n \\
n' \\
l \\
\end{align*}
\]

\[
\begin{align*}
u \quad u' \\
\end{align*}
\]
Keynes vs the Classics in the General Theory

- The classical theory of employment
- The Keynesian theory of employment
The Keynesian Theory of Employment

Aggregate Demand

Output

Technology

Employment
The Keynesian Theory of Employment

\[ n \]

Wage vs. Employment
Keynes vs the Classics in the General Theory

- The classical theory of employment
- The Keynesian theory of employment
  - Price setting by firms:
    \[ \rho_t = \mu^p + (w_t - mpn_t) \]
  - Implied wage schedule:
    \[ w_t - \rho_t = mpn_t - \mu^p \]
The Keynesian Theory of Employment

\[ w - p \]

Wage schedule

Employment

Wage
Unemployment in the Keynesian Theory of Employment

Wage

Labor supply
\( (mrs) \)

\( w - p \)

\( u \)

Employment

Wage schedule

Labor force

\( n \)

\( l \)
Cure for Keynesian Unemployment: Aggregate Demand Expansion

- **Wage**
- **Labor supply** ($mrs$)
- **Wage schedule**
- **Employment**
- **Labor force**

Diagram showing the cure for Keynesian unemployment through aggregate demand expansion. The wage schedule shifts from $w - p$ to $w' - p'$, leading to increased employment from $n$ to $n'$ and a decrease in unemployment from $u$ to $u'$.
Households/Preferences

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

where

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

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

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

\[ x_t = \rho_x x_{t-1} + \epsilon_t^x \]

- Firms/Technology

\[ Y_t = A_t N_t^{1-\alpha} \]

where

\[ a_t = \rho_a a_{t-1} + \epsilon_t^a \]
Monopolistic competition in goods and labor markets
The Standard New Keynesian Model: Main Ingredients (II)

- Monopolistic competition in goods and labor markets
- Staggered price and wage setting à la Calvo
The Standard New Keynesian Model: Main Ingredients (II)

- Monopolistic competition in goods and labor markets
- Staggered price and wage setting à la Calvo
- Unemployment (Galí (2011)):

\[ u_t \equiv l_t - n_t \]

where participation \( l_t \) is given by:

\[ w_t - p_t = c_t + \varphi l_t \]
The Standard New Keynesian Model: Main Ingredients (II)

- Monopolistic competition in goods and labor markets
- Staggered price and wage setting à la Calvo
- Unemployment (Galí (2011)):

\[ u_t \equiv l_t - n_t \]

where participation \( l_t \) is given by:

\[ w_t - p_t = c_t + \varphi l_t \]

- Monetary policy

\[ i_t = \rho + \phi_\pi \pi_t + \phi_y y_t + \nu_t \]

where

\[ \nu_t = \rho_\nu \nu_{t-1} + \varepsilon_t^\nu \]
The Standard New Keynesian Model: Main Ingredients

Simplifying assumptions

- no fiscal sector
- closed economy
- no endogenous capital accumulation
The Standard New Keynesian Model: Main Ingredients (III)

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

- Efficient allocation

\[
\begin{align*}
  n_t^e &= \frac{\log(1 - \alpha)}{1 + \varphi} \equiv n^e \\
y_t^e &= a_t + (1 - \alpha)n^e
\end{align*}
\]
Beyond the *General Theory* (I): Cyclical Behavior of Wages

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The Effects of an Aggregate Demand Expansion in the General Theory

![Diagram showing labor supply and wage schedule with labor force and employment axes.](image-url)
Dynamic Responses to an Aggregate Demand Shock in the NK Model

Output

Employment

Unemployment Rate

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

- The wage schedule with flexible prices (General Theory)
  \[ w_t - p_t = mpn_t - \mu^p \]
  \[ \uparrow n \Rightarrow \downarrow mpn_t \Rightarrow \downarrow (w_t - p_t) \]
Beyond the General Theory (I): Cyclical Behavior of Wages

● The wage schedule with flexible prices (General Theory)

\[ w_t - p_t = mpn_t - \mu^p \]

↑ \( n \) ⇒ ↓ \( mpn_t \) ⇒ ↓ \( (w_t - p_t) \)

● The wage schedule with sticky prices (NK model)

\[ w_t - p_t = mpn_t - \mu^p_t \]

↑ \( n \) ⇒ ↓ \( mpn_t \), ↓ \( \mu^p_t \) ⇒ ↓↑ \( (w_t - p_t) \)
The Effects of an Aggregate Demand Expansion with Sticky Prices

\[ w' - p' \]

\[ w - p \]
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

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The Effects of Technology Shocks on Employment: the Classical Model

The diagram illustrates the relationship between wage and employment, with labor supply and demand curves intersecting at points representing equilibrium wage and employment levels. The wage gap ($w' - p'$) and $w - p$ are shown, indicating changes in the wage and price levels, respectively. The shifts in labor demand and supply reflect the impact of technology shocks on employment.
The Effects of Technology Shocks on Employment: the Keynesian Model

Assumption: constant aggregate demand
Beyond the *General Theory* (II): The Effects of Technology Shocks on Employment

- Equilibrium employment in the NK model

\[ n_t = \frac{1}{1 - \alpha} (y_t - a_t) \]
Beyond the *General Theory* (II): The Effects of Technology Shocks on Employment

- **Equilibrium employment in the NK model**

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

- **Equilibrium output in the NK model**

  \[ y_t = E_t \{ y_{t+1} \} - (i_t - E_t \{ \pi_{t+1} \}) + (1 - \rho_x) x_t \]
Beyond the *General Theory* (II): The Effects of Technology Shocks on Employment

- Equilibrium employment in the NK model
  \[ n_t = \frac{1}{1-\alpha} (y_t - a_t) \]

- Equilibrium output in the NK model
  \[ y_t = E_t \{ y_{t+1} \} - (i_t - E_t \{ \pi_{t+1} \}) + (1 - \rho_x) x_t \]

Equivalently:
\[ y_t = x_t - E_t \left\{ \sum_{k=0}^{\infty} (i_{t+k} - E_t \{ \pi_{t+1+k} \}) \right\} \]
Beyond the *General Theory (II): The Effects of Technology Shocks on Employment*

- Equilibrium employment in the NK model
  \[ n_t = \frac{1}{1 - \alpha} (y_t - a_t) \]

- Equilibrium output in the NK model
  \[ y_t = E_t \{y_{t+1}\} - (i_t - E_t \{\pi_{t+1}\}) + (1 - \rho_x)x_t \]

Equivalently:
\[ y_t = x_t - E_t \left \{ \sum_{k=0}^{\infty} (i_{t+k} - E_t \{\pi_{t+1+k}\}) \right \} \]

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

Equilibrium employment in the NK model

\[
n_t = \frac{1}{1 - \alpha} \left( x_t - E_t \left\{ \sum_{k=0}^{\infty} (i_{t+k} - E_t \{ \pi_{t+1+k} \}) \right\} - a_t \right)
\]
Gains from Wage Flexibility in the New Keynesian Model

- Equilibrium employment in the NK model

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

- Under constant real interest rate:

\[ n_t = \frac{1}{1 - \alpha} (x_t - a_t) \]
**Gains from Wage Flexibility in the New Keynesian Model**

- **Equilibrium employment in the NK model**

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

- **Under constant real interest rates:**

\[
n_t = \frac{1}{1 - \alpha} (x_t - a_t)
\]

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

\[
\downarrow w \Rightarrow \downarrow \pi \Rightarrow \downarrow i \Rightarrow \downarrow r \Rightarrow \uparrow y \Rightarrow \uparrow n
\]

\[\Rightarrow \text{importance of endogenous monetary policy response ("policy rule")}\]
Gains from Wage Flexibility in the New Keynesian Model

Equilibrium employment in the NK model

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

Under constant real interest rates:

\[ n_t = \frac{1}{1-\alpha} (n_t - a_t) \]

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)

Illustration: Effects of a payroll tax shock on employment

\[ \tau_t = \rho_\tau \tau_{t-1} + \epsilon_t^\tau \]
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

$$\mathbb{I} \sim (1 + \varphi) \text{var}(n_t) + \left(\frac{\epsilon_p}{\lambda_p(1 - \alpha)}\right) \text{var}(\pi^p_t) + \left(\frac{\epsilon_w}{\lambda_w}\right) \text{var}(\pi^w_t)$$

- Conditional analysis:
  - (i) technology shocks
  - (ii) preference shocks
Wage Flexibility, Monetary Policy and Employment Volatility (I): Technology Shocks
Wage Flexibility, Monetary Policy and Welfare (I): Technology Shocks
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
Wage Flexibility, Monetary Policy and Welfare (II): *Preference Shocks*
Decomposition of Welfare Losses (III): *Preference Shocks*

(i) Employment

(ii) Price Inflation

(iii) Wage Inflation
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

\[ \Pi \sim (1 + \phi) \text{var}(n_t) + \left( \frac{\epsilon_p}{\lambda_p (1 - \alpha)} \right) \text{var}(\pi^p_t) + \left( \frac{\epsilon_w}{\lambda_w} \right) \text{var}(\pi^w_t) \]

- 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

Welfare loss under Optimal Policy vs Wage Stickiness
Decomposition of Welfare Losses under the Optimal Monetary Policy

Components of Welfare Loss under Optimal Policy

- Wage Stickiness
- Employment
- Wage Inflation
- Price Inflation
Some Caveats

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

\[ \downarrow w \Rightarrow \downarrow p \Rightarrow \uparrow q \Rightarrow \uparrow y \Rightarrow \uparrow n \]
Some Caveats

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

\[ \downarrow w \Rightarrow \downarrow p \Rightarrow \uparrow q \Rightarrow \uparrow y \Rightarrow \uparrow n \]

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

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

\[ \downarrow w \Rightarrow \downarrow p \Rightarrow \uparrow q \Rightarrow \uparrow y \Rightarrow \uparrow n \]

- Offsetting channel (I): if no interest rate response (e.g. exchange rate peg):

\[ \downarrow w \Rightarrow \downarrow \pi \Rightarrow \uparrow r \Rightarrow \downarrow y \Rightarrow \downarrow n \]
Some Caveats

- Closed economy assumption: no room for "competitiveness channel"
  \[ \downarrow w \Rightarrow \downarrow p \Rightarrow \uparrow q \Rightarrow \uparrow y \Rightarrow \uparrow n \]

- Offsetting channel (I): if no interest rate response (e.g. exchange rate peg):
  \[ \downarrow w \Rightarrow \downarrow \pi \Rightarrow \uparrow r \Rightarrow \downarrow y \Rightarrow \downarrow n \]

- 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)
Concluding Remarks

- Current environment: persistently high unemployment, though large heterogeneity across countries
- Recurring calls for structural reforms to make labor markets more flexible
- **Main lesson:** impact of such reforms on employment likely to be limited, unless accompanied by an expansion of aggregate demand.
Concluding Remarks

- Current environment: persistently high unemployment, though large heterogeneity across countries
- Recurring calls for structural reforms to make labor markets more flexible
- **Main lesson:** impact of such reforms on employment likely to be limited, unless accompanied by an expansion of aggregate demand.

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
Concluding Remarks

- Current environment: persistently high unemployment, though large heterogeneity across countries
- Recurring calls for structural reforms to make labor markets more flexible
- **Main lesson**: impact of such reforms on employment likely to be limited, unless accompanied by an expansion of aggregate demand.

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

**Challenge**: how to stimulate aggregate demand in high unemployment countries without amplifying existing imbalances (public and private debt, external,...)