

LECTURE NOTES

Chapter 12: Real Business Cycles and New Keynesian Economics

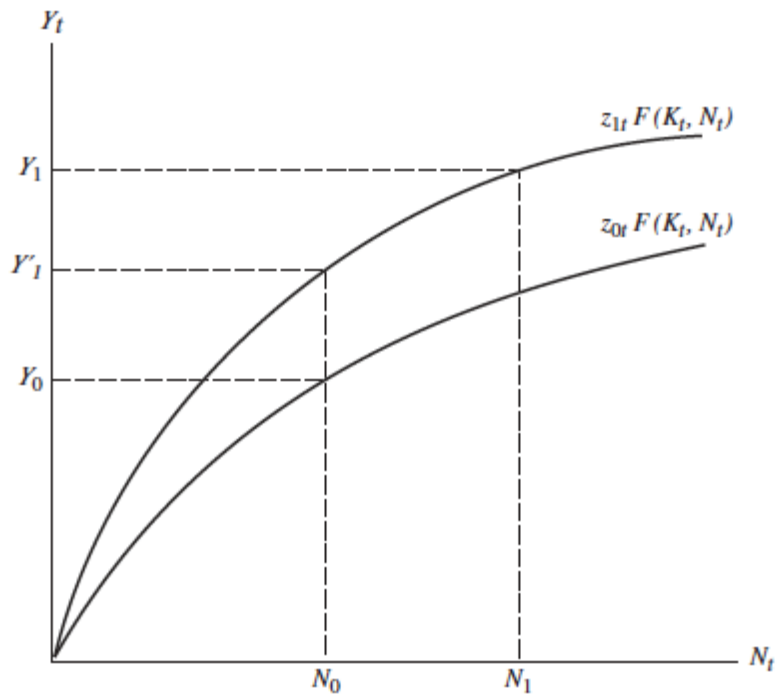
- As both sides of the debate (Keynesians versus “classics” –monetarists and New Classics) remain unconvinced of the other side’s criticisms, “new directions” emerged

1. Real Business Cycle Models (RBC)

- RBC models: Second Generation of New Classical models
- Central Features of RBC Models
 - From New Classical Economics:
 - Agents optimize
 - Markets clear
 - RBC models apply these principles to the point where the business cycle is an equilibrium phenomenon in the sense that all markets clear
 - The difference with new classical economics is on the causes of the fluctuations.
 - For RBC, the cause of a “cycle” is a real shock (hence *real* business cycle theory)
 - Shocks to technology, environmental conditions, relative price of commodities (i.e. oil), tax rates, individual preferences, etc.
 - Succinctly: RBC theories accept that real factor can change in the short-run (fast). In the Keynesian/classical models they are assumed constant because real factors were expected to change slowly
 - New Classical models will accept that a real shock affects output and unemployment, but these models work with the position that unexpected monetary shocks are more common and important
 - Keynesian models would also accept that a real shock affects output and unemployment, but these models work with the position that aggregate demand is the main stabilizing variable
 - Two interpretations of RBC:
 - Supply shocks are more important than AD shocks. It’s just another version of a New Classical model
 - Nominal and nominal shocks have no significant effect on the economy. This is not a New Classical model anymore

- A Simple RBC Model
 - Aggregate economic variables are the outcome of economic agents maximizing utility and profits
-> microeconomic foundations
 - Assumptions:
 - The economy (model) is populated by a group of identical individuals. The behavior of the group can then be explained in terms of a representative agent, Robinson Crusoe represents all individuals
 - Robinson Crusoe maximizes his utility by choosing between consumption (C) and Leisure (L): $U_t = U(C_t, L_t)$.
 - Output comes from a production function with technology (TFP: Total Factor Productivity or Solow's residual) (z), capital goods (K), and labor (N): $Y_t = z_t F(K_t, N_t)$
 - Note that K is not constant
 - The production function has:
 - Diminishing marginal returns
 - Constant returns to scale
 - $Y_t = C_t + S_t$
 - $K_{t+1} = S_t + (1 - \delta)K_t$, δ : *depreciation rate*
 - Note that this assumes that $I = S$
- Effects of a Positive Technology Shock
 - Assume a positive shock to technology that lasts only for one period
 - Then $z_{1,t} > z_{0,t} \rightarrow Y_{1,t} > Y_{0,t} \rightarrow z_{1,t}F(K_t, N_t) > z_{0,t}F(K_t, N_t)$
 - $\frac{Y_{1,t}}{N_t} > \frac{Y_{0,t}}{N_t} \rightarrow MPN_{1,t} > MPN_{0,t} \rightarrow N_{1,t}^d > N_{0,t}^d \rightarrow N_{1,t}^* > N_{0,t}^*$
 - What to do with the extra output?
 - Temporary shock: Because individuals smooth consumption, the individual will increase *some* consumptions, but most will go to savings and a higher capital stock in future periods
 - Permanent shock: Because individuals smooth consumption, the individual will increase consumption *more*
 - Note that the economy is *always* in equilibrium. What happens is that the equilibrium level of output changes. This is what "equilibrium always" means

FIGURE 12-1 The Effect of a Positive Technology Shock in a Real Business Cycle Model



A positive technology shock shifts the production function up from $z_{0t}F(K_t, N_t)$ to $z_{1t}F(K_t, N_t)$. Robinson responds to this rise in his productivity by increasing his labor input from N_0 to N_1 . Because of the increase in productivity and increase in the labor input, output rises from Y_0 to Y_1 .

- Macroeconomic Policy in a RBC Model
 - Monetary policy
 - A good monetary policy would focus on controlling the price level
 - Note: Real shocks cannot be offset by monetary policy
 - Fiscal policy
 - Effects on output occur from the supply side, not the aggregate demand of the model
 - Changes on taxes affect optimization behavior (labor versus leisure), and therefore affect supply
 - Fiscal policy should minimize tax distortions subject to providing government services (law and order)
 - However, the treasury can finance the budget with seignorage (“printing money”)
 - Seignorage: Amount of real resources brought by the government with newly created money
 - The optimal inflation rate might be positive ($\pi > 0$)
 - Trade-off: Reduce tax distortions with seignorage but increase the costs associated with inflation
 - Inflation tax: $\pi \cdot \left(\frac{BM_{t-1} + BM_t}{2} \right) / NGDP$
 - *Digression: If inflation is a tax, and is not legislated, should it be done without Congress approval?*
- Questions about RBC Models
 - (1) The Importance of Technology Shocks
 - Technology shocks are too small and industry specific to explain business cycles
 - Reply: Transmission mechanisms can amplify and extend the shock (you only need a match to light a forest)
 - (2) Voluntary Employment Changes [are job losses real voluntary?]
 - With a negative technology shock, voluntary employment should decrease
 - For this mechanism to explain business cycle labor supply needs to be *implausible elastic* to changes in technology –horizontal labor supply
 - Empirical studies suggest that labor supply is steep, not horizontal
 - (3) Negative Supply Shocks
 - What is a negative supply shock? Knowledge can be recorded (Popper’s 3rd World).
 - Reply: New models that are based on expected growth rate of technology rather than with technology level. The negative shock is a lower growth rate of technology than expected. Adjust the model from z_t to $\frac{\Delta z_t}{z_t}$

2. New Keynesian Economics

- Additional explanations of involuntary unemployment (i.e. due to sticky wages)
- There are multiple reasons, not only one, of why wages might be sticky. Some reasons may apply more in some industries and less (or be absent) in others
- Common characteristics of New Keynesian models
 - Assume imperfect competition (Keynesians assumed perfect competition)
 - Not only wages are sticky, some product prices can be sticky too
 - Add real rigidities to wages
- (1) Sticky Price Models (menu cost models)
 - Models on which costs of changes prices prevent price adjustments when demand changes
 - Assume imperfect competition, then prices are not *given* but have to be set (subject to constraints) by the firm
 - *Digression: Prices are not set by anyone. A price is the outcome of a particular exchange in a particular time and place. The price you see in a store is the desired or expected price of the good. The economic price occurs at the moment of the transaction whether or not coincides with the desired price. If you buy three apples for one dollar each, there are three prices, there is no such thing as the price of “apples” in general*
 - Firms may not change the price when demand changes if the cost of changing the price (menu cost) is higher than the profit saved by reducing the price. Menu costs:
 - Managerial costs
 - Consumer goodwill
 - In some markets (oligopolies), price is not reduced to avoid price wars
- (2) Efficiency Wage Models
 - Models on which labor productivity depends on the real wage that workers are paid
 - Positive correlation between real wages and labor productivity
 - Productivity: $e = e\left(\frac{W}{P}\right)$
 - $\frac{\partial e\left(\frac{W}{P}\right)}{\partial\left(\frac{W}{P}\right)} > 0, \frac{\partial^2 e\left(\frac{W}{P}\right)}{\partial\left(\frac{W}{P}\right)^2} < 0$
 - Then: $Y = F(\bar{K}, eN)$
 - Firm maximizes the number of efficient units of labor bought with each dollar of the wage bill. This happens when the elasticity of efficiency with respect to real wage equals 1

- There is a $\left(\frac{W}{P}\right)^*$ such that $\frac{\frac{\Delta\left[e\left(\frac{W}{P}\right)\right]}{e\left(\frac{W}{P}\right)}}{\frac{\Delta\left(\frac{W}{P}\right)}{\frac{W}{P}}} = \frac{\Delta\left[e\left(\frac{W}{P}\right)\right]}{\Delta\left(\frac{W}{P}\right)} \cdot \frac{\frac{W}{P}}{e\left(\frac{W}{P}\right)} = \frac{e\left(\frac{W}{P}\right)\%}{\left(\frac{W}{P}\right)\%} = 1$

- But then this does not clear the labor market
 - (a) Shirking model: By setting the price above the market level employees are incentivized to not shirk. If fired, it'll be difficult to get a new job
 - (b) Turnover cost models: By paying an above-market real wage, firms reduce quit rates and reduce recruiting and training costs. This also allows for a more experienced and trained labor force
 - (c) Gift exchange models: The firm gives an above-market wage as a gift to the employee. The employee reciprocates with more efficiency as a gift to the employer
 - Then:
 - $\left(\frac{W}{P}\right)^* > \left(\frac{W}{P}\right)_0$ [clearing market real wage]
 - Unemployment is higher than the natural rate of unemployment: $\mu > \mu_N$
- Efficiency wages are set on efficiency (productivity): This is a real factor
- Assume now a fall in nominal aggregate demand (NGDP)
 - A firm could reduce the price (P) to keep output unchanged and (2) reduce nominal wage (W) such that $\left(\frac{W}{P}\right) = \left(\frac{W}{P}\right)^*$
 - However, if there are menu costs, P does not change, then W should remain constant to keep $\left(\frac{W}{P}\right) = \left(\frac{W}{P}\right)^*$
 - Then when NGDP falls, output falls and unemployment increases
- (3) Insider-Outsider Models and Hysteresis
 - Models that provide an explanation of hysteresis in unemployment
 - Insiders: Union members who bargain real wages with employers. They push for higher real wages
 - Outsiders: Unemployed who do not bargain real wages with employers
 - With a recession some insiders become outsiders and the ratio $\frac{Insiders}{Outsiders}$ increase
 - This gives more bargaining power to the insiders
 - Real wages are increased and this produces higher unemployment rates
 - This is an hysteresis phenomenon

3. Different Keynesian Schools

- (1) Post Keynesian Economics
 - No need of market failures to explain unemployment
- (2) Neo Keynesian Economics
 - Formalization of Keynes's ideas
- (3) New Keynesian Economics
 - Assume a diversity of market failures to explain (involuntary) unemployment