固定收益证券

路 磊

北京大学光华管理学院

课程信息

- 本科生选修课
- 周五上午：9-12点

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课程概述和目标

- 课程概述：本课程包括固定收益证券的工具，定价和风险管理。

- 课程目标：通过本课程的学习，学生对固定收益证券市场的基本理论，定价，以及风险管理有一定的了解，能够把理论和实践结合起来。

课程教材

- **Fixed Income Securities, 2nd *Edition***
  by Bruce Tuckman (John Wiley & Sons, Inc)

- **固定收益分析**， Frank Fabozzi（著）,张敦力，赵纯祥(译），东北财经大学出版社，2011年。

- **债券市场，分析和策略**，Frank Fabozzi（著）, 路蒙佳（译），中国人民大学出版社，2010年。

网址

www.chinabond.com.cn

www.bondmarket.com

www.federalreserve.com

www.standardpoors.com

www.bis.org

www.bloomberg.com

课程材料

- 讲义：课前在course.pku.edu.cn上下载讲义，含有大量的案例分析。
- 参考资料：大量的资料可以从以上网址下载。

- 案例分析：利用课堂所学知识，进行案例分析。
- 作业：有一定数量的作业，难度适中。
- 课程论文：可以是一个实证分析，也可以是一篇关于中国债券市场的论述性报告。

- 教学方式：教师教授为主，希望同学们积极发言。

课程评估

- 课堂参与和作业完成情况：30%
- 案例分析（小组形式）：20%
- 课程论文：50%

课程安排

Tuckman	Topic
Chapter 1 Chapter 15 Notes	Introduction to Fixed Income Markets
Chapter 3 Chapters 5-6 Notes	Bond Analytics The Salomon Brothers Bond Squeeze
Chapter 2 Chapter 9-14 Notes	Term Structure of Interest Rates Interest Rate Models
Notes	Measuring Risk and Reward of bonds with imbedded options
Notes	Portfolio Management Strategies
Chapters 15-20 Notes	Fixed Income Derivatives
Chapter 21 Notes	Mortgage Backed Securities
Chapter 21 Notes	CMOs and Asset Backed Securities
Notes	Convertible Bonds Credit Derivatives
Chapters 7-8 Notes	Risk Management/Hedging

Introduction to Fixed Income Markets

Fixed Income Markets

- US Government Securities
  - Treasury Securities
  - Agency Securities
- Municipal Bonds
- Corporate Debt
- Money Markets
- Mortgage-Backed Securities (MBS)
- Asset-Backed Securities (ABS)
- Fixed Income Derivatives

Bonds

- A bond is a contract between the issuer and the purchaser where:
  - The purchaser lends money to the issuer
  - The issuer promises to pay it back with interest
  - In the US, the issuer usually pays interest payments twice per year and pays interest and principal when the bond matures.

Bond Terminology

- Par Value
  - Face value of each bond
- Maturity
  - Date all debt is paid off (e.g., Maturity is 8/15/2019)
  - Also used for time until that date (e.g., maturity is ten years)
- Coupon Rate
  - In the US, Interest Rate is usually paid every six months
    - If coupon rate is 10%, then the owner gets two payments per year of 5% of the par value

Bond Terminology

- Price
  - Expressed as a percent of par value. Price of 100% referred to as "par."
  - Price does not include Accrued Interest
- Yield
  - Nominal rate used to discount all cash flows of the bond.
  - The one period rate is (yield/2)

US Treasury Securities

- Market Size
  - $13,361,739,911,386.51 (as of 8/23/2010)
  - $ 8,833,342,442,821.93 in Marketable Securities
- Treasury Bills (Maturity less than one year)
- One payment at maturity – Sold at a discount
  - Priced using a discount rate
- Treasury Notes (Maturity of 2,3,5,10 years)
  - Interest paid semiannually, principal repaid at maturity
- Treasury Bonds (Maturity 30 years)
  - Interest paid semiannually, principal repaid at maturity
- Treasury Inflation-Protected Securities (TIPS)
  - Interest paid semiannually, principal repaid at maturity
  - Principal amount grows according to an inflation index
- Treasury Strips
  - One single payment in the future. Priced at a discount to face value.

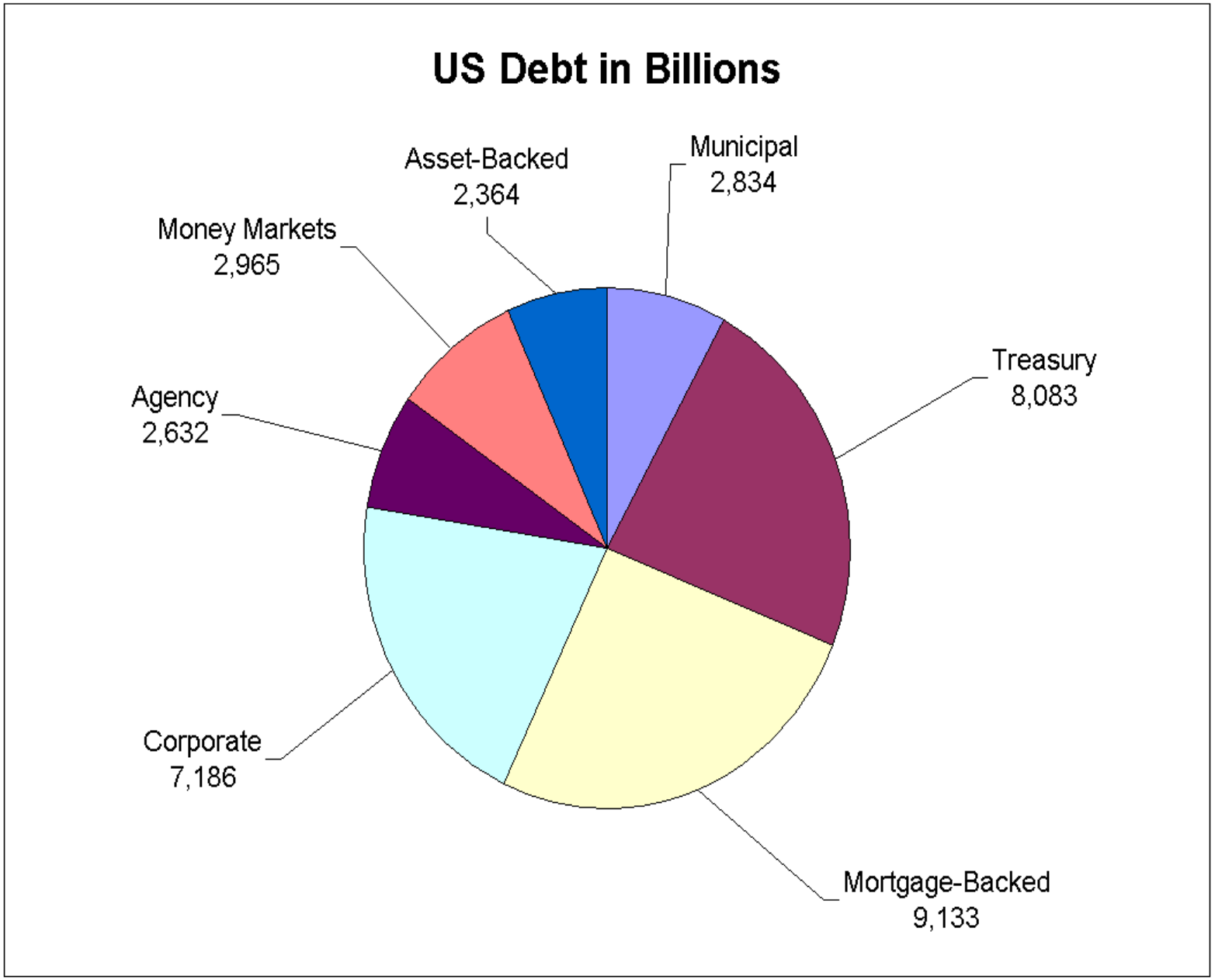
US Public Debt As of 8/23/2010

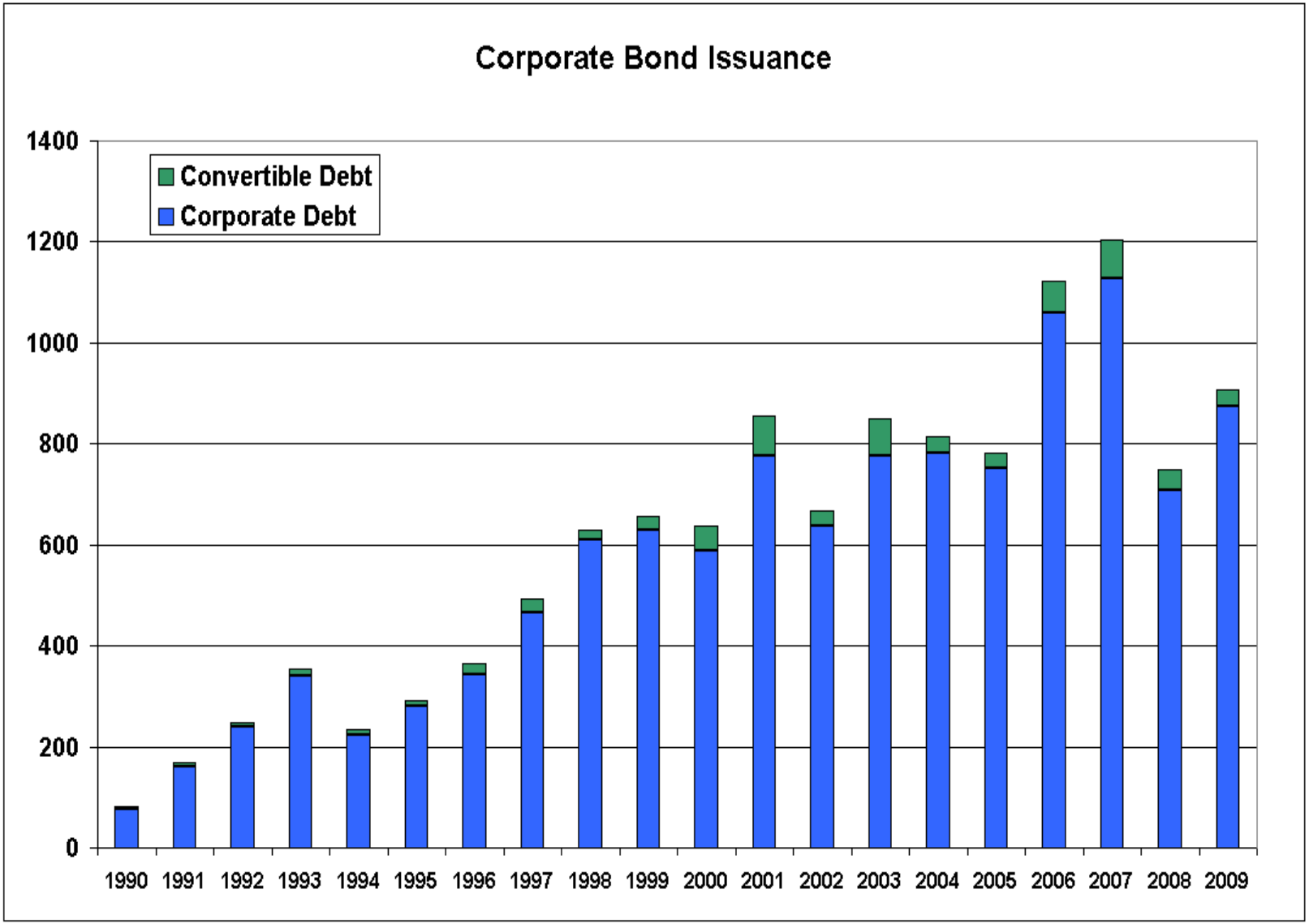
- Total: $13,361,739,911,386.51
  - $12,327,380,804,696.82 (as of 1/22/2010)
  - $11,896,808,244,570.28 (as of 10/22/2009
  - $11,605,521,079,875.38 (as of 7/23/2009)
  - $10,617,861,263,183.30 (as of 12/30/2008)
  - $9,618,734,657,724.09 (as of 8/26/2008)
  - $8,984,216,518,515.89 (8/30/2007)
  - $8,919,046,678,032.00 as of 7/1/2007
  - $7,777,880,152,594.89 as of 6/1/2005
  - $6,792,556,749,803.50 as of 9/2/2003
  - $6,380,582,269,971.85 as of 1/13/2003
  - $5,574,178,209,886.86 as of 9/30/2000
- Marketable: $8,833,342,442,821.93
- Non-marketable: $ 4,528,397,468,564.58
- In December 2009, the breakdown was:
  - T-Bills: $1,788 B
  - T-Notes: $4,179 B
  - T-Bonds: $715 B
  - Inflation: $568 B

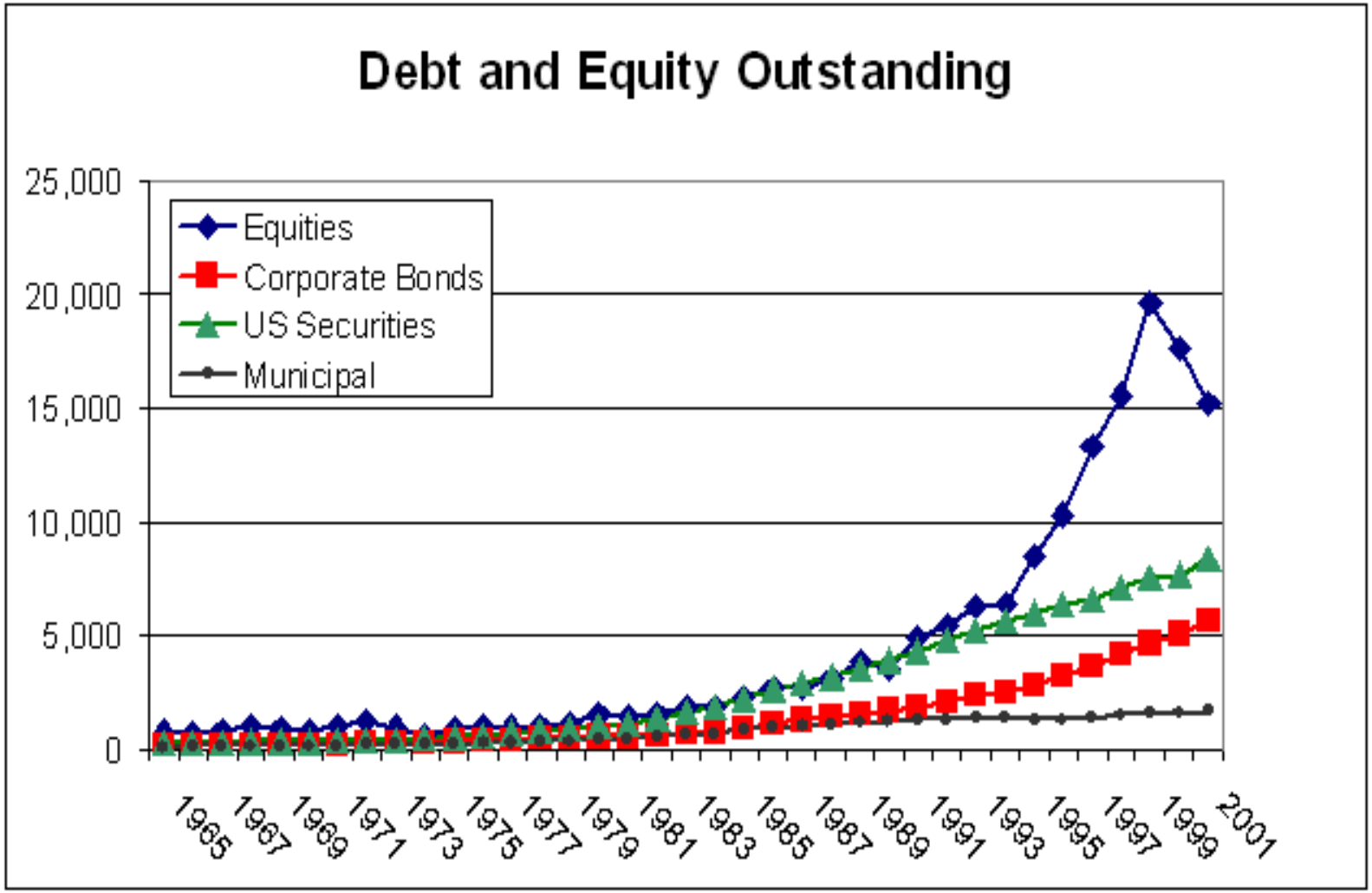
Outstanding US Debt in Billions

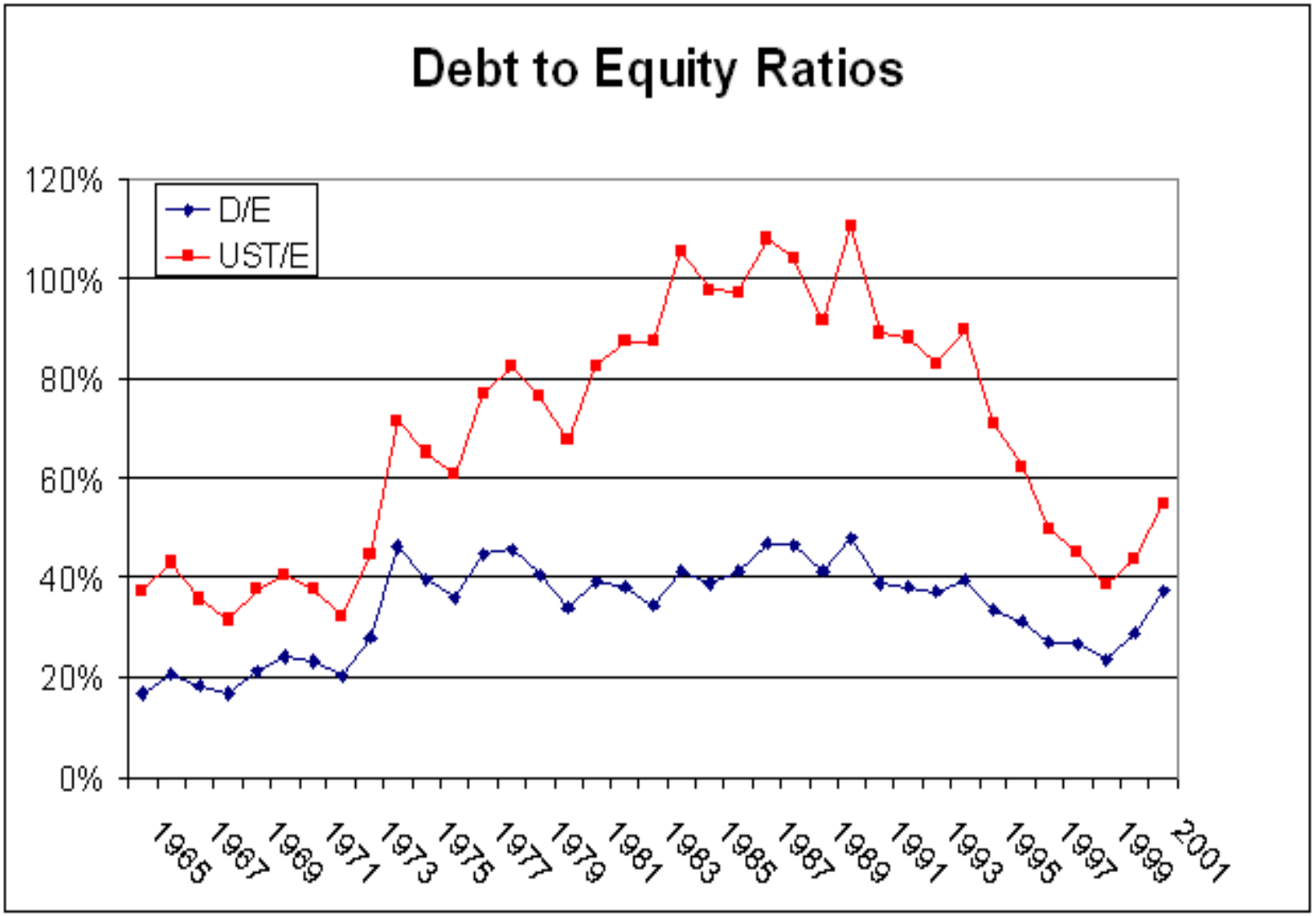
	2010-Q1	2008-Q3	Δ Outstanding
Municipal	2,834	2,639	195
Treasury	8,083	5,716	2,368
Mortgage-Backed	9,133	9,121	12
Corporate	7,186	6,135	1,051
Agency	2,632	3,176	(543)
Money Markets	2,965	3,942	(977)
Asset-Backed	2,364	2,794	(431)
Total	32,036	33,524	(1,488)

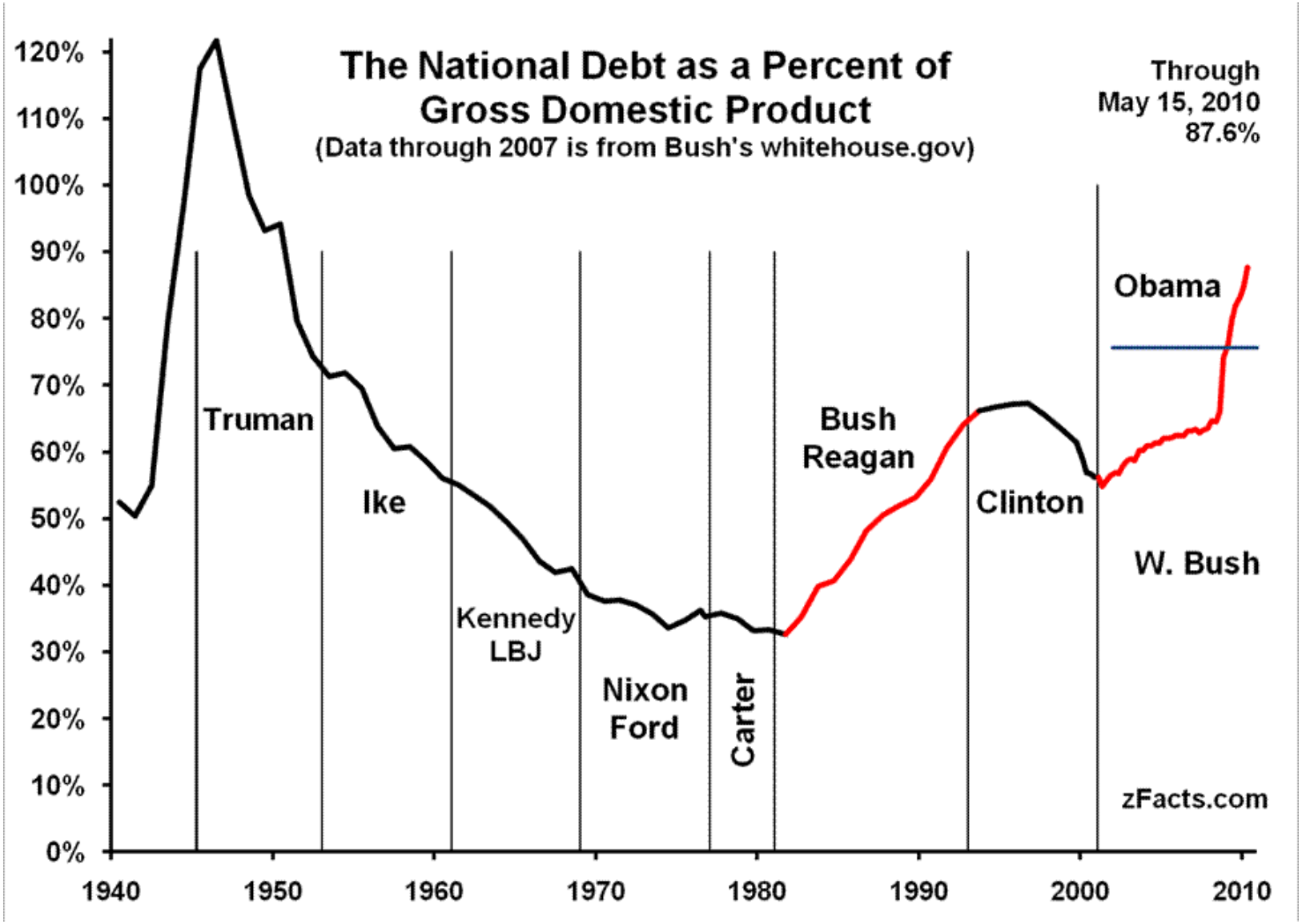
Source: SIFMA


US Debt in Billions
Asset-Backed
2,364
Municipal
2,834
Money Markets
2,965
Treasury
8,083
Agency
2,632
Corporate
7,186
Mortgage-Backed
9,133


Corporate Bond Issuance
Convertible Debt
Corporate Debt
1400
1200
1000
800
600
400
200
0
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009


Debt and Equity Outstanding
25,000
20,000
15,000
10,000
5,000
0
Equities
Corporate Bonds
US Securities
Municipal
1965
1967
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001


Debt to Equity Ratios
D/E
UST/E
120%
100%
80%
60%
40%
20%
0%
1965
1967
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001


The National Debt as a Percent of Gross Domestic Product
(Data through 2007 is from Bush's whitehouse.gov)
Through May 15, 2010 87.6%
120%
110%
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1940
1950
1960
1970
1980
1990
2000
2010
Truman
Ike
Kennedy LBJ
Nixon Ford
Carter
Bush Reagan
Clinton
Obama
W. Bush
zFacts.com

Terminology (US Treasury Securities)

- Bills:
  - Short term.
  - One payment at maturity
- Notes & Bonds:
  - Intermediate-term (Notes), Long-term (Bonds)
  - Interest paid regularly
  - Principal paid at maturity
- On-The-Run (OTR) vs Off-The-Run:
  - OTR – most recently issued
  - An Off-the-run ten year bond could be a 30-year bond that was issued about 20 years ago.
  - An On-the-run ten year bond was just issued recently

Bond Yield

- Yield:
  - Internal Rate of Return (IRR) that equates present value of cash flows with price plus accrued interest.
  - Yield is expressed as a semiannual rate – meaning it is expressed as a yearly rate with two compounding periods per year. If Yield = 8%, then effective annual rate is calculated:

$$r = \left(1 + \frac{.08}{2}\right)^2 - 1 = 1.04^2 - 1 = 8.16\%$$

US Government Securities

- Bills:
  - Short-term Debt. 4-week, 13 week bill, 26 week bill and (possibly discontinued) 52-week bill.
  - Sold at auction at a discount to face value.
  - Pays face value at maturity.
  - Price quoted as a discount rate

US Government Securities

- Treasury Notes
  - 2-year, 5-year, 10-year Debt Obligations
  - Sold at Auction
  - Semiannual Interest Payments
  - Principal plus one period of Interest paid at Maturity
  - Price quoted as % of Par or as Yield

US Government Securities

- Treasury Bonds
  - 30-year Debt Obligations
    - Discontinued in the late 1990s, but brought back a couple years ago
  - Sold at Auction
  - Semiannual Interest Payments
  - Principal plus Interest paid at Maturity
  - Price quoted as % of Par or as Yield

US Government Securities

- Inflation Indexed Notes & Bonds
  - Coupon Rate set at Auction
  - Principal is adjusted for inflation, and is paid at maturity
  - Semiannual payments based on outstanding inflation adjusted principal.
  - Index is the *non-seasonally adjusted U.S. City Average All Items All Urban CPI* (CPI-U)
  - We won't be valuing inflation indexed bonds in this class

US Government Securities

- Features
  - No Credit Risk
  - Liquid Market
  - Prices – quoted in 32nds or 64ths
    - 103:12 ➔ 103 12/32% of par
    - 103:12+ ➔ 103 25/64% of par
  - Accrued Interest (*AI*)
    - d = days from last coupon to settlement
    - D = total days in coupon period
    - C = coupon rate
  - Present Value is Par Amount times (Price plus *AI*)

$$AI = \left(\frac{d}{D}\right)\left(\frac{C}{2}\right)Par$$

Accrued Interest

- In most finance classes, bonds are always priced using whole periods.
- In this class, the real world (and the WSJ), there is usually less than one whole period until the next coupon.
- The IRS uses the capital gains rate for any changes in capital (price) – but charges the ordinary rate on interest.
- Therefore, they want value broken up into the principal portion and interest portion – so that they can calculate taxes.

Accrued Interest

- Day Counting:
  - For Government bonds, the number of days since the last coupon was paid and the total number of days in the period are the actual number of days
  - For most other bonds, the calculations use 360 days per year (180 days per half year) and 30 days for each month.
  - This means that for Government bonds, the accrued interest for the following periods different, but for corporate bonds, they are all the same
    - From 2/15-3/15
    - From 3/15-4/15
    - From 4/15-5/15

Treasury Auctions

- Treasury Bills
  - **4-week, 13-week** and **26-week bills:** Offered each week.
  - **52-week bills:** Were offered every four weeks – may have been discontinued.
  - **2-year, 5-year notes:** Issued monthly.
  - **10-Year Notes** – Issued February, May, August and November
  - **30-year bond:** Issued February and August
  - **Inflation-indexed security** (note or bond): January, April, July, and October – depending on maturity.

Auction Process

- Auction is announced.
- “Sealed” Bids are accepted by Phone, Internet or on Paper.
  - Noncompetitive Bids
    - Up to $1MM (Bills) $5MM (Other)
    - Security Purchase Guaranteed
  - Competitive Bids
    - Bills – Bid Discount rate and Amount
    - Notes & Bonds – Bid Yield and Amount
    - Bidding is limited to 35% of the issue per bidder

Auction Process

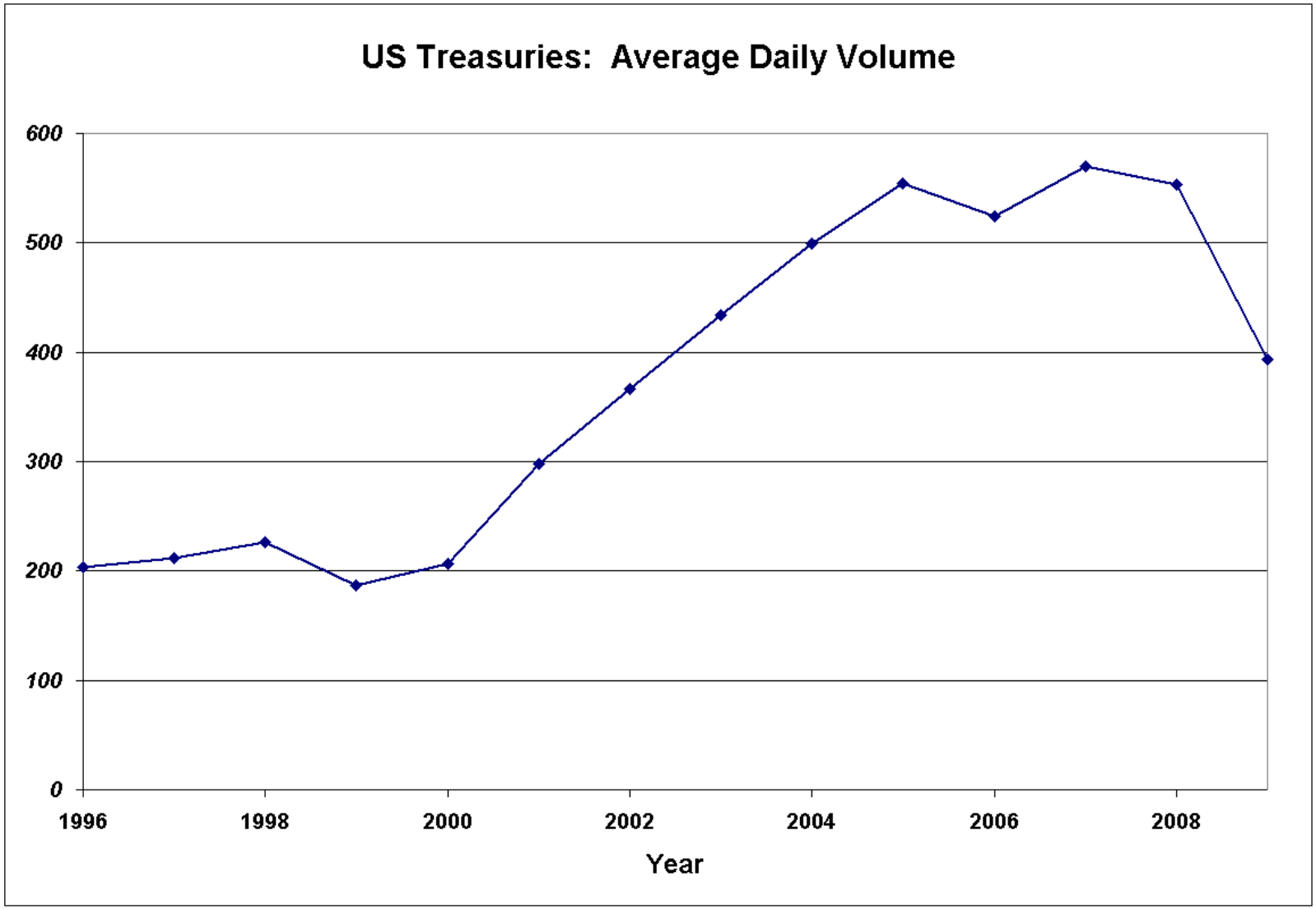
- Coupon Rate is set at the highest accepted bid.
  - All noncompetitive bids are filled at this interest rate.
  - All bids with lower yields are filled at this rate.
  - All bids **at** this rate share what remains.
  - All bids at a higher yield are rejected.

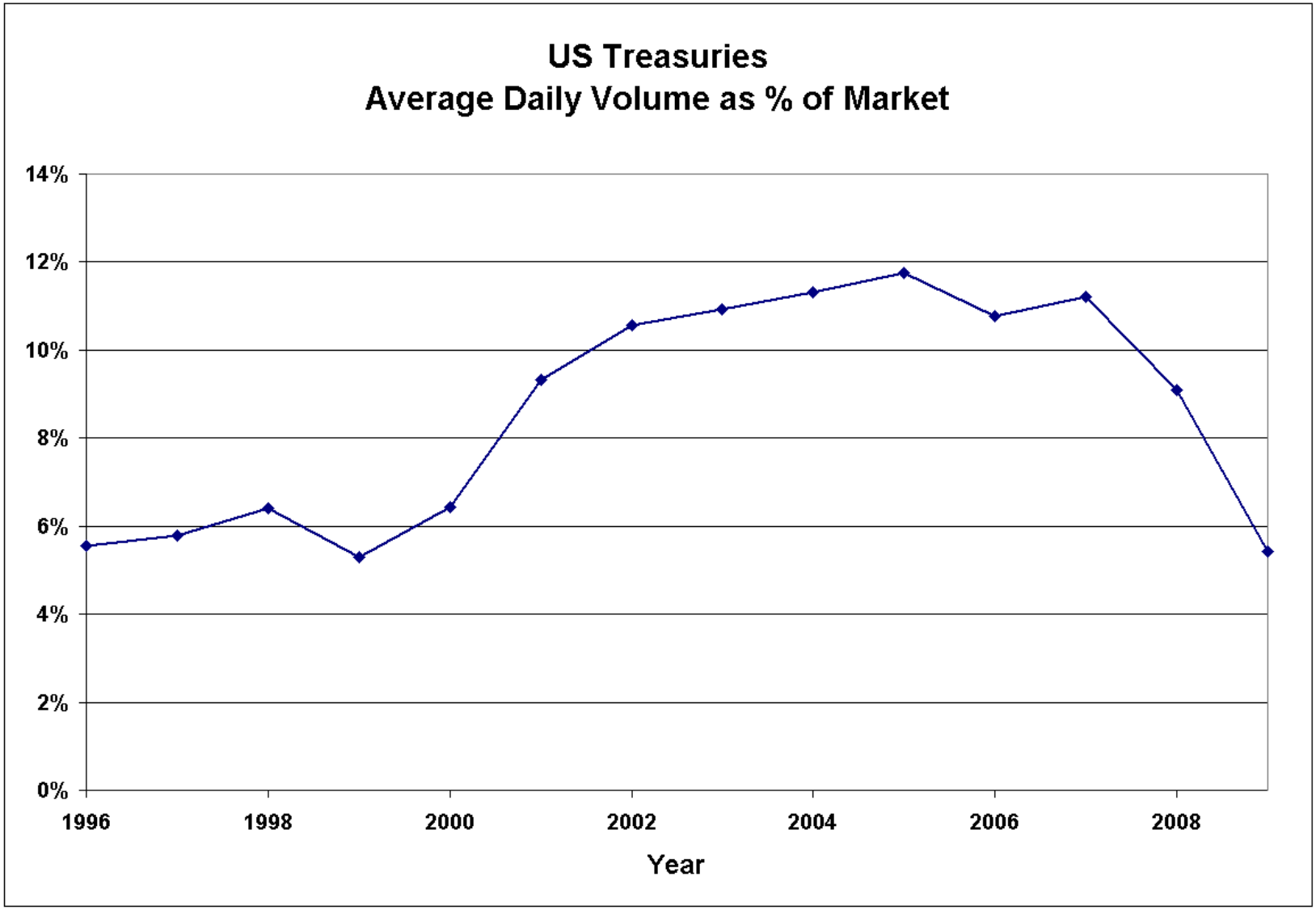
Auction Process: Who Bids?

- Most noncompetitive bids are from individuals
- Competitive bids come from institutions and Primary Issuers
- Primary Dealers:
  - Investment banks that bid for their clients.
  - Prior to 1991, others could only order for their own account
  - Capital Reserves & Volume requirements
- In 1991, Salomon Brothers cornered the market on the two-year note.
  - The fallout from this caused the Treasury to change its rules to make the auction more competitive
  - We will discuss the Salomon Bond Squeeze in the next class

Secondary Market

- Buy or Sell after auction
  - Mainly on-the-run treasuries
- Reasons for high volume
  - rebalancing portfolios
    - corporations with spare funds
  - Interest rate hedgers/speculators


US Treasuries: Average Daily Volume
600
500
400
300
200
100
0
1996
1998
2000
2002
2004
2006
2008
Year


US Treasuries
Average Daily Volume as % of Market
14%
12%
10%
8%
6%
4%
2%
0%
1996
1998
2000
2002
2004
2006
2008
Year

Secondary Market

- OTC (Dealer) Market
  - No Exchange – Phones or computers used to place orders
  - Bid and Ask set by Dealers
  - 50/50 trading with customers/other dealers
  - Institutional markets dominate retail

Secondary Market

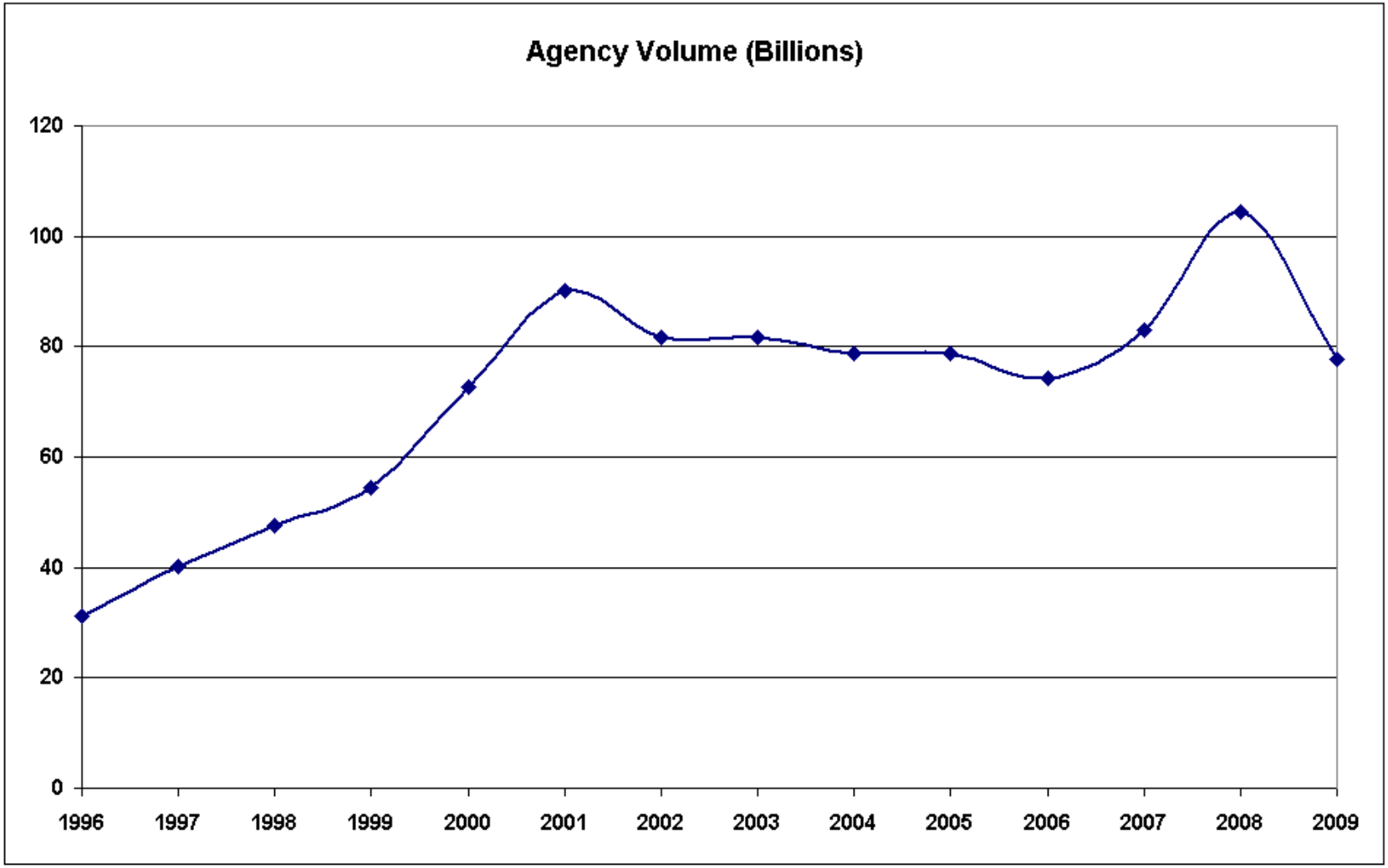
- Trading begins when issue is announced (‘When-issued” trading).
- On-the-run – most recently issued securities
  - The market for OTR securities is much more active
- Trading concentrated in “when-issued” and on-the-run issues.
- Trades settle on the next business day (T+1)

Treasury Strips

- Coupon bonds can be split into strips.
- Strips (or Zeros) pay principal at maturity, but pay no interest.
- Original strips: TIGRs (Merrill Lynch) – Early 1980s
- Priced at a discount
- Arbitrage keeps strips market in line with bond prices

Agency Bonds

- Bonds sold by US Agencies
  - Fed Home Loan Bank
  - Federal Farm Credit
  - Student Loans (SLMA)
  - GNMA
- These bonds use corporate bond conventions for yield and accrued interest
  - These conventions are slightly different from treasuries
- “Full faith and credit” of US
- Trade at slight spread to Treasuries


Agency Volume (Billions)
120
100
80
60
40
20
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009

Corporate Bonds

- Corporations can borrow money through the corporate bond market
- The company pays interest (the coupon) every six months, and pays principal plus interest at maturity.
  - Foreign corporations might not pay semiannually
- There is credit risk (the company could default)
- Many corporate bonds have other features, which we will discuss later in the course.
- Delivery is T+3 (trade date plus three business days)
- Daily Volume – About $15B (2010)

Present Value Review

Financial Principals

1. Money is worth more now than in the future.
2. Investors demand to be rewarded for taking on risk.
3. Two assets that always have the same payoffs have the same price (the *Law of One Price*)

Present Values

- The price of a financial asset will be tied to (at least) two things:
  - Time until you get the money
  - Risk associated with how much you get
- Let’s start off by considering the value of a future payment when there is no risk to the amount that you will receive

Present Value

- Notation

  V_0 – Value Today

  V_n – Value after ***n*** periods

  n – Number of Periods

  r – Effective Periodic Rate

  R – Nominal Interest Rate (APR)

  m – Number of Compounding Periods/Year

  t – Number of Years

  APR – *Effective* Annual Rate (compounded rate)

One Year – One Period

- If there is one compounding period of a year, then:

$$APR = r = R = \frac{V_1}{V_0} - 1$$

Multi-Period Effective Annual Rate

$$APR = (1+r)^m - 1 = \left(1 + \frac{R}{m}\right)^m - 1$$

Compounding Example

Using the following formula and R = 6%,

$$r = \left(1 + \frac{R}{m}\right)^{m} - 1 \qquad \text{we get :}$$

	Nominal Rate	Periods	Periodic Rate	Effective Rate
Yearly	6%	1	6.00%	6.000000%
Semiannual	6%	2	3.00%	6.090000%
Quarterly	6%	4	1.50%	6.136355%
Monthly	6%	12	0.50%	6.167781%
Daily	6%	365	0.01644%	6.183131%
Hourly	6%	8,760	0.00068%	6.183633%
Every Second	6%	525,600	0.0000114%	6.183654%
Continuous	6%	N/A	N/A	6.183655%

Continuous Compounding

$$APR = \lim_{m \to \infty} \left(1 + \frac{R}{m}\right)^m - 1 = e^R - 1$$

Note: We will not do very much with continuous compounding until we talk about FI Derivatives

Future Value

- Invest V_0 for one period:

  $V_1 = V_0 (1+r)$

- Invest for 2 periods

  $V_2 = V_1 (1+r) = V_0 (1+r)^2$

- Invest for *n* periods

  $V_n = V_0 (1+r)^n$

Present Value

- Use algebra to define Present Value in terms of Future Value

$$V_0 = V_n / (1+r)^n$$

Present Value

- What do we need
  - Value of future cash flow
  - Number of periods until that flow is received
  - Periodic Interest Rate

Multiple Cash Flows

- Suppose you have two cash flows, F_1 and F_2. Then the present value of those flows is equal to the sum of the present values.
- In general:

$$PV(F_1,\ldots,F_k) = \sum_{j=1}^{k} PV(F_k)$$

Perpetuities & Annuities

- Perpetuity: A fixed payment is made each period forever

- Annuity: A fixed payment is made each period for a specific number of periods.

PV of a Perpetuity

- C = Amount Paid each period
- r = Periodic Interest Rate

$$PV = \frac{C}{r}$$

- Where does this come from?
  - Do you remember geometric series from Calculus?

Perpetuities

$$V = \sum_{k=1}^{\infty} \frac{C}{(1+r)^k}$$

$$V = \frac{C}{(1+r)} + \sum_{k=2}^{\infty} \frac{C}{(1+r)^k}$$

$$V = \frac{C}{(1+r)} + \frac{1}{(1+r)} \sum_{k=1}^{\infty} \frac{C}{(1+r)^k}$$

$$V = \frac{C}{(1+r)} + \frac{1}{(1+r)} V$$

$$V\left(\frac{r}{(1+r)}\right) = \frac{C}{(1+r)}$$

$$V = \left(\frac{C}{(1+r)}\right)\left(\frac{(1+r)}{r}\right) = \frac{C}{r}$$

The good news: You don't need to know this.

I just wanted you to know that there is a reason why this formula works

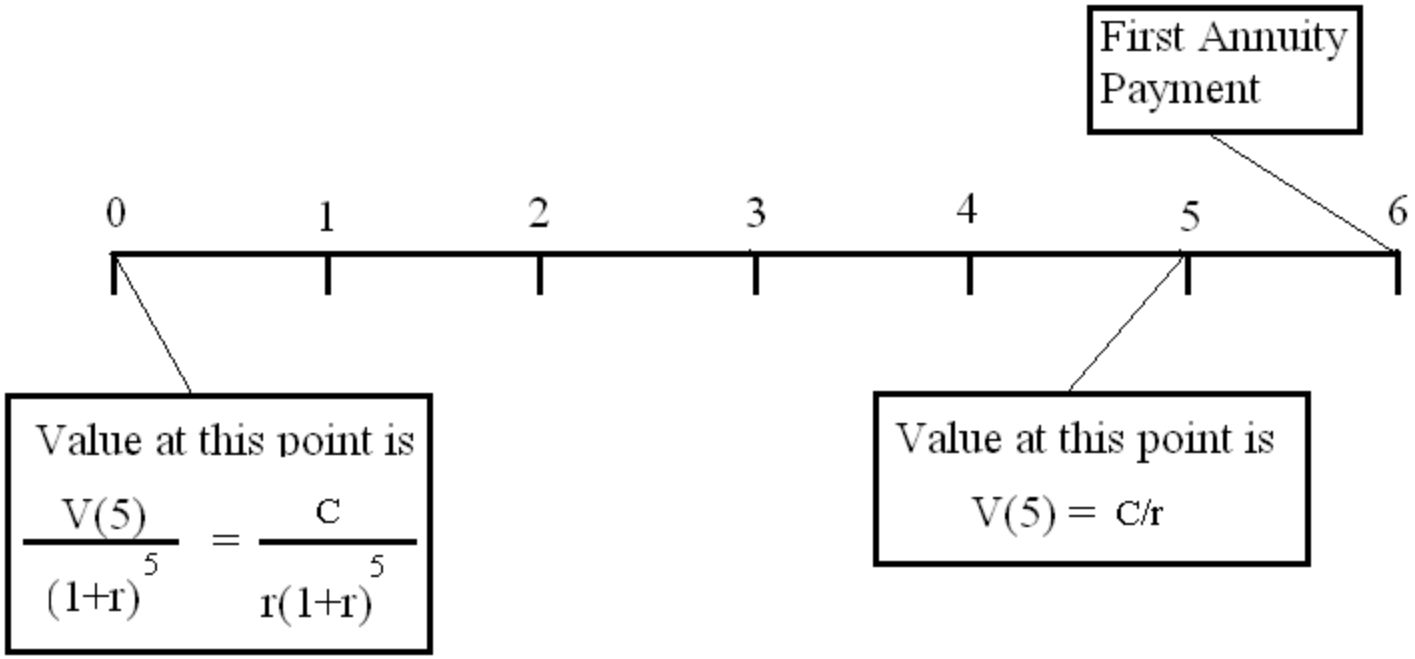
Value of a Perpetuity That Starts in the Future

- What is the value of a perpetuity that starts paying in period (n+1) (time t_{n+1})
- We know that the value at time t_n is $\frac{C}{r}$
- So – we need to discount this back to the present. The PV of a perpetuity that starts paying in period (n+1) is

$$PV = \frac{1}{(1+r)^n}\frac{C}{r} = \frac{C}{r\cdot(1+r)^n}$$

Value of a Perpetuity That Starts in the Future

- Consider this time line:



Annuity

- An annuity pays a fixed amount, C, for a predetermined number of periods.
- An *n*-period annuity pays C for *n* periods.
- The present value is:

$$PV = \sum_{k=1}^{n} \frac{C}{(1+r)^k}$$

- This is easy to calculate if *n* is small, but difficult if it is large
- But there is a better formula

Annuity

- An annuity can be thought of as a perpetuity that starts now minus a perpetuity that starts in period (n+1).
- Therefore, its value must be equal to the value of a perpetuity that starts in period 1 minus the value of a perpetuity that starts in period (n+1)

PV of Annuity

- Assume C is paid for *n* period.

$$PV = \frac{C}{r} - \frac{C}{r(1+r)^n}$$

Growing Perpetuities

- A growing perpetuity is an asset that pays in every period – with the payment growing over time at some rate g.
  - The cash flows look like C, C(1+g), C(1+g)^2, . . .
- How do we find the present value of a growing perpetuity.
- The present value is:

$$PV = \sum_{k=1}^{\infty} \frac{C(1+g)^{k-1}}{(1+r)^k} = \frac{C}{r-g}$$

Present Value Summary

Assume that r is the one period interest rate :

The present value of a cashflow C that is paid after n periods is :

$$PV(C) = \frac{C}{(1+r)^n}$$

The present value of a perpetuity that pays C in every period is :

$$PV = \frac{C}{r}$$

The present value of a growing perpetuity that pays C in the first period anf grows at g is :

$$PV = \frac{C}{r-g}$$

The present value of a perpetuity that pays C starting in period $(n+1)$ is :

$$PV = \frac{C}{r \cdot (1+r)^n}$$

The present value of an anuity that pays C for n periods is :

$$PV = \frac{C}{r} - \frac{C}{r \cdot (1+r)^n}$$

Money Markets

- Money Market instruments are a collection of short term debt obligations including:
  - T-Bills
  - Commercial paper
  - Repurchase Agreements
  - Federal Funds
  - Banker’s Acceptances
  - Eurodollar Deposits & CDs

Treasury Bills

- All the safety of T-Bonds
- Maturity 3 mo, 6 mo, 1 year (discontinued)
- No coupons or accrued interest
- Auctioned by Treasury
- Market size – $1,788 B (2009-Q3)
- Priced by Discount Rate:

$$P = Par - Par \times Discount \times \frac{\text{Days to maturity}}{360}$$

Fed Funds Market

- Fed Funds – The Fed requires banks to deposit reserves. No interest paid
- Fed Funds Market – Banks with excess reserves lend reserves to those who need it at Fed Funds rate.
- **Interest Paid = Principal×days×Rate/360**
- Commercial Banks are largest investors
- Very short-term – usually overnight

Fed Funds Market

- Fed sets policy with target rate
- Risks are small
  - Short-term maturities
  - High quality borrowers
- Rates tied to Repo Market, since banks can borrow there to raise cash for reserves.
- Billions of Dollars traded per Day
  - 2/3 from Commercial Banks
  - 1/3 from Broker/Dealers

Commercial Paper

- Corporate Debt
  - Short term (up to 270 days) due to SEC registration rules
  - Less than 90 days: larger market (can be used as collateral with Fed)
  - Often roll over debt to pay back
  - Alternative to bank loans
  - High quality firms (Many financial companies)
- Market size $1,066B (7/2010)
  - Less than half of 2007 levels
  - Source SIFMA

Commercial Paper

- Default Risk – minimal
  - One default from 1971-1988
  - Three in 1989, Four in 1990
  - Lehman Brothers defaulted on CP in 9/2008
  - Rated by Moody's, S&P, Fitch
  - Risk is that Company cannot pay
- Dealer Placed or Directly Placed
- Priced by Discount Rate
  (like T-Bills)

Commercial Paper

- Light trading in secondary market
- Bought by MM Mutual Funds, trusts, companies with short term surplus
- How do they differ from T-Bills
  - Pay higher rate
  - Credit risk
  - State & local taxes on interest
  - Less liquid

Eurodollar Deposits

- Eurodollars are dollar-denominated deposits in banks outside the US
- Multinational companies use Eurodollars to simplify transactions.
- Major banks use Eurodollar market to raise short-term funds
- Rate charged is marginal cost-of-funds
  - Negotiated by major banks – many in London. The average rate sets LIBOR
- LIBOR
  - London Inter-Bank Offer Rate

Eurodollar Deposits

- Dealers match buyers & sellers
- There is some credit risk, especially for longer maturities
- LIBOR is often used as a benchmark for risky floating rate debt.
- Note: US Banks sell CDs in a similar manner

Repurchase Agreements
The Repo Market

- Market for short-term collateralized borrowing and lending
- Used by financial institutions & Government
  - $3.8 Trillion (9/2009) 42% decrease from 2008
- What is a repo agreement?
  - One party agrees to buy security at a set date (today or tomorrow) and sell it back the next day. The effect? One party lends money for one day using security as collateral.
  - Borrow funds – Repo
  - Borrow Collateral – Reverse Repo

Repo Market

- Liquid market for many securities
- Most Repos are Treasuries, though others can be used.
- The lender of funds has unrestricted use of the collateral
- Rates reported like Fed Funds market
- Highly desirable collateral gets low rates – are *On Special*
  - Rates determined demand – does the 1st party really need the security or does the 2nd party really need money?
- On-the-run treasuries are often on special (short interest is high)

Repo Market

- Haircuts
  - The one borrowing money can't borrow against the total value. The amount of 'reserve' is called a haircut
  - Haircuts are greater when there is more price risk
    - Note – when you borrow for a house or car, you can't borrow the total value.
- Credit risk (counterparty risk) is low
  - Goes both ways.
  - The party who lends money is at risk if the price falls and counterparty defaults. The haircut helps.
  - The party who borrows money is at risk if the price rises and counterparty defaults. The haircut hurts.

Repo Market

- Participants
  - Dealers (cover shorts, finance positions), Do both & capture spread
  - Thrifts, Banks sell collateral (raise short-term funds)
  - Federal Reserve (implements policy by buying or selling to set rates)
- Determinants of Repo Rate
  - Issue Quality
  - Term (maturity) of Repo
  - Delivery Requirements
  - Availability of requirements
  - Fed Policy

Repurchase Agreement (Repo) Market Haircuts during the Crisis*

Asset Class**	July '07 Pre-Crisis	Late July-August	Q3 2007	Q4 2007	Q1 2008	Q2 2008	Q2--> Current*
Corporates A-AA rated	0%	0%	0%	0%	0%	0%	0%
Corporates BBB rated	0%	0%	0%	0%	0%	0-5%	0-5%
Corporates < BBB-rated	0%	0%	0%	0%	0%	0-5%	0-5%
ABS AA-AA *	0%	2-5%	3-7%	5-10%	10-15%	15-20%	20-25%
ABS BBB-AA	0%	3-7%	5-10%	10-15%	15-20%	20-25%	20-30%+
ABS < BBB	0-2%	5-10%	10-15%	15-20%	20-25%	No financing	No financing
CLO, Other AA-AAA	0%	2-5%	3-7%	5-10%	10-15%	15-20%	15-25%
CLO, Other BBB-AA	0%	3-7%	5-10%	10-15%	15-20%	20-25%	20-30%
CLO, Other < BBB	0-2%	5-10%	10-15%	15-20%	20-25%	No financing	No financing
CMO, Other AA-AAA	0%	3-7%	4-8%	5-10%+	15-20%	20-25%	20-30%+
CMO, Other BBB-AA	0%	5-10%	5-10%+	15-20%	20-25%	20-25%	No financing
CMO, Other < BBB	0-2%	5-10%	10-20%	20-25%	No financing	No financing	No financing
CDO AA-AAA	0%	3-7%	5-10%	10-20%	15-20%	15-20%	15-20%
CDO BBB-AA	0%	5-10%	10-15%	15-25%	20-30%	25-30%	No financing
CDO < BBB	0-2%	10%+	15-20%	25-30%	No financing	No financing	No financing

Source: Repo trader.

* As of September 15, 2008.