

Intermediate Macroeconomics

Chapter 9  
Money Demand

Money Demand Equation

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$$M_d = k * Y - h * i$$

$M_d$  = demand for real balances,  $M/p$   
(i.e., purchasing power)

Positive function of income

Negative function of nominal interest  
rate

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Money Demand

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- Benefits and Costs of Holding Money
- Transactions Motive
- Precautionary Motive
- Speculative Motive
- Empirical results

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1. Benefits and Costs of Holding Money  
Benefits

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- Transactions Motive (M1)
  - avoid transaction costs
- Precautionary Motive (M1 and M2)
  - money available for unexpected expenses
- Speculative Motive (M2)
  - optimize return and risk of investment portfolio

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## 1. Benefits and Costs of Holding Money Costs

### Opportunity cost of holding money:

Interest or profits that could be earned from better paying but illiquid or riskier non-money investments.

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## 2. Transactions Motive Benefits and costs

- Benefit of holding cash (M1):  
Reduce transaction costs of converting cash to interest-bearing deposit and back to cash
- Cost of holding cash:  
Interest on deposits not earned

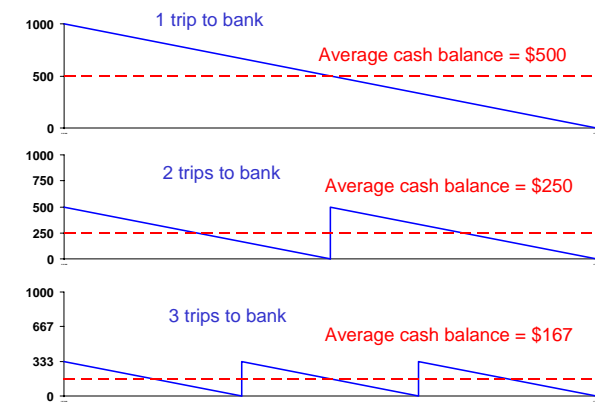
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## 2. Transactions Motive Example

- \$1,000 monthly income deposited directly in bank at beginning of month.
- Cost \$1 each trip to bank (transaction cost)
- Maximize net benefits =  
Interest earned on bank deposits  
– transaction costs

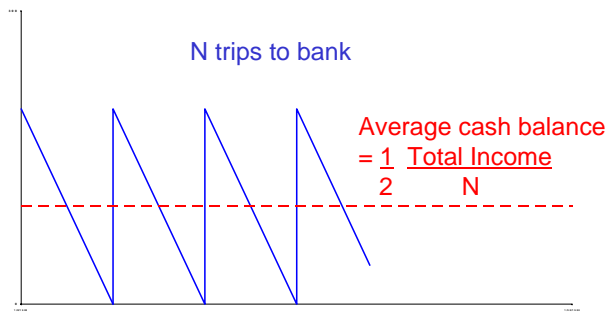
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## 2. Transactions Motive Example – money held by individuals



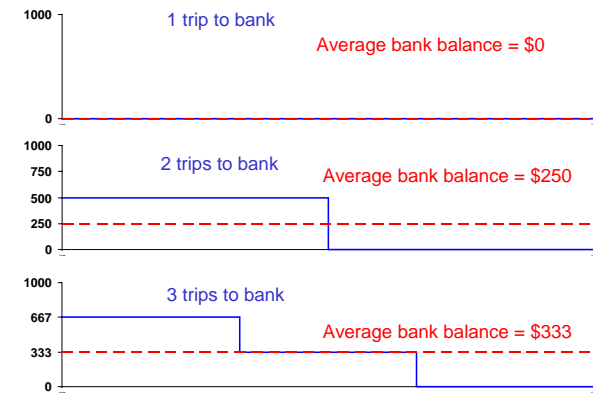
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## 2. Transactions Motive Example – money held by individuals



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## 2. Transactions Motive Example – bank deposits



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## 2. Transactions Motive Example - average balances

- For  $N$  trips to bank
- **Average cash holdings**  
=  $\frac{1}{2} \frac{\text{total income}}{N}$
- **Average bank balance**  
=  $\frac{1}{2} \text{total income} \left(1 - \frac{1}{N}\right)$   
=  $\frac{1}{2} \text{total income} - \text{average cash holdings}$

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## 2. Transactions Motive Average Balances

Assume: \$1,000 income earned at beginning of every month

Number of Transactions	Average Cash Holdings	Average Bank Balance
1	\$500	\$0
2	\$250	\$250
3	\$167	\$333
4	\$125	\$375

Average cash holdings (money demand) =  $\frac{1}{2} * \text{income} / N$   
Average bank balance =  $(\frac{1}{2} * \text{income}) - \text{average cash holdings}$

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## 2. Transactions Motive

### Interest earned on deposits

Number of Transactions	Average Bank Balance	Interest Earned at Nominal Monthly Interest Rate of		
		½ %	1 %	1 ½ %
1	\$ 0	\$ 0	\$ 0	\$ 0
2	\$250	\$1.25	\$2.50	\$3.75
3	\$333	\$1.65	\$3.33	\$4.95
4	\$375	\$1.88	\$3.75	\$5.63

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## 2. Transactions Motive

### Tobin-Baumol model

Money demand (average cash holdings)

$$M^d = \frac{(Y \cdot tc)^{1/2}}{(2 \cdot i)^{1/2}}$$

$i$  = nominal interest rate

$Y$  = monthly income

$tc$  = transaction cost

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## 3. Precautionary Motive

- Benefit of holding cash (M1 and M2):
  - Uncertainty over future expenses. Shortage of cash leads to additional costs.
- Cost of holding cash:
  - Interest on deposits not earned on better paying but *illiquid* investments.

illiquid investment - not quickly converted to cash

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## 3. Precautionary Motive

### Implications

Real money demand (purchasing power) increases if:

- Decline in Interest Rate (on illiquid assets)
- Increase in uncertainty over future expenses or income (e.g., recessions)
- Higher cost of illiquidity (not having enough cash to cover emergencies)

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#### 4. Speculative Motive Capital Asset Pricing Model (CAPM)

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- Portfolio - all the securities held for investment by an individual
- Role of Money in Portfolio of Assets
  - Return on most assets (stocks, bonds, etc.) is uncertain (risky)
  - Investors are (to some degree) risk averse
  - Hold some “safe” assets (e.g., certificates of deposit) with low returns to reduce overall risk of investment portfolio
- How much of safe asset to hold? Depends on willingness to take risk and difference in returns.

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#### 4. Speculative Motive

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- Benefit of holding cash (M2):
  - reduce overall risk of investment portfolio
- Cost of holding cash
  - lower average return on investments

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#### 4. Speculative Motive Implications

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Nominal money demand (M2) increases if

- Decline in return on risky assets
- Increase in interest rate of safe assets (e.g., insured certificates of deposit - M2)
- Increase in riskiness of other assets

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#### 5. Empirical Results

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- M2 money demand more stable than M1
- Short-run elasticities smaller than long-run elasticities

Elasticity - % change in real money demand arising from a 1% change in interest rate or real income

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