Quantity Theory of Money (9/9/2010) Econ 310-004

Equations

- $\mathbf{M^S V = Py}$ equation of exchange
- $V \equiv Py/M^S$ definition of velocity
- $M^S = kPy$ Cambridge equation
- $M^D = Py/V$ money demand for graphical model
- $M^S = C$ money supply for graphical model
- $\mathbf{\bar{V}M^S = \bar{y}P}$ quantity theory of money: bar means constant
- $\mathbf{M^D/P = f(i,y)}$ liquidity preference theory: $f_i < 0$, $f_y > 0$
- $M^D/P = f(y_P, r_b - r_m, r_e - r_m, \pi^e - r_m)$ Friedman's quantity theory of money: $y_P > 0$, others < 0
- $\mathbf{M^D/P = f(y_P)}$ Friedman's quantity theory of money approximated
- $V = y/f(i,y)$ velocity under liquidity preference theory
- $V = y/f(y_P)$ velocity under Friedman's quantity theory of money

Definitions

- ***purchasing power of money*** – the basket of goods and services that a single dollar can buy
- ***price level*** – weighted average of prices in the economy
- ***inflation*** – a rise in the price level (fall in PPM)
- ***deflation*** – a fall in the price level (rise in PPM)
- ***relative prices*** – implicit barter ratios between goods
- ***real variables*** – "constant" dollars
- ***nominal variables*** – "current" dollars
- ***aggregate output*** – total production of final goods and services in the economy
- ***aggregate income*** – Total income of factors of production (land, labor, capital) in the economy
- ***real money balance*** – quantity of money in real terms
- ***velocity of money*** – average number of times a unit of money turns over in a given period
- ***transactions motive*** – money is a medium of exchange that can be used to carry out transactions
- ***precautionary motive*** – people hold money as a cushion against an unexpected purchase need
- ***speculative motive*** – people hold money as an alternative store of wealth to bonds
- ***transactions demand*** – money demand for transactions
- ***portfolio demand*** – money demand as a store of value (captures precautionary and speculative)
- ***permanent income*** – present discounted value of all future earnings

Variable definitions

- PPM ≡ purchasing power of money
- PPM ≡ 1/P
- P ≡ price level
- V ≡ velocity
- Y ≡ aggregate output = aggregate income
- Y ≡ nominal output
- y ≡ real output
- M^D ≡ money demand
- M^S ≡ money supply
- M^S/P ≡ real money stock
- y_P ≡ permanent income
- M^D/P ≡ demand for real money balances
- π^e ≡ expected inflation rate

Notable Figures

- ***Irving Fisher*** – equation of exchange, quantity theory of money (*The Purchasing Power of Money*)
- ***John Maynard Keynes*** – liquidity preference theory (*General Theory of Employment, Interest, & Money*)
- ***Milton Friedman*** – modern quantity theory of money (*A Monetary History of the U.S., 1867-1960*)
- ***William Baumol & James Tobin*** – transactions & precautionary are also sensitive to the interest rate

Principles

- Price level is stated in terms of price indexes.
- Price levels move independently of relative prices.
- Capital letter variables are nominal. Lowercase letter variables are real. (nominal/P = real, e.g.: Y/P = y)
- The money supply can be in terms of any of the monetary aggregates: M1, M2, M3, MB, MZM.
- Equation of exchange is an identity, not a theory ($V \equiv Py/M^S$)
- Right side of equation of exchange is nominal output ($Y = Py$)
- Quantity theory of money: $\bar{V}M^S = \bar{y}P$, P is flexible & y is sticky: $\Delta M^S \rightarrow \Delta P$ (doubling M^S will double P)
- Keynes: interest rates should be in a narrow band: when interest high, people expect it to fall.
- Keynes: If interest rates rise, then the price of a bond falls. So if $i^e\uparrow$, expect a capital loss from bonds.
- Baumol & Tobin showed transactions and precautionary demand are also sensitive to the interest rate because people will vary how frequently they visit the bank.
- The permanent income hypothesis is that people spend money based on perceived average life income.
- Under Friedman's theory, changes in interest rates have little effect on the demand for money.
- Friedman's velocity isn't constant, but it is stable: relationship between y_P and y is predictable.
- If something doesn't effect M^S or M^D, then it can't effect the price level.

Government price indexes

- consumer price index (CPI)
- producer price index (PPI)
- GDP deflator

Keynes' reasons individuals hold money

- transactions motive (+ related to y)
- precautionary motive (+ related to y)
- speculative motive (– related to i)

Transactions demand vectors

- population: $N\uparrow \rightarrow y\uparrow \rightarrow M^D\uparrow$
- output/person: $y/N\uparrow \rightarrow y\uparrow \rightarrow M^D\uparrow$
- vertical integration: merge$\uparrow \rightarrow M^D\downarrow$
- clearing system efficiency: eff.$\uparrow \rightarrow M^D\downarrow$

Transaction demand causes

- population: e.g., black death, baby boom
- output/person: e.g., Internet revolution
- vertical integration: e.g., oil company buys gas stations
- clearing system efficiency: e.g., credit cards

Quantity theory assumptions

- velocity is constant
- wages and prices are completely flexible

Empirical evidence on velocity

- Declines during recessions.
- Fluctuates in the short run(not constant).
- Sensitive to interest rates, but not ultra-sensitive when interest rates are non-zero (i.e., there is no liquidity trap).

Portfolio demand vectors

- wealth: $W\uparrow \rightarrow M^D\uparrow$
- uncertainty: uncertainty$\uparrow \rightarrow M^D\uparrow$
- interest differential: $i\uparrow \rightarrow M^D\downarrow$
- anticipations about inflation: $\pi_e\downarrow \rightarrow M^D\uparrow$

Portfolio demand causes

- wealth: e.g., win the lottery
- uncertainty: e.g., travel to a foreign country
- interest differential: i.e., interest rate soars
- anticipations about inflation: e.g., print money non-stop