Banking, Credit, and Monetary Policy

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June 2016

OUTLINE

- Brief review of standard theory
- Failings of Traditional Theory
- Setting to New Monetary Theory Within a Broader Agenda
- Modelling Banking and The Supply of Credit
- Some Applications
- Some Key Insights

I. Brief review of monetary theories

- Quantity theory

MV = PQ

V (velocity of circulation) constant

M= Money supply

P = price leve

Q= output

pQ = Y = nominal income

So an increase in M leads to an equiproportionate increase in Y

Keynesian monetary theory

- $M^d = M(Y, r)$

Where r is interest rate, opportunity cost of funds

Equilibrium

$M^d = M^s$, controlled by government

Simple version

$M^d = Yk(r)$

Generalization of quantity theory, with $V = 1/k(r)$

Monetary transmission

- An increase in money supply, at any Y, lowers r, lower r leads to higher investment (and possibly higher consumption), leading to higher *equilibrium* output
  - Interest rate (intertemporal substitution) effects are central
  - Asset prices also affected: wealth effect leads to more spending
  - In open economy, exchange rate effects

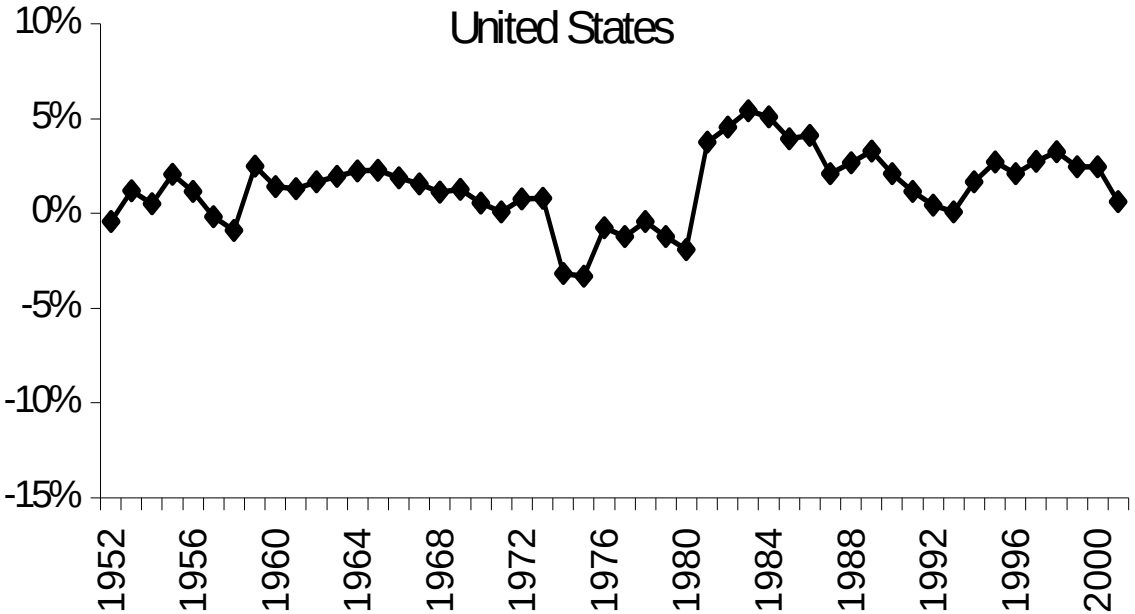
Limitations to monetary policy

- Keynes talked about liquidity trap limiting ability of r to fall
- And interest inelasticity of consumption and investment, implying that even if it did fall, it wouldn't help much
- When the economy reaches ZLB interest rate mechanism doesn't work
  - Modern discussions do not rely on Keynesian liquidity trap, simply on the difficulty of having negative interest rates in an economy with

II. Failings of the Traditional Theory of Money

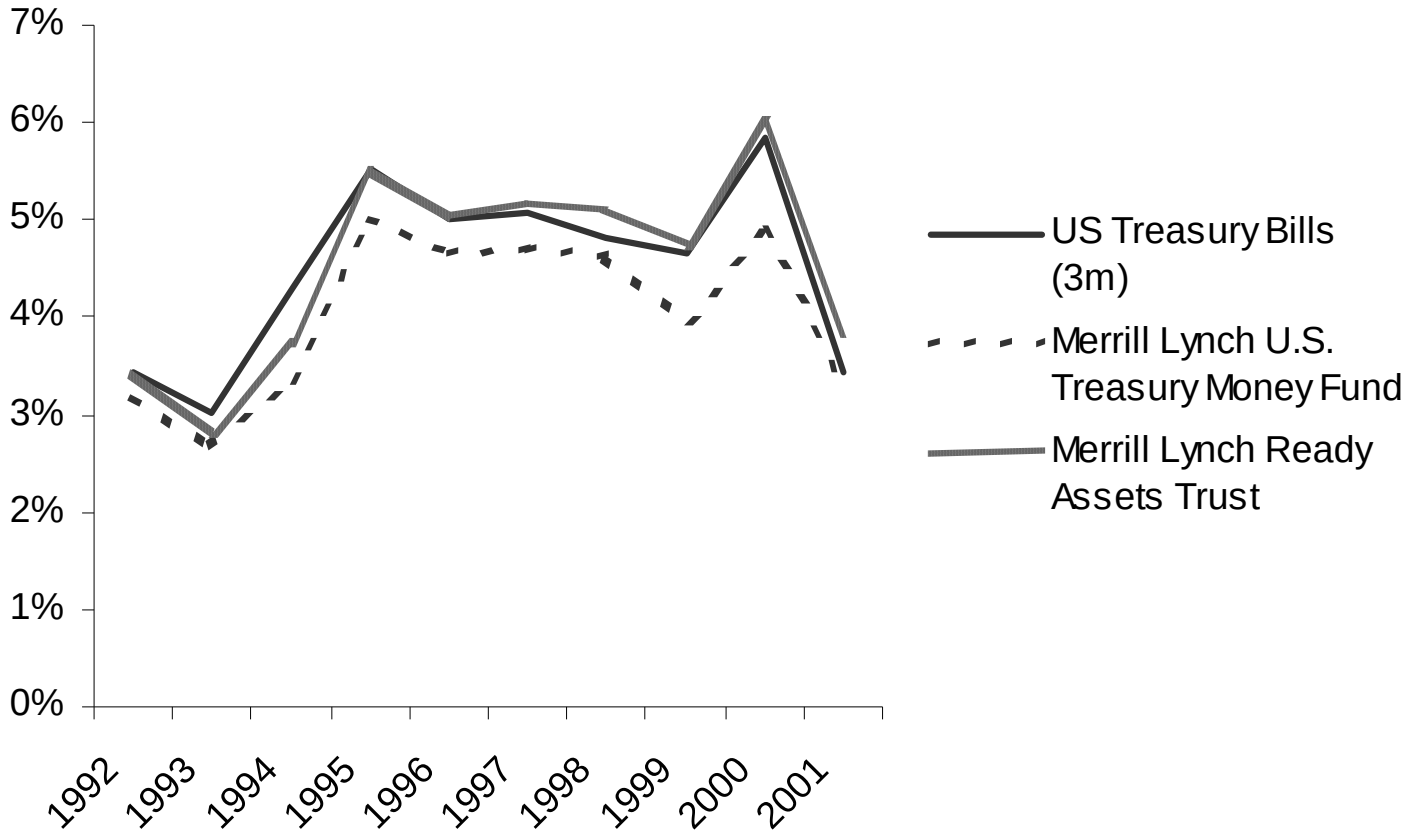
- Because of new technologies, "money" is interest bearing, with differences between t-bill rate & "CMA" accounts rate small (determined by transactions costs, unrelated to economic activity)
- With new technologies, money is not required for transactions—electronic payments system
- What enables individuals to spend is their wealth plus access to credit
  - Relationship between money supply and credit availability variable
- Most transactions not income generating—simply exchanges of assets; ratio of exchange of assets to income is not stable
  - Some money goes to provide margin on speculative gambles
- Velocity has not been stable, relatively little of the changes in velocity are explained by changes in interest rates

Relative stability of real interest rates

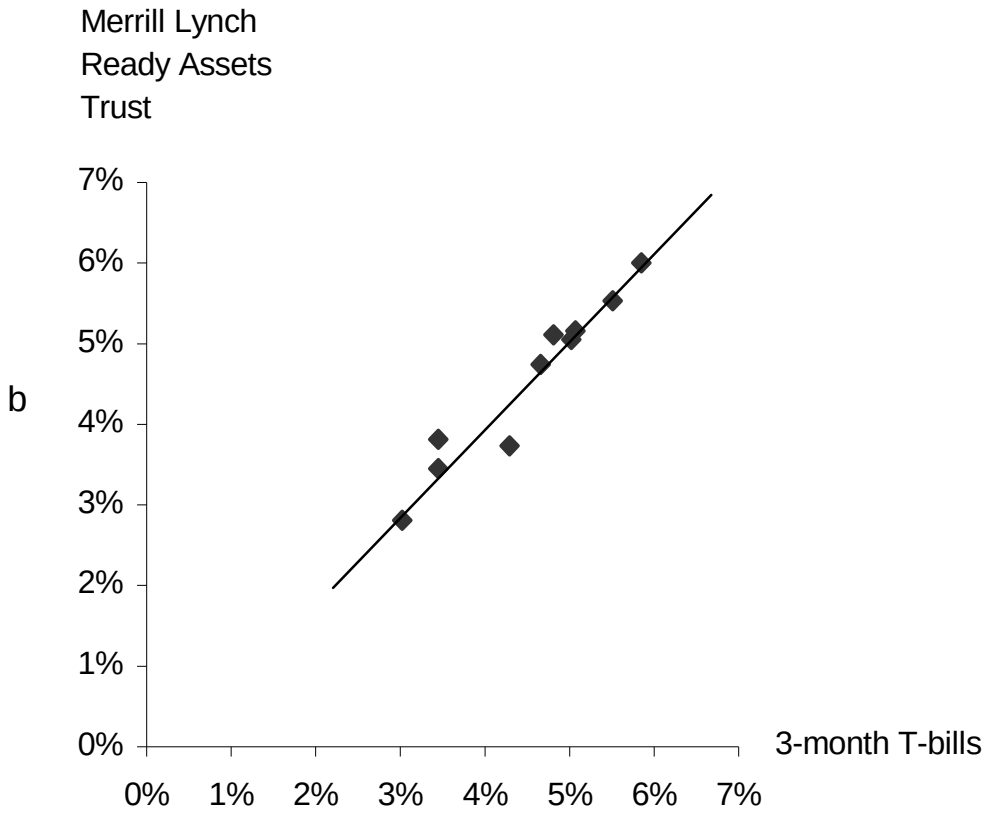


Source: *International Financial Statistics (IFS)* , Washington, DC: IMF, 2002.

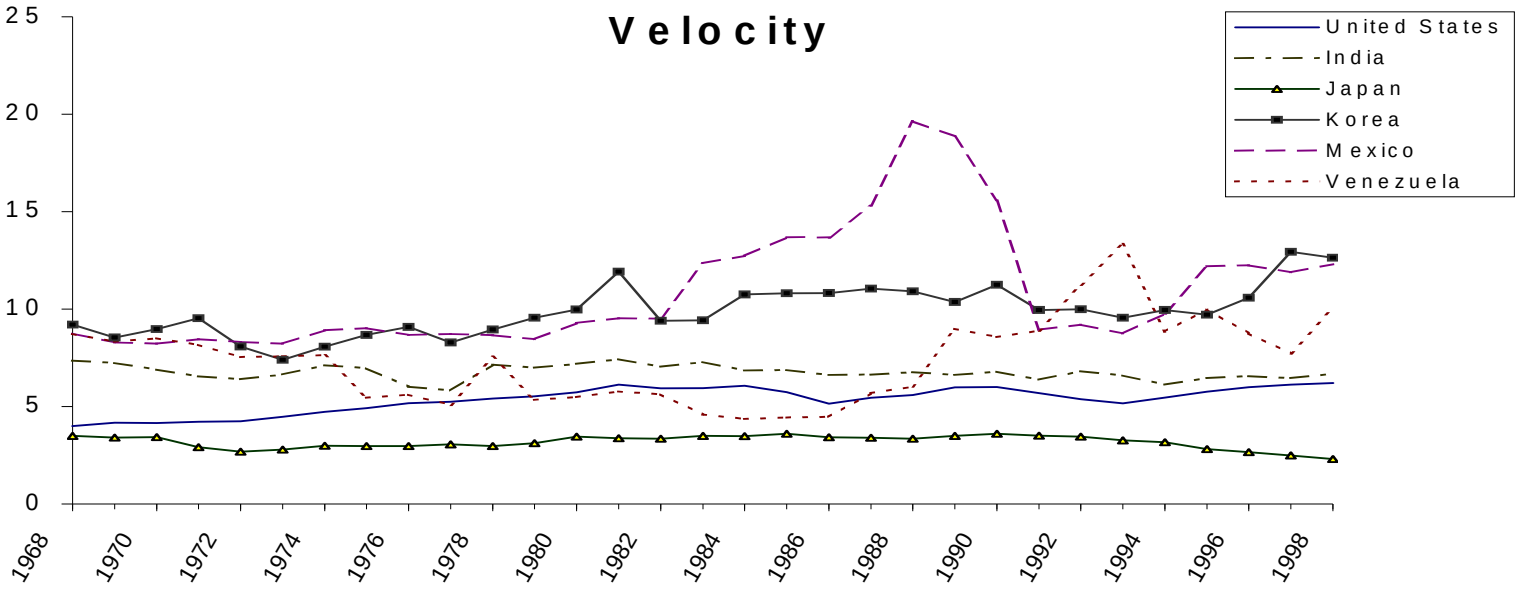
Differences between average annual T-bill rate and CMA rate



Relationship between yearly returns on T-bill and CMA



Non constancy of velocity

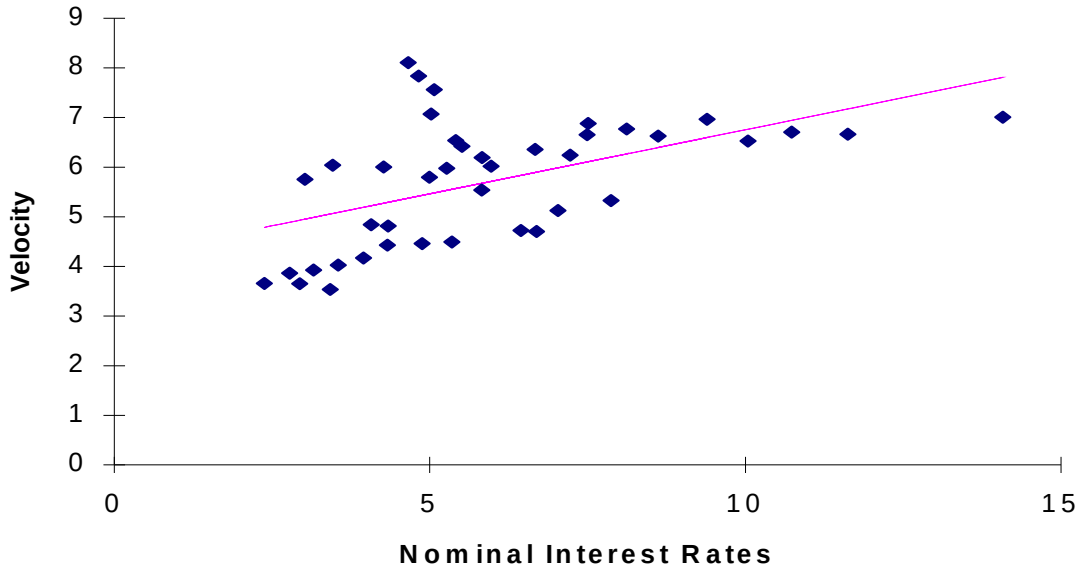


Money (current LCU) (mill) from World Development Indicators, World Bank, 2000.
Definition - Money is the sum of currency outside banks and demand deposits other than those of central government. This series, frequently referred to as M1 is a narrower definition of money than M2.
GDP at market prices (current LCU) (mill) from World Development Indicators, World Bank, 2000.

Empirical Failings

- Real interest rate does not seem to play pivotal role assumed by theory:
  - For many investment regressions, nominal interest rates, instead of, or as well as, real interest rates matter
  - For long periods of time, real interest rate did not vary much at all; can't explain economic variability by a constant
  - For long term investments, it is arguably long term interest rate that should matter; but then why should changes in monetary conditions today have significant effect on long term interest rate? (QE focused on changing long term interest rates. Only little effect.)
- Economy is supposed to be "on" money demand curve, and demand curve is supposed to be stable, but without data mining and massaging, that does not seem to be the

Variations in nominal interest rates explain only a small fraction of the variation in velocity



Source:
International Financial Statistics Database, IMF 2000.
Data range: the United States annual data from 1959 to 1999.
Velocity is calculated by GDP divided by M1.
Nominal interest rates are approximated by Treasury bill rate, discount on new issues of three-month bills and annual averages of these.

III. Two Strands in New Keynesian (review)

- Key problem is price and wage rigidities
- Key problem is imperfect information and incomplete contracts
  - Which may lead to price and wage rigidities
  - But problems can arise even when wages and prices are flexible
    - *Fisherian debt-deflation*
    - *Revived by Greenwald and Stiglitz*
    - *Wage and price flexibility (deflation) may make matters worse*

New Keynesian Theories (2nd strand)

- Credit - not money used for transactions purposes - is central
- And banks are central to the provision of credit
- Central questions:
  - How do changes in economic environment affect supply of credit
  - How does conventional monetary policy affect supply of credit
  - How does financial regulatory policy affect supply of credit
  - What are the determinants of the demand for credit

IV. Credit Should Be at The Center of Monetary Theory

- Providing credit entails assessing credit-worthiness, ie. probability of repaying loan
  - Based on information
- Information is highly specific and not easily transferable
- Credit is not allocated by an auction market (to highest bidder)
- There may be credit rationing
  - Because of adverse selection and incentive effects, increasing interest rate beyond a certain level may lead to a reduction in expected return (i.e. Probability of default increases faster than nominal return)
- Even in the absence of credit rationing, non-price terms, like collateral requirements, are important (on both

Key to Understanding the Supply of Credit Is Understanding Bank Behavior

- **Banks are firms that certify creditworthiness, screen and monitor loan applicants**
- Issuing loans is risky, since there is probability of not being repaid
- Banks, like other firms, act in a risk averse manner
- "Constraints" in the issuance of equity imply limited ability to diversify out of risk
  - Empirical evidence: firms finance little of new investment through issuing new equity
  - When firms issue new equity, share price typically declines markedly
  - Explained by theories of adverse selection

Why Banks Are Risk Averse (continued)

- With equity constraints, if banks want to increase lending, they must borrow fixed obligations, with uncertain returns
- The more firms borrow, the higher the probability of bankruptcy
- With significant costs of bankruptcy, banks will limit borrowing and lending, acting as if they are risk averse
- Risk averse managers provide alternative explanation of risk averse banks

Modeling an Ideal Competitive Banking System

- Government Insured Deposits
- Government Imposed Reserve Requirements, which Acts as a Tax on Deposits
- No Transactions Costs
- High Degree of Competition So
- Deposit Rate = T-Bill Rate

The Bank's Objectives

- There are two alternative ways of modeling bank behavior, similar results
  - The bank is risk neutral, provided it does not go bankrupt, but there is a high cost to bankruptcy, wishes to avert bankruptcy.
  - Alternative Formulation - Mean Variance

Risk Neutral Bank With Costly Bankruptcy

- Formally, we assume the bank

$$\text{Max } E(a_{t+1}) - cF$$

  - Where a_{t+1} is final wealth, c cost of bankruptcy, and F is probability of bankruptcy
  - Choosing lending rate r, monitoring and other expenditures e, amount lent N, and amount "borrowed" M
  - s.t. amount lent must be equal to or less than the demand for funds (at terms of contract)

Basic Model

- The bank goes bankrupt if

  $Y + M(1 + \rho) - \rho(1 + \tau)(N + M + e - a_t)$

  - Where ρ is cost of funds (return on deposits)
  - T is effective tax on deposits (derived from non-interest bearing reserve requirements)
  - Y is return on loans
  - Θ state of the business cycle, representing the undiversifiable risk of banks' portfolio
  - Higher Θ higher Y

Basic Model

- Let F(Θ^) be the probability that Θ is less than the critical Θ at which the bank goes bankrupt, the probability that the bank goes bankrupt,
- and let c be the cost of bankruptcy
  - (c will normally be a function of the scale of the bank; bankruptcy costs will be larger the larger the bank, e.g., measured by the value of assets or liabilities)

Basic Model

- Two Cases:
  - Constraint is not binding - credit rationing
  - Constraint is binding - “competitive” market for loans

Mean Variance

- The Bank Maximizes

$U = U(\mu,\sigma)$

  - Where mu is mean
  - and sigma is standard deviation
  - For most of the analysis we assume constant returns, so that. . .

Simplification - CRTS

- $\mu = N\mu^*(r,e)$
- $\sigma = N\sigma^*(r,e)$

  which in turn means that

  $\mu Y = N\mu^* + M\,\rho - \rho\,(1 + \tau)\,(N + M + e - a_t)$

  for $N + M + e - a_t > 0$

  $\mu Y = N\mu^* + M\,\rho$

  for $N + M + e - a_t < 0$

  and

  $\sigma Y = N\sigma^*$

General Model

- Bank maximizes expected value of terminal wealth net of bankruptcy cost, i.e.
- Max $E\{a_{t+1}\} - cF$
  - Where $a_{t+1} = \text{Max}\{Y + M(1 + \rho) - \rho(1 + \tau)(N + M + e - a_t), 0\}$
  - A_t = Wealth at Time t,
  - Y = Income,
  - c = Cost of Bankruptcy
  - F = Probability of Bankruptcy
  - N = Amount Lent
  - M = Amount Borrowed by the Bank
  - e = Expenditures on Screening

Some Key Propositions

Comparative statics

- Proposition 1. A Decrease in Bank's Net Worth Leads to a Decrease in Bank Lending
- Proposition 2: a Mean Preserving Increase in Risk Reduces Lending Activity

Key propositions

Policy

- Proposition 3: An Increase in Reserve Requirements Leads to Reduced Lending
- Proposition 4: An Increase in the Rate of Interest on T-Bills Leads to Less Lending for Banks that Accept Deposits

Illustrate in Terms of First Model

- Equilibrium is intersection of MBC (marginal bankruptcy curve) and marginal return curve

- Decrease in bank wealth shifts up marginal bankruptcy curve

Illustrate in Terms of Mean Variance Model

- Basic Diagrammatics:
- RR - Mean variance frontier if all of wealth invested in loans, no bank borrowing
- Generalization of Stiglitz-Weiss diagram
- Contrast RR when two variables {e, r_1} chosen optimally and case where bank takes r_1 as given. Two variable locus is outer envelope of single variable locus
- S - Income if entire portfolio invested in T-bills

Illustrate in Terms of Mean Variance Model

- Total Portfolio - SPP'L
  - SP - Mixture of T-Bills and loans
  - PP' - All loan portfolio
  - P'L - Bank borrows, putting extra proceeds (beyond "tax") into risky assets (loans)
- Implication - When there is credit rationing, a risk averse bank chooses a lower interest rate than a risk neutral lender

Illustrate in Terms of Mean Variance Model

- Reduction in wealth shifts curves in
- Under plausible conditions, decreasing amount allocated to risky activity - i.e. to lending

V. Towards a General Equilibrium Theory of Credit

- While banks are pivotal in the supply of credit, credit is also supplied by firms
- Firms can be thought of as "producers" and "financial agents"
- Why not specialization?
  - Information which forms the basis of providing credit is dispersed in economy
  - Obtained as a joint product with other activities
  - May be better incentives for repayment

Towards a General Equilibrium Theory of Credit

- Implication - huge credit interlinkages, as important as commodity and factor interlinkages stressed in standard general equilibrium analysis
- Disturbance in one part of system is transmitted to others
- Impacts can be particularly large in the event of bankruptcy

Financial Architecture Matters

- Different kinds of linkages (risk sharing) have different implications for systemic stability
- Some architectures may be better for small shocks but less resilient for large shocks
- Some architectures may impose larger information requirements
- All architectures are characterized by externalities
- Subject of lecture Friday

Failure of old models of bank intermediation

- Simple models of financial market provide a description of a corn economy
- Some farmers have more seed than they want to plant or consume
- Others want to consume/plant more seed than they have
- Banks (financial system) intermediate
  - Good system of intermediation—low transactions costs
- Markets clear demand and supply of seed

But this model provides a poor description of our economy

- What enables individuals to spend more than the resources they have available (either for consumption or investment) is access to credit
- Credit is *different* from ordinary commodities

- [as an aside: financial system has been *disintermediating,* taking money from corporations and distributing it, not intermediating]

Credit creation

- Credit can be created out of “thin” air
  - Unlike seeds
- Still, one needs to explain supply of credit (e.g. through banking system)

A credit economy is based on trust

- Trust that the “money” that is borrowed will be repaid
- Trust that the money that is received will be honored by others.
- If a financial institution is trusted, it can create “money” (“credit”) on its own, issuing IOU’s that will be honored by others
  - Can thereby increase effective demand

Sudden changes in credit availability

- Can result from sudden changes in trust
- Sudden changes in banks' perceptions of risk
- Sudden changes in banks' balance sheets (actual and perceived)
  - As a result of changes in market prices
  - As a result of changes in pseudo-wealth
  - As a result of defaults (actual or anticipated)

- With aggregate demand depending on credit availability, changes in credit availability can have macroeconomic consequences
  - Adjustments in prices do not instantaneously offset
  - No presumption that the market supply of credit will ensure aggregate demand equaling aggregate supply
    - A key function of monetary policy is to provide the requisite coordination

Fundamental asymmetry

- Asymmetry: Loss of wealth or purchasing power (access to credit) may force those who want to spend more than their income to decrease spending in tandem
  - Those who gain in wealth (access to credit) do not have to increase spending in a corresponding way
- Problem familiar in international context
  - Worry about global imbalances
  - Adverse effect on global aggregate demand from surpluses

Inequality gives rise to corresponding imbalances

- Those at the bottom who see their incomes decline are forced to reduce spending
  - Unless one temporarily creates a housing bubble
- Those at the top continue to save
- Lowering interest rates will not likely resolve problem
    - Target savers (for purchasing home, financing college education, retirement) will increase saving
    - Retirees depending on T-bills will reduce consumption
    - How interest-sensitive is consumption of the very wealthy?
      - Even taking into account effects of lower interest rates on capital assets
      - Especially if interest rate reductions are expected to be temporary
      - Especially if policy regime introduces new macroeconomic uncertainties

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Old model of credit economy

- Strong system of accountability for banks issuing IOU's
  - Net worth at risk
    - If they issue loans that are not repaid, they suffer the consequences
  - Personal liability of bankers
- But old model often didn't work
  - Limited ability to punish
  - Sudden disappearance of confidence could lead to macroeconomic fluctuations
- Problems exacerbated by limited liability
  - And difficulty of holding those in corporations accountable
- Problems exacerbated by increasing complexity of financial system
  - No one can really monitor a big bank

Response

- Today, underlying “trust” in financial system is belief that government will come to the rescue
  - And that government is adequately regulating the financial system
  - But this exacerbates moral hazard problem
  - Worse for financial institutions that are too big, too interconnected, too correlated to fail
    - Distorted market
  - But belief is tempered by government’s ability to rescue
    - Giving advantage to banks from rich countries

Easy solution for some governments

- They can create money and credit
  - Power to tax and print money—to make good on their promises
  - They have delegated powers, allowing others to profit
  - Contributing greatly to ongoing inequality
- Standard approach
  - Enhance the ability of banks to provide credit
    - Through regulatory and monetary policies
    - Through open and hidden subsidies
  - Hope that they do so
    - And that the money goes to increase effective demand
    - Rather than purchasing preexisting assets (land)
  - And that they don’t take advantage of the unwary

Solution hasn't worked

- Banks often haven't lent
- And when they have lent, money hasn't gone to where it would lead to an increase in effective demand
  - Helps explain ineffectiveness of monetary policy
    - Outcome might have been different if we had done a better job at recapitalizing community banks and "fixing" mortgage market
  - Not the traditional Keynesian liquidity trap
  - Nothing to do with ZLB
  - Can get asset price inflation even when the economy is not doing well—giving rise to increases in wealth inequality
- Politically unsavory
  - Giving money to those who caused the economic crisis seems "unjust," argument that is was necessary to "save the economy unpersuasive

Alternative solutions

- Government uses its own credit capacity
- To engage in high return public investments
- To address other major social needs
  - E.g. related to growing inequality
    - A public option for mortgages and student loans
  - Climate change
- Criticism of direct lending by the government
  - Government is not good at lending
  - Response: neither is the private sector; government has done better job at least in these areas
- Alternatively, induce banks to focus on *productive* lending
  - Should have been one of major foci of regulatory reform
  - Should have recognized disparity between private and social returns

Money rain

- Would induce more spending
- Would not be inflationary, so long as amounts were appropriately calibrated
- But in many countries (e.g. US) the problem is not an insufficiency of consumption, but of investment, and broad based money rain would restore full employment by encouraging consumption
- Better to use “money” to finance public investment

VI. Key Differences Between New Paradigm and Old

- Focus on **lending rate**
- Equilibrium lending rate may not equate demand and supply of funds (may be **credit rationing)**
- Need to solve simultaneously for **endogenous deposit rate - interest rate spread** (in IS curve, investment depends on lending rate, savings depends on deposit rate)
- Supply of funds depends not just on monetary stance, but on:
  - Bank capital
  - Firm capital (affects probability of default on loans, indirectly bank's net worth)
  - Risk perceptions
- These effects can overwhelm effect of T-bill rate
  - And to increase lending, other policies may be more effective
    - Partial insurance
  - Bank capitalization may matter
    - Older theories had nothing to say about how best to do it

Key Differences

- Major difference with standard model - LM curve stable over business cycle, IS curve shifts
- Here, **LM curve shifts** as well
- Implication: movements in real interest rates over cycle indeterminate
- **Controlling T-bill rate (or even longer term government interest rates or the money supply) does not suffice to control the economy**
  - Monetarism focused on controlling the money supply
  - Many recent theories focused on controlling the interest rate
  - Both are incomplete

Impacts of Interest Rate Changes

- Supply side effects as well as demand
  - **Demand and supply intertwined**
    - Supply of funds
    - Supply of goods
  - Particularly evident in East Asia
  - **Effects can be long lived** (bankruptcy and wealth effects) (hysteresis)
    - Model suggests raising interest rates may have larger and more prolonged effects under certain circumstances than previously thought - destroys firm and bank capital

- Because asset value effects differ across firms, any **change in the interest rate** may contribute to uncertainty (which has own adverse effect).

Key Differences

- Model explains why changes in nominal interest rates matter, even when real interest rates do not change, if loan contracts are not fully indexed
- Model suggests why changing the institutional structure of the banking system - e.g. increasing competition - may alter efficacy of monetary policy
  - Eliminates seignorage effects, with associated wealth effects
  - Forces greater reliance on substitution effects
- Because of credit rationing, investment may be affected even when interest rates are not

VII. Monetary policy

(a) Explaining ineffectiveness of monetary policy

Not zero lower bound

- No reason to believe that lowering interest rates from -2% to -4% would have made much difference
  - Though money rain would have
- If it were problem, other ways of changing intertemporal prices (tax policy)

Ineffectiveness of monetary policy

- “looser” monetary policy does not necessarily result in more lending and/or lower lending rate
- More lending does not necessarily result in more spending on domestically produced goods
  - Purchase of existing assets
  - Margin on futures markets, other speculative activity
  - Lending abroad

Explaining ineffectiveness of monetary policy

- Adverse distribution effects
  - Elderly dependent on interest income reduce consumption
- Increased uncertainty
  - Associated with any change in interest rates
- Lower interest rates may lower consumption
  - Target savers reduce consumption

Explaining ineffectiveness of monetary policy

- Lower interest rates may not lead to much increased investment
  - Interest rate effect overwhelmed by increased uncertainty, other factors affecting demand and supply of credit
- Negative interest rates may adversely affect banks
  - With resulting reduction in lending
- Wealth effect of increased stock market benefitting mostly wealthy, who have low mpc

Monetary policy distortionary

- Low interest rates translate into mispricing of risk
  - Behavioral finance—search for yield
  - Evidence *against* market rationality
- Intersectoral distortions—strong effects on interest sensitive sectors
- Distortions in choice of capital intensity
  - Contributing to jobless recovery

Distributional effects

- *If* it succeeded in restoring full employment, large benefits (including for wages and government benefits)
- If interest rates are increased every time there is a hint of inflation (e.g. with strong inflation targeting) then average output gap will be large, and real wages will be lower
- Low interest rates hurt elderly who saved in government bonds

Distributional Effects

- QE helped increase stock market and other asset prices
  - Equity owned disproportionately by rich
  - Thus increasing wealth inequality

What monetary authorities *should* have done

- Focused more on fixing the credit channel
- Limiting market power
  - Much of lower interest rates captured by banks
  - Market power in credit and debit cards represent taxes on all transactions, enriching banks, hurting ordinary individuals
- Forcing banks to focus on lending
- By restricting other activities, profit centers
- By restricting access to window to banks

What monetary authorities *should* have done

- Directing the allocation of credit
  - Away from the purchase of pre-existing assets and providing margin for speculative activities
  - Away from foreign lending
  - Towards helping SME's—where incremental effects are large

Further Implications For Monetary Policy

- What affects the level of economic activity is terms at which credit is made available, and *quantity* of credit, not the quantity of money itself nor the interest rate on T-bills
- Relationship between the terms at which credit is available (e.g. the loan rate) and the T-bill (or deposit) rate may change markedly over time
- Similarly, the supply of credit may not change in tandem with the money supply; and changes in the relationship between money and credit may be particularly marked in periods of crisis

Implications For Monetary Policy

- The terms and quantity at which credit is made available are determined by banks; their ability and willingness to lend are affected by the T-bill interest rate, but in ways which depend on economic conditions; changes in interest rates affect the net worth of the firm, and the opportunity set of the bank
- What matters is not just the supply of credit (and the terms at which it is available) but the uses to which it is put
  - Buying fixed assets
  - Putting up margin for speculative activities

Implications For Monetary Policy

- Monetary authorities can affect bank behavior not only through changes in the T-bill rate, but also by altering constraints (e.g. reserve requirements, capital adequacy standards) and incentives
- Impacts on bank behavior are likely to be greater when constraints (e.g. reserve requirements) are binding than when they are not (there is "excess liquidity")
- In some extreme circumstances, there may even be a liquidity trap, in which easing of monetary policy has no significant effect on lending

Implications For Monetary Policy

- Monetary policy affects economic activity not only through its effect on demand (e.g. for investment) but also on supply (e.g. when there is credit rationing, it is impacts on the supply of credit that matter)
- Impacts on aggregate supply and on aggregate demand are often intertwined
- While the immediate impact of monetary policy is on the banking system, its full effects are distributed through the economy as a result of the network of credit interlinkages

Explaining ineffectiveness of QE

- Not ZLB (zero lower bound)
- If that were the problem, government could have used tax policy to change intertemporal prices
- Banks became very risk averse with loss of net worth; new regulations increased effective cost of capital; increased perception of risk, especially of SME lending: all leading to constrained lending even with low (negative) interest rates
  - Credit channel was broken
  - Mortgage channel especially so
  - Fed did little to fix this

Money didn’t always go to stimulate economy

- Did lead to competitive devaluation
- Much of money went abroad
- Spending money on fixed assets—creating asset price bubbles
  - Very little trickle down effect
  - Significant effect on inequality
- Lower interest rates had limited role on mortgage rates
  - Crisis had reduced competition

Main worry: financial instability

- When interest rates get low, risk premia get small
  - "reach for yield"
  - Hard to reconcile with rational model
  - Behavioral finance
- Sudden change in beliefs could lead to large asset price changes, financial and economic crisis

Negative interest rates

- Zero lower bound has been breached
- Intended to incentivize banks to lend
- But has adverse effects on their balance sheet (if they have to pay for keeping money in reserves)
  - Japan tried to run policy to avoid this
  - Could lead to less lending (substitution vs wealth effects)

Other Implications For Monetary Policy

- **Increases in the competitiveness of the banking system**, eliminating or significantly reducing seignorage, is also likely to reduce the effectiveness of monetary policy

Implications For Monetary Policy

- Aggregate money or credit numbers (or free reserve numbers) may be highly misleading; credit entails highly specific information about specific borrowers inside specific lending institutions. Funds may not flow freely from banks with excess free reserves to banks with capital shortages
  - An increase in the interest rate reduces the value of the bank's assets, both directly, and indirectly, through increased probability of default of the loans, with potentially severe consequences, especially if there is a mismatch between maturity of assets and liabilities

Implications For Monetary Policy

- Adverse effects of interest rate increase on lending increased by uncertainty--effects on any particular firm, bank may be uncertain
  - Leads to reduced supply of lending
  - Effects are likely to be *persistent*, i.e. last long after interest rates are lowered