New Keynesian Phillips Curve

$$\pi_t = \phi E_t \pi_{t+1} + \zeta(y_t - y_n) + u_t$$

Inertia.

Relatively high inflation.

Anchored Expectations.

Hysteresis.

Extensions to NK Model:

Consumption/Investment and cash flow.

Wage stickiness.

Habit Persistence/Adjustment Costs.

Economic Uncertainty.

Great Depression.

Policy Uncertainty (Baker, Bloom, and Davis, 2011).

Taylor and Rules.

Hysteresis (Ball, Aggregate Demand and Long Run Unemployment, 1999).

New Keynesian: output demand-determined.

Demand main source of output fluctuations (e.g., government expenditure).

More generally: an array of rigidities such as inflexible prices. Frictions such as unions.

Today: NK and RBC. Salt/fresh water. Debate about quantitative importance of channels.

Real business cycle theory: variations in supply.

Money neutral (no money in model). Empirical relationship not a problem.

Composition and Level of Y_t change.

Really, an extension of Ramsey-Cass-Coopmans model (the Solow model with an endogenous savings rate).

Fluctuations represent optimal responses to economic conditions. Fluctuations are Pareto Optimal (follows from perfect competition assumption and First Welfare Theorem).

RBC: technology/TFP shocks.

Shocks are real. Everything in real terms. No nominal variables.

TFP central to growth theory.

Empirically, Solow residual is procylical.

Technology shocks change potential $Y = A_t K_t^{\alpha} L_t^{1-\alpha}$

For now, $Y_t = A_t K_t^{\alpha} L_t^{1-\alpha} = C_t + I_t$

A is anything that changes amount for output for given K and L; e.g., inventions, oil, taxation, weather, regulation, bank failures/failures of financial intermediation.

As a result, they change MPK and MPL.

No role for demand, output always at potential (and interest rate at r_n.) No FED.

Potential varies.

Long-run model: recall central role of technology, A.

Capital accumulation important too.

What if technology varies cyclically?

Robinson crusoe example (fish; weather).

Fluctuations are optimal.

"Unemployment" voluntary. Intensive/Extensive Margins.

First welfare theorem; stabilization policy.

Good fit with very basic model.

Income/Sub effects.

e.g. permanent change in wage.

Temporary rise in wage above trend.

Temporary rise in interest rate.

Income effects small due to PIH.

"Make hay while sun shines"

Fish example.

Consequence for saving, investment, and next period's capital.

Persistence important for capital accumulation; if not persistent no need to invest.

Shocks can't be "too temporary" since consumption *does* rise moderately. So shocks are temporary and persistent.

Propagation mechanisms.

Shocks must be temporary and somewhat persistent.

First key idea: Intertemporal substitution of labour.

Productivity shock raises labour demand.

Rise in wages causes people to "make hay while sun shines"

Rise in wage must be temporary, making the substitution effect small (A permanent rise could cause labour supply to *fall* if income effect was strong enough).

People also increase labour supply in response to interest rate fluctuations.

Second key idea

Capital accumulation.

With productivity shock, lifetime wealth goes up.

By PIH, we smooth that over lifetime (since income increase only temporary.) So consumption only goes up a little today.

But output goes up a lot today due to A and L increase.

$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha} = C_t + I_t$

Savings used for investment.

Model predicts procyclical consumption and *highly* variable investment.

Persistent business cycles.

Higher investment this period: implication for next period?

$K_{t+1} = I_t + K_t$

Capital stock is higher next period, thereby causing *persistence*.

Representative Firm and Household

$$E_0 \sum_{t=0}^{t=\infty} \beta^r \left(\log C_t - \frac{l_t^{1+\sigma}}{1+\sigma} \right)$$

$$w_t l + r_t k_t = C_t + i_t$$

$$k_{t+1} = (1-\delta) k_t + i_t$$

No profits in budget constraint (since firms are perfectly competitive).

Combining

$$w_t l_t + r_t k_t = C_t + k_{t+1} - (1-\delta) k_t$$

$$w_t l_t + r_t k_t = C_t + k_{t+1} - k_t + \delta k_t$$

$$w_t l_t + (1 + r_t - \delta)k_t = C_t + k_{t+1}$$

$$\underbrace{w_t l_t + (1 + r_t - \delta)k_t}_{sources} = \underbrace{C_t + k_{t+1}}_{destinations}$$

Tradeoff.

Time constraint.

Set $\delta = 0$ (or think of r_t as real return *net of depreciation*).

$$u'(C_t) = E_t \beta (1 + r_{t+1}) u'(C_{t+1})$$