LECTURE NOTES

Chapter 13: Macroeconomic Models: A Summary

1. Theoretical Issues

	Classical	Keynesian	Monetarist	New Classical
Labor demand	$\left(\frac{W}{P}\right)$	$\left(\frac{W}{P}\right)$	$\left(\frac{W}{P}\right)$	$\left(\frac{W}{P}\right)$
Labor supply	$\left(\frac{W}{P}\right)$	$\left(\frac{W}{P^e}\right)$	$\left(\frac{W}{P^e}\right)$	$\left(\frac{W}{P^e}\right)$
Aggregate demand	Depends only on *M*	*M* is one of the AD components	Depends only on *M*	*M* is one of the AD components
Aggregate supply	Vertical	SRAS: $Y(P^e)$	SRAS: $Y(P^e)$	SRAS: $Y(M^e, G^e, T^e, I^e)$
Expectations	Perfect information: No expectations	Adaptive (backward looking)	Adaptive (backward looking)	Rational (forward looking)
The market	Always in equilibrium	Unstable	Shock absorber	In disequilibrium if unexpected shock

- RBC: New Classical model but with supply shocks rather than AD shocks

2. Policy Issues

- Classical models: Free market position
- Keynesian models: Market intervention position
    - This can go from intervene when necessary to “socialize investment” (J. M. Keynes)

3. Consensus as Well as Controversy

- What is the consensus across models?
    - The quantity theory of money: $M\bar{V} = P\bar{Y}$
        - High inflation can only be explained with increase in money supply
    - Rational expectations
        - Few, if any, models use simple backward expectations any more.
        - Unless there is a good reason, models are expected to be consistent with rational expectations
    - All modern models accept that AD has a role in determining output
- Why controversy?
    - It is not about the ability to perform laboratory experiments
        - This is a very old (rarely held) epistemological position
        - Laboratory experiments cannot prove nor disprove a theory (Duhem-Quine thesis)
    - It is about assumptions considered to be true *a priori*
        - This means that empirical evidence and scientific discussion needs to *persuasive*

4. Macroeconomics Going Forward

- The financial crisis of 2008 was the largest one since the Great Depression
    - How is it possible that it was completely unforeseen
    - How, just a few months before the housing bubble burst, the Fed Chairman claim that there is no housing bubble
    - Real world data is interpreted at the light of given theories
    - Are macro theories well grounded (regardless of their mathematical consistency)?
    - Read Ricardo Caballero's paper

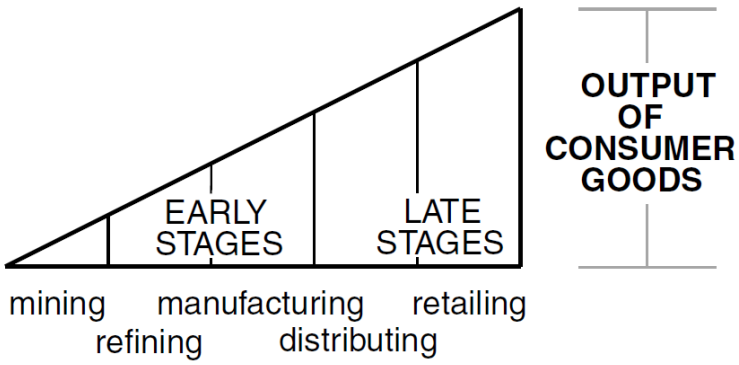
5. Digression: Important Economic Topics you need to Know

- Relative prices inside *P*
    - Resource allocation does not depend on $\frac{W}{P}$, it depends on the prices inside *P* and *W*. Resource allocation depends on relative prices, not on aggregate price indices
    - If there are *n* goods and *m* different types of labor:
        - $P = \sum \omega_1 p_1 + \cdots + \omega_n p_n$
        - $W = \sum \omega_1 \mathrm{w}_1 + \cdots + \omega_\mathrm{m} \mathrm{w}_\mathrm{m}$
        - Economic order (equilibrium) does not depend on "aggregates" like $\frac{W}{P}$, but on the combination of different relative prices: $\frac{p_i}{p_j}, \frac{w_i}{w_j}, \frac{p_i}{w_j}, \ldots$
    - If macro does not deal with relative prices, how much explaining is actually doing and how much of the problem to explain is being assumed away?
    - If macroeconomics does not have microeconomics, it is still "economics"?
    - That's why macro needs to have microeconomic foundations. However…
- Microeconomic foundations: Representative Agents
    - Models are populated by *n* identical agents
    - Therefore to model only one consumer and one firm is enough to *represent* all economic agents
    - However:
        - Exchange (the market process) occurs because economic agents are different rather than equal
        - You cannot explain the market by assuming everyone is an identical Robinson Crusoe
            - Example: Business cycles may be driven by decisions of some (marginal) entrepreneurs (not all of them). This approach is unable to capture this effect
- Say's Law
    - Supply creates its demand
        - Important: Demand = preferences + purchasing power
        - Then, *how much* you can demand depends on the market value of your supply (not in the physical quantity produced)
        - This means that there cannot be an excess of demand at the aggregate level, only excess in some markets with shortages in other markets
        - But this also means that there cannot be a shortage of demand at the aggregate level.
        - If Say's Law is true, what happens then to Keynesian models?
        - For Say's Law to not hold one of good should not be considered a good: money
        - This is why to demand money (hoarding) is considered "bad" (saving > investment)
        - But money has a price, therefore it is an economic good

- Frank H. Knight: Risk versus Uncertainty
    - Risk is measurable
        - The probability of having of your house burning
    - Uncertainty is unmeasurable (different than not having a measure)
        - Future market conditions (demand, supply, etc.)
    - Risk can be covered with insurance (a bet against oneself)
    - There is no insurance against uncertainty
    - Economic agents face (1) risk and (2) uncertainty
    - Mathematical models are not designed to handle uncertainty
        - Mathematical models are either incomplete or misdirected depending how important you think uncertainty is
- Capital Theory
    - Heterogeneity
        - Financial capital: How much money is needed to fund a project
        - Capital (goods): Actual physical goods used to produce other goods
        - Capital goods are neither completely homogeneous nor heterogeneous
        - Efficient capital allocation is the efficient combination of heterogeneous capital goods
            - Think of a jigsaw puzzle, all pieces are different (heterogeneous) but can be combined in different ways to produce different shapes
        - If economics is about resource allocation, then to assume capital is heterogeneous is to assume the economic problem away
        - This has led to three “capital theory controversies”
            - Böhm-Bawerk versus John B. Clark
            - Friedrich A. von Hayek versus Frank H. Knight
            - Cambridge US versus Cambridge UK

- Capital Controversies
  - Consider the profit function: $\pi = PQ - rK - wN$
  - *Q* is quantity of good *i* per USD $\left(\frac{1 coffee\ cup}{3USD}\right)$. Similarly, *N* is one hour of work per USD
  - Then *PQ* and *wN* are numerical amounts of USD
  - However, *K* is in money terms, and *r* is an interest rate. Then *rK* is also a money term
    - There are <u>no capital *goods*</u>
      - For instance: *P, Q, w, and N* are vectors, but *K* (and *r*) is a scalar [just one number]
    - *r* is the price of capital
    - The price of capital is the marginal productivity of capital
    - The marginal productivity of capital depends on the present value of future output
    - The present value is discounted with the *interest rate*
      - $P_K = \frac{\sum cash\ flow_t}{(1+r)^t}$
    - Then there is a circular reference
      - *r* depends on the marginal productivity of capital
      - Marginal productivity of capital depends on *r*
  - Unless *r* is the price of time, not the price of capital goods. The price of capital goods is how much you have to pay to buy the capital good
    - $P_K = \frac{\sum cash\ flow_t}{(1+r)^t}$
    - You can buy the input required to build a tractor
    - Or you can buy the tractor already done today
    - The difference in price is due to the *price of time* (interest rate)
      - The (natural) interest rate equilibrates the price of capital goods between today and tomorrow
- Time Structure of Production
  - Production takes time
  - Time has a price: the interest rate
  - Then time is a scarce resource
  - Therefore, time allocation should also be efficient (avoid bottleneck effect in the chain of production)
  - Pedagogically, this is captured in the Hayekian triangle (originally depicted by Stanley Jevons)
    - Output goes through different stages of production

- How much capital (and labor) should be allocated in each stage?
- Interest rate governs *how long* production should take and *how much resources* would be allocated on each stage
- None of the models seen so far account for time
    - If the study of economics is the study of producing goods and services, and production takes time, shouldn't time be a key variable?



- Money neutrality is an assumption, not a fact
    - Money neutrality: Unexpected shocks to money supply have effects on resource allocation in the short run but not in the long run. The economy returns to the same equilibrium it would have gone without the monetary shock (the only difference is on nominal values: price level, etc.)
    - Equilibrium depends on the location of demand and supply
        - Demand depends on preferences
        - Supply depends on technology and the existence of resources and inputs
        - Then:
            - (1) capital goods are heterogeneous
            - (2) a monetary shock affects relative prices
            - (3) resource allocation is affected and capital goods transformed to produce particular goods
            - (4) If resource endowment or preferences change, then equilibrium with and without a monetary shock will differ. Then money supply is not neutral
        - Super-neutrality: Money is neutral <u>also</u> in the short run
    - Signal extraction problem
        - Economic agents may correctly predict a rise of x% on *P*. But they cannot predict how each p_i will behave until the new level of *P* is reached
        - To assume such knowledge is like going back from rational expectations to perfect information