New Keynesian (NK) Model

Advanced Macro

Pavel Solís

CIDE

2025

Introduction

- RBC model assumes perfect competition in goods and input markets
  - Classical tradition: Fluctuations are natural and efficient responses
  - Implication: Fiscal and monetary policies ineffective for macro conditions
- In MIUF model, money is neutral
- New-Keynesian economics embrace imperfect competition
  - Keynesian principles: Fluctuations are the result of market failures
  - Implication: Fiscal and monetary policies can improve macro conditions
- Over time, convergence in approach, so less fights about methodology
  - Micro foundations, nominal rigidities, shocks to demand and supply
  - See: Woodford (2003), Galí (2008), Blanchard (2025)

Assumptions: Economy

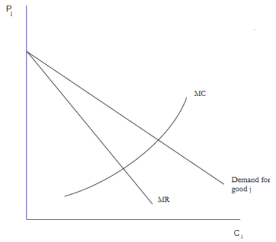
- Same assumptions about economy as in RBC model
- HHs: Same behavior as in RBC model
- Firms: Significant changes to supply side
  - Production now done in two steps
  - New ingredients: Monopolistic competition and price stickiness (friction)
- Central bank: New agent that conducts monetary policy
  - In practice, monetary policy influences economic activity in short run
  - In model, price stickiness makes monetary policy non-neutral
  - CB follows a Taylor (1993) rule to stabilize inflation and output gap
  - New shock: Monetary policy shock (in Taylor rule)

Assumptions: Firms

- Production side consists of two sectors (instead of one)
- **Wholesalers**: Producers of (differentiated) intermediate goods
  - Markets with **imperfect** competition: Similar but not identical goods
  - Optimize in two steps
    - Minimize TC (taking factor prices as given) by choosing production factors
    - Maximize profits by setting price of good
  - No fixed costs and constant returns to scale, so MC = average TC
- **Retailers**: Producers of (identical) final goods
  - Markets with **perfect** competition: A single bundle for consumption
  - Aggregators of a continuum ($j \in [0, 1]$) of wholesale goods (inputs)
  - Maximize profits by choosing wholesale goods (taking prices as given)

Wholesalers: Monopolistic Competition

- Firms produce differentiated goods having some degree of market power
  - Price setters, not price takers
- At optimum,
  - Profit-maximizing firms choose output so that MR = MC
  - Since demand curve above MR curve, price > MC (i.e., markup > 0)



Wholesalers: Price Stickiness

- Prices do not adjust immediately to changes in demand and/or supply
  - Rationale: Costs to adjust prices (e.g., menu cost)
- Price stickiness derived from behavior of optimizing agents
  - Rotemberg (1982) pricing: Firms face quadratic costs to change prices
  - Calvo (1983) pricing: Staggered price contracts
    - Every period, firms keep prices fixed ($p_{jt} = p_{jt-1}$) with probability θ
    - Price-setting is forward looking (b/c may not be able to adjust in future)
- Calvo pricing was key to derive NK Phillips curve (Roberts, 1995)
- With nominal rigidities, price response to a shock spreads out over time

Retailers: Aggregation Technology

- Common aggregators: Dixit and Stiglitz (1977), Kimball (1995)
  - Harding, Lindé and Trabandt (2022) discuss differences
- Dixit-Stiglitz uses a constant elasticity of substitution (CES) function

$$Y_t = \left(\int_0^1 Y_{jt}^{\frac{\psi-1}{\psi}} dj \right)^{\frac{\psi}{\psi-1}}$$

- CES function nests others as special cases
  - $\psi \to 1$: Cobb-Douglas case
  - $\psi > 1$: Wholesale goods are imperfect substitutes, firms are price setters
  - $\psi \to \infty$: W goods are perfect substitutes (linear case), no market power

Variables: Firm

- Y_t: Aggregate output (by retailers) at time t
- Y_{jt}: Output by intermediate firm j at time t, $\forall j \in [0, 1]$
- p_t: Aggregate price level at time t
- p_{jt}: Price for intermediate good j at time t
- μ_{jt}: Marginal cost for intermediate good j at time t
- s_t: Monetary policy shock
- ψ: Parameter for elasticity of substitution between wholesale goods
- θ: Parameter for price stickiness (higher when $\theta \approx 1$)
- ϕ_Y, ϕ_π: Sensitivities of interest rate to output and inflation in Taylor rule
- ϕ_r: Interest rate persistence or smooting parameter in Taylor rule