Essex EC248-2-SP Lecture 5

The Demand for Money and Monetary Theory

Alexander Mihailov, 13/02/06

Plan of Talk

• Introduction

- 1. Theories on the Demand for Money
- 2. Money in IS-LM and AD-AS Analysis
- 3. Money and Inflation
- 4. Money and Output
- Wrap-up

Aims and Learning Outcomes

• Aims

- Understand what determines money demand
- Discuss the role of money and policy in the economy

Learning outcomes

- Compare alternative theories of money demand
- Analyse effects of money in IS-LM and AD-AS models
- Comment the link between money and inflation
- Characterise the real effects of money

Quantity Theory of Money

Velocity
$$V \equiv \frac{P \times Y}{M}$$
 (definition)

Equation of Exchange $M \times V \equiv P \times Y$ (identity)

Quantity *Theory* of Money

1. Irving Fisher's (1911) view: V is fairly constant

- 2. Equation of exchange no longer identity, but theory
- 3. Nominal income, PY, determined by M
- 4. Classicals assume *Y* fairly constant
- 5. *P* determined by *M*

Change in Velocity from Year to Year: US Data, 1915–2002



Cambridge Approach and Keynes (1936)

Cambridge approach: Is velocity constant?

- 1. Classicals thought V constant because they did not have good data
- 2. Great Depression => economists realised velocity was far from constant

Keynes: 3 motives to hold money

- 1. Transactions motive—related to Y
- 2. Precautionary motive—related to Y
- 3. Speculative motive
 - A. related to W and Y
 - B. negatively related to *i*

Liquidity Preference

$$\frac{M^d}{P} = f(\underbrace{i, Y}_+)$$

Keynes's Liquidity Preference Theory

Implication: Velocity not constant

$$\frac{P}{M^d} = \frac{1}{f(i,Y)}$$

Multiply both sides by Y and substitute in $M = M^d$

$$V = \frac{PY}{M} = \frac{Y}{f(i,Y)}$$

1. i
$$\uparrow$$
, f(i,Y) \downarrow , V \uparrow

2. Change in expectations of future i, change f(i,Y) and V changes

Baumol (1952) – Tobin (1956) Model of Transactions Demand

Assumptions

1. Income of \$1000 each month 2.2 assets: money and bonds

If keep all income in cash

1. Yearly income = \$12,000 2. Average money balances = \$1000/2 = \$500 3. Velocity = \$12,000/\$500 = 24

Keep only 1/2 payment in cash

1. Yearly income = \$12,000 2. Average money balances = \$500/2 = \$250 3. Velocity = \$12,000/\$250 = 48

Trade-off of keeping less cash

1. Income gain = $i \times \$500/2 = i \times \$250 => i$ as an opportunity cost of holding money

2. Increased transactions costs: (i) brokerage fee; (ii) more trips to bank *Conclusion:* Higher is *i* and income gain from holding bonds, less likely to hold cash: Therefore $i \uparrow, M^d \downarrow$

Cash Balance in Baumol-Tobin Model



Precautionary and Speculative M^d

Precautionary Demand

Similar trade-off to Baumol-Tobin framework

- 1. Benefits of precautionary balances
- 2. Opportunity cost of interest foregone

Conclusion:

i \uparrow , opportunity cost \uparrow , hold less precautionary balances, $M^d \downarrow$

Speculative Demand

Problems with Keynes's framework:

Hold all bonds or all money: no diversification

Tobin (1958) Model

- 1. People want high R^e , but low risk
- 2. As $i\uparrow$, hold more bonds and less *M*, but still diversify and hold *M*

Problem with Tobin model: No speculative demand because T-bills have no risk (like money) but have higher return

Friedman's (1956) Modern Quantity Theory

Applied the theory of asset demand to money: M^d function of wealth = *permanent* income (Y_p) [= PDV of all future income] and *relative* R^e of other assets

$$\frac{M^{d}}{P} = f(Y_{P}, r_{b} - r_{m}, r_{e} - r_{m}, \pi^{e} - r_{m})$$

Differences from Keynesian theories

- 1. Other assets besides money and bonds: *equity* and *goods* (real assets) => more than one interest rate matters in the aggregate economy, no comovement
- Goods and money are *substitutes* (choice) => M has direct effect on spending
 r_m not constant: r_b ↑, r_m ↑, r_b − r_m unchanged, so M^d insensitive to interest rates: Δr_b have little effect on M^d since matched by Δr_m
 M^d is a stable function

Implication of 3. combined with 4.:

$$\frac{M^d}{P} = f(Y_p) \Longrightarrow V = \frac{Y}{f(Y_p)}$$

Since relationship of Y and Y_p predictable, 4. implies V is predictable: Get QTM theory view that change in M leads to predictable changes in nominal income, PY

Empirical Evidence on Money Demand

Interest Rate Sensitivity of Money Demand Is sensitive, but no liquidity trap

Stability of Money Demand

- 1. M1 demand stable till 1973, unstable after
- 2. Most likely source of instability is financial innovation
- 3. Cast doubts on money targets



AD-AS Analysis: Monetarist View of AD

$$V = \frac{P \times Y}{M} = \frac{1 \times 2000}{1000} = 2$$

Modern Quantity Theory of Money (Friedman, 1956) $M \times V = P \times Y$

Implication: M determines $P \times Y$ if *V* predictable and unrelated to ΔM **Deriving** *AD* **Curve**

 $P=1, M=1000, V=2 \Rightarrow P \times Y=2000$ (Point B below)

Point A:P = 2Y = 1000 $PY = 2 \times 1000 = 2000$ Point B:P = 1Y = 2000 $PY = 1 \times 2000 = 2000$ Point C:P = 0.5Y = 4000 $PY = 0.5 \times 4000 = 2000$ Conclusion: $P \downarrow$, $Y \uparrow$, downward sloping AD

2 Key Differences w.r.t. Keynesians (see also next slide):

- Shift in *AD* Curve: *one* primary source, ΔM (e.g., if M = 2000 above) $M \uparrow <=> P \times Y \uparrow$, i.e., *AD* shifts right (at any given P)
- Crowding out: *complete* (see next slide)

AD-AS Analysis: Keynesian View of AD

$$Y^{ad} = C + I + G + NX$$

Downward Sloping AD

 $P \downarrow, M/P \uparrow, i \downarrow, E \downarrow$ (depreciation, in Mishkin) $I \uparrow, NX \uparrow, Y^{ad} \uparrow, Y \uparrow$

2 Key Differences w.r.t. Monetarists

Shift in AD: many sources

 $M\uparrow, M/P\uparrow, i\downarrow, I\uparrow, NX\uparrow, Y^{ad}\uparrow, Y\uparrow$

 \Rightarrow AD shifts right

 $C \uparrow$ or $I \uparrow$ or $NX \uparrow$ or $G \uparrow$ or $T \downarrow : Y^{ad} \uparrow, Y \uparrow$

 \Rightarrow *AD* shifts right

Crowding Out: partial (in the short run)

Complete (monetarists): $G \uparrow$, $i \uparrow \Rightarrow C \downarrow$, $I \downarrow$, $NX \downarrow \Rightarrow C + I + G + NX = Y^{ad}$ unchanged

Partial (Keynesians): private spending down, but not fully offsetting $G \uparrow$

Money and Inflation: The Evidence

"Inflation is always and everywhere a monetary phenomenon" (*M. Friedman*)

Evidence

In every case when π high for *sustained period*, *M* growth is high

Examples:

- 1. Latin American inflations
- 2. German Hyperinflation, 1921–1923

Controlled experiment, particularly after 1923 French invasion of Ruhr—government prints money to pay strikers, $\pi > 1$ million %

Meaning of "inflation"

Friedman's statement uses definition of π as continuing, rapidly rising price level: only then does evidence support it!

German Hyperinflation: 1921–1923



Monetarist and Keynesian Views on $\boldsymbol{\pi}$

Monetarist View

Only source of *AD* shifts and π can be M^s growth

Keynesian View

Allows for other sources of *AD* shifts, but comes to same conclusion that only source of *sustained* high π is M^s growth

Lags in Shifting AD

- 1. Data lag
- 2. Recognition lag
- 3. Legislative lag
- 4. Implementation lag
- 5. Effectiveness lag

Case for Activist Policy

If self-correcting mechanism is slow $(U > U_n \text{ for long time})$

Case for Nonactivist Policy

If self-correcting mechanism is fast

Lucas (1976) Critique

Lucas challenges usefulness of econometric models for policy evaluation

- 1. Critique follows from RE implication that change in way variable moves, changes way expectations are formed
- 2. Policy change, changes relationship between expectations and past behavior
- 3. Estimated relationships in econometric model change
- 4. Therefore, can't be used to evaluate change in policy

Example: Evaluate effect on long rate from Fed policy raising short-term *i* permanently, if in past changes in *i* quickly reversed (were temporary)

- 1. Estimated term structure relationship indicates only small change in long rate
- 2. Once realize short $i \uparrow$ permanently, average future short rates \uparrow a lot, long rate \uparrow a lot
- 3. Another implication of Lucas analysis: expectations about policy influence response to policy

New (Neo)Classical Model

Assumptions:

- 1. Rational expectations
- 2. Wages and prices completely flexible with respect to expected inflation: adjust immediately and fully to changes in the expected price level

Implications:

- 1. Policy ineffectiveness proposition: anticipated policy has no effect on business cycle
- 2. Effects of (unanticipated) policy are uncertain because they depend on expectations
- 3. No beneficial effect from activist policy: supports nonactivism

New Keynesian (or NNS) Model

Assumptions:

- 1. Rational expectations
- 2. Wages and prices display rigidity: do not adjust immediately (and fully) to changes in the expected price level

Implications:

- 1. Unanticipated policy has larger effect on *Y* than anticipated policy
- 2. But policy ineffectiveness does not hold: Anticipated policy does affect *Y*!
- 3. Does not rule out beneficial effect from activist policy
- 4. However, effects of policy are affected by expectations: designing policy is tough

Concluding Wrap-Up

• What have we learnt?

- How alternative theories of money demand differ
- What is the role of money in IS-LM and AD-AS models
- Why inflation is ultimately a monetary phenomenon
- What are the effects of money and policy on output
- Where we go next: to the *formulation* and *implementation* of monetary policy by central banks