The Loanable Funds Model

Interest rate determination

You want to get this right so you can stay here ...

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What we will do with this lecture ...

1. Discuss certain types of borrowing and financial assets (means of borrowing)
2. Describe key interest rates
3. Introduce fundamentals of the loanable funds model
4. Draw primary lessons from the use of the loanable funds model
5. Use the loanable funds model for topical applications
The major players in markets for borrowing and lending (for credit and debt)

**Borrowing (DF)**
- **Households**: Credit cards, installment debt, mortgages, student loans
- **Businesses**: Bank credit, mortgages, corporate notes and bonds
- **Federal Government**: U.S. Treasury and Agency bills, notes and bonds
- **State and Local Govt.**: Municipal bills, notes and bonds

**Lending (SF)**
- **Households**: Savings, direct investments, retirement investments
- **Businesses**: Business savings, direct investment
- **Federal Reserve System**: Direct unfunded credit creation

**Finance Markets & Banks**

**Overseas borrowing from & lending to**
Domestic Non-financial Debt / National Income

1962-2012

This is the total net indebtedness of all parties in the U.S. economy (non-financial eliminates double counting) divided by National Income. This is a national proxy for our debt divided by our capacity to pay it.

This is at the root of why we are in trouble.

Source (debt): Federal Reserve Flow of Funds Accounts, Z1 statistical release
Net Debt Outstanding by Sector

$ Trillions

Home Mortgage Debt: 9.4
Consumer Credit: 3.0
Corporate Debt: 5.9
Noncorporate Business: 4.9
State and Local Government: 15.7
Federal Government: 14.8

2013 Q3
Total equaled $55,004 b, of which this is all but $1,267.1 b.

Source: Federal Reserve Flow of Funds Z1 series
Financing the U.S. Government budget deficit

The budget deficit is financed by the sale of interest-bearing U.S. Treasury securities to the public, including corporations, financial institutions, and foreign investors, including foreign central banks of countries with which we have been running a trade deficit, like the Bank of China, OPEC funds, etc., and to the Federal Reserve System (indirectly) The securities differ largely by the maturities. These are the classes of securities sold:

<table>
<thead>
<tr>
<th>Security</th>
<th>U.S Treasury Securities Offered to the Public</th>
<th>Maturity</th>
<th>Now Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bills:</td>
<td></td>
<td>Less than one year</td>
<td>4,13,26 and 52 weeks</td>
</tr>
<tr>
<td>Notes:</td>
<td></td>
<td>More than one to ten years</td>
<td>2,3,5,7,9 and 10*</td>
</tr>
<tr>
<td>Bonds:</td>
<td></td>
<td>20 to 30 years</td>
<td>30 years*</td>
</tr>
<tr>
<td>Inflation Indexed:</td>
<td></td>
<td>5, 10, and 20 years</td>
<td>All*</td>
</tr>
</tbody>
</table>

*These are sometimes approximate. E.g. a 30 year bond might have a maturity of 29 years and 11 months.

These are sold at competitive interest rates and they vary from maturity to maturity and the vary over time as market interest rates change. Current UST rates will be shown in a later slide.

Note: When a debt security matures, it is "rolled over" by issuing a new one.
Total U.S. Treasury External Marketable Debt

This is the true level of the indebtedness of the U.S. Government. It is debt owed to outside parties.

The amount shown is more than double what it was in 2006.

By this time next year, the amount will be about $12.2 trillion.

<table>
<thead>
<tr>
<th>Type</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bills</td>
<td>1,527.9</td>
</tr>
<tr>
<td>Notes</td>
<td>7,750.3</td>
</tr>
<tr>
<td>Bonds</td>
<td>1,363.1</td>
</tr>
<tr>
<td>TIPS</td>
<td>936.0</td>
</tr>
<tr>
<td><strong>Total Marketable Debt:</strong></td>
<td><strong>11,577.4</strong></td>
</tr>
</tbody>
</table>

TIPS are Treasury Inflation Protected Securities.

Source: Treasury Bulletin, December 2013, Table FD-2
Example: CDOs that pass through interest payments

- Your credit card balance
- Others
  - 100,000 others
- Others

Visa Credit Card CDO issued by a bank.

A1 tranche
A2 tranche
Multiple Cash Pass-thru Certificates (Tranches)
A20 tranche

Servicing fees: Huge

These CDOs can be repackaged and resold. A freeze-up of this market (especially in mortgages) was a significant part of the problem in 2008 - 2012.
Observations about interest rates (yields)

- There are as many interest rates as there are yield-bearing financial assets in circulation, because each has its own yield ... there is a full continuum of interest rates.
- There are two types of assets that offer interest: (1) yields on deposits in financial institutions, which are "sticky" and slow to change, and (2) the yields on marketable securities like U.S. Treasury notes or corporate bonds, which can change in value minute by minute because these securities are traded in a huge secondary market. Both classes of interest are competitive.
- *Most* of the loans that you obtain for student loans, credit cards, auto finance, mortgages, etc. were originally funded by combining the loans into huge pools of loans called *Collateralized Debt Obligations* which in turn are sold as (1) yield-bearing financial assets with either market-determined competitive yields and fixed maturities or (2) *pass-thru* securities where the investors earn the interest that you pay. [Example shown in previous slide].
... observations (continued)

- Intermediary financial institutions like banks and commercial mortgage and credit card lenders make their profits from the spread between their cost of funds (their deposit interest rates or the yields on the financial assets they issue) and what they charge for their loans.
- Although there are often exceptions, interest rates in general rise in fall together as market conditions change. Therefore, for the purposes of an introductory macroeconomics class, we can refer to the full spectrum of interest rates as "the interest rate" without too much loss. Theories about the full spectrum of interest rates are taught in introductory finance classes (like Econ 104).
- Generally, financial assets with higher risk have higher yields.
- Generally, financial assets with longer maturities have higher risk, hence higher yields when compared to short-term maturities.
### Select key interest rates
(see handout)

<table>
<thead>
<tr>
<th>Deposit rates</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Savings</td>
<td>No maturity, low, insured</td>
</tr>
<tr>
<td>CD</td>
<td>Short maturity, insured</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lending rates</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime</td>
<td>Variable bank corporate base rate</td>
</tr>
<tr>
<td>Mortgage</td>
<td>Variable and fixed multiple maturities</td>
</tr>
<tr>
<td>Installment</td>
<td>High</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Financial asset rates</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Treasury</td>
<td>Multiple maturities</td>
</tr>
<tr>
<td>10-year note</td>
<td>UST bellweather rate</td>
</tr>
<tr>
<td>Corporate notes/bonds</td>
<td>Multiple maturities, different levels risk</td>
</tr>
<tr>
<td>Municipal notes/bonds</td>
<td>Multiple maturities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Policy rates</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Funds rate</td>
<td>Short-term FRS target interbank lending rate</td>
</tr>
<tr>
<td>Discount rate</td>
<td>Direct bank loan rate from FRS</td>
</tr>
</tbody>
</table>
Why interest rates matter (so much)

- They are the cost of credit/debt, and this is a credit-based economy if there ever was one.
  - Credit cards, consumer durables, mortgages
  - Debt service can become a problem in a country like this.
- Real estate lives and dies by interest rate levels
- They are an international barometer of national strength and price stability.
- They strongly affect the financial markets
  - When higher, generally harmful
  - Hence the wealth effect
- International capital flows strongly influenced by relative interest rates.
Key Interest Rates, comparing 2007 to 2013

15 year FRM
30 year FRM
Prime Rate
High Yield Junks
Corp 5 YR AAA
30 year Treasury
10 year Treasury
2 year Treasury
13 week Treasury
Federal Funds target

Source: Federal Reserve Data Download program
The yield curve, sometimes called the "term structure of interest rates" normally slopes upward as maturities lengthen. This reflects the greater market and economic risk of long-term YBFAs. Typical spreads might be 250 to 400 basis points.
The Role Played by the Federal Reserve System (FRS)

- The FRS is our nation's central banking authority (central bank), with a counterpart in every country of the world.
- The FRS is a regulatory agency whose job is to keep our banking system healthy, promote price stability (prevent inflation) and regulate interest rates to the degree possible.
- (For the purposes of this lecture) The FRS has the unrestricted ability to increase the supply of credit to this economy at any time.
  - how this is done is complicated and is covered later in the course in the lectures on open market operation in the section about monetary policy.
  - in the context of this model, we will assume that they can do this.
  - in the model, this will be shown by shifting out the supply-of-funds line
Question ...???
What determines the level of Interest Rates

- Federal Reserve Policy
- Budget Deficits
- Inflationary Expectations
- Exchange Rates
- et. al.

Complicated answer:
The conflation of all forces that act upon them.
The demand for funds represents the desire of borrowers to borrow. They include obvious examples like consumer demand for auto loans, mortgages, and credit cards, but also U.S. Treasury borrowing through the sales of U.S. Treasury Securities, state and local government borrowing through the sale of municipal securities, corporate borrowing through the sale of corporate bills notes and bonds, and any and all borrowing from banks.

The supply of funds represents the desire of lenders to lend, including banks, credit card companies, and includes purchases of U.S. Treasury Securities, municipal securities, corporate bills, notes and bonds, and any other debt assets.
Demand and Supply of Funds in the Context of CDOs.

**Demand for Funds**

- Intermediaries (who sell yield-bearing securities)

**Supply of Funds**

- Borrowers through credit cards, installment loans, auto loans, leases, mortgage loans etc.

- Lenders through purchases of yield-bearing securities.
Variables that effect the supply of and demand for funds

➢ The demand for funds
   1. Interest rates (-)
   2. Inflationary expectations (+)
   3. Budget deficits (+)
   4. Corporate borrowing (+)
   5. Commercial real estate (+)
   6. Foreign demand for U.S. funds (+)

➢ The supply of funds
   1. Interest rates (+)
   2. Inflationary expectations (-)
   3. Institutional savings (+)
   4. Discretionary savings (+)
   5. Corporate savings (+)
   6. FRS Open Market Ops (+/-)
   7. Foreign purchases of U.S. financial assets
The Loanable Funds Model

Interest rate

$e_1$

$V_1$

$DF$

$SF$

$V_1$

Volume of Credit
Any general increase in the demand for credit will increase interest rates:

The effect of growing consumer credit demand

\[ \text{SF}_1 \]

\[ \text{DF}_1 \]

\[ \text{DF}_2 \]

\[ r_1 \]

\[ r_2 \]

\[ V_1 \]

\[ V_2 \]
Any increase in savings or other sources of credit will lower interest rates.

An increase in the savings rate (decrease would move it the other way).
Loanable Funds – Case 1

The effect of larger budget deficits

The diagram shows the supply and demand for loanable funds. The supply curve (SF) intersects with the demand curve (DF) at point e, indicating the equilibrium rate of interest (r) and the corresponding quantity of loanable funds (V). When budget deficits increase, the supply curve shifts to the right, from SF1 to SF2, leading to a new equilibrium at e2 with a higher rate of interest (r2) and a greater quantity of loanable funds (V2).
Loanable Funds – Case 2

The effect of FRS Open Market Operations

\[ SF_1 \]

\[ SF_2 \]

\[ DF_1 \]

\[ r_1 \]

\[ r_2 \]
Loanable Funds – Case 3

The two combined ...

SF\(_1\)  
SF\(_2\)  
DF\(_1\)  
DF\(_2\)

because of OMO  
because of deficits
Loanable funds – Case 3 (cont.)

... with FRS interest rate target ranges

FRS allowable trading range
Loanable Funds – Case 4

The effect of inflationary expectations

The “inflation premium” on interest rates
CPI and Mortgage and 10-year Treasury Bond Rates: 1972-2012

What story is found here?
As goes inflation, so will go mortgage rates and other key rates.

Source for interest rates: Federal Reserve Board data download program, H-15 series
The Effect of **Uncertainty** as shown by the MicroFunds Model: Reaction of Private (Corporate) Bond and Note Yields to Higher Perceived Risk

The supply of funds (lending) to the micro-market contracts, reducing loan volume and raising interest rates on that class of lending.
Context 2014

... the Obama/Boehner/Yellen political environment
(1) Stimulate the economy with an $3$ trillion spending package (as shown with the AS/AD model)

A classical economic stimulus designed to shift out aggregate demand.

Note: We will look at the plan in more detail in the fiscal policy section of the course.
But!!: This has required the U.S. Treasury to borrow a huge amount of money...

This equaled $6.1 trillion from FY 2009 to FY 2013!

To do this, they had to sell U.S. Treasury securities at an unprecedented scale.

... shifting outward the demand for funds, which, without remedy, might increase the level of interest rates, killing the effects of the spending stimulus...

... and who buys?
(2) Which has required the FRS to hugely increase the supply of funds to this market (TARP, QE2, and QE3)

... by directly or indirectly buying these newly issued Treasury securities through Open Market Operations in the effort to keep interest rates down.

This works, but can we roll it back? Will it be inflationary at some point?
The sheer scale of the problem ...

- Between 2006 and 2013, U.S. Government external debt increased by 2.4X or more (from $4.8T to $11.6 T).
- We ran a budget surplus in 1999. In 2009 we ran a budget deficit of $1.4 trillion (this year it will be about $600b).
- The FRS ownership of U.S. securities has increased more than $1 trillion over the last 2 years.
- Critical question: Will external investors and in particular overseas central banks and sovereign investment funds (like China, Canada, Japan, and OPEC) be able or willing to buy some of this debt?
- The barometer?: **Interest rates on UST Securities**
- TBC
2014: Impact of Sequester and FRS tapering?

1. Federal spending and the budget deficit will fall considerably this year, due to sequesters, tight budget bills, an end to expensive unemployment programs, and higher tax receipts from an economy that is doing better. On net, this would have a slight negative impact upon demand.

2. The Federal Reserve System has announced a “tapering” of QE3, which reduce their monthly purchases of U.S. Treasury securities and mortgages from $85 billion to $75 billion, which could raise interest rates some and also has a slight negative impact upon demand.