Session 3
July 12, 8:30am-10:30am

# Valuation and Subsidy Measures

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# Critical questions

- How does the private sector evaluate the cost of direct loans and loan guarantees?

- How do those cost estimates differ from budget estimates calculated under FCRA and why?

- Issues for discussion

  - How FCRA accounting affects Agencies' ability to sell loans

  - Which approach makes more sense? Which seems likely to lead to better gov't decision-making?

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# When is an investment worthwhile?

*A firm or gov't should invest in any project that creates more value than what it costs to produce it*

That is, a manager should choose projects with a **positive net present value**:

Net Present Value (NPV) =

Project Value - Project Cost

Net present value is what an investor would pay *TODAY* for the project. It is the value of all future cash flows.

# Calculating NPV

**Estimating a net present value requires valuing cash flows:**

1.  that arrive at different future points in time

2. with different degrees of uncertainty or risk

Accounting for these two effects provides a framework for determining value.

*Finance is said to be the study of the effect of time and uncertainty on value.*

# Accounting for time value

- A dollar today is worth more than a dollar next year because it can earn interest.

- Hence future cash flows are put on a current dollar basis by discounting.

  - Example:

    - Say interest rate is 5%.

    - Invest $100 for 1 year at 5% => you will have $105 in one year.

    - Hence present value of $105 in 1 year is $100 = $105/(1.05)

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# What interest rate(s) account for the "pure" effect of time value?

- The Treasury yield curve gives the rates of return that investors demand to invest in safe securities as a function of maturity
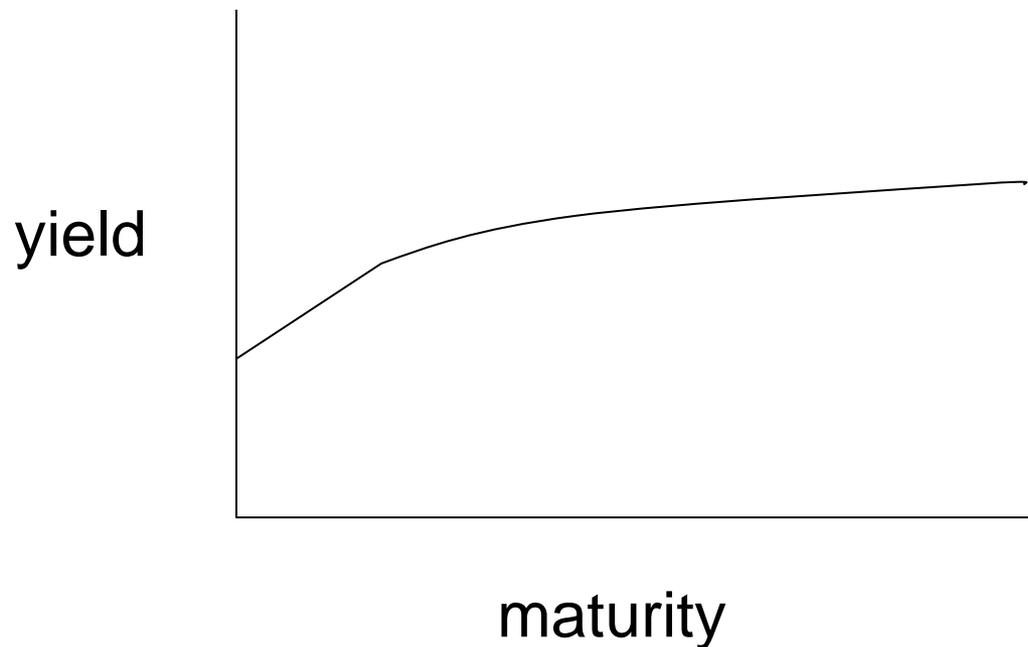
# Accounting for risk

- A certain future cash flow is generally worth more than a risky one with the same expected value

- Importantly, investors value cash more when the economy is weak than when it is strong

- Implications:

  - Investors discount risky investments at a higher rate than risk-free investments (higher discount rate => lower PV)

  - Market discount rates include a "market risk premium"; lingo: market rate = "risk-adjusted rate"

  - The market risk premium only compensates for risk that cannot be easily avoided by diversification; "market" or "systematic" risk

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# Accounting for risk

- Market risk is relevant to direct loans and loan guarantees because defaults rise and recovery rates fall in market downturns.

  – Risky loans, like stocks, perform better in good times than in bad times

- Implications:

  – Investors discount risky loans at risk-adjusted rates that are higher than the maturity-matched Treasury rates

  – Private guarantors charge more for credit guarantees than the value implied by discounting at Treasury rates; effectively they discount guarantee cash flows at *lower* than Treasury rates.

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# Default rates vary:
# Over time, by credit rating, and with the business cycle



**Global Default Rates: Investment Grade Versus Speculative Grade**

Legend: Investment grade · Overall · Speculative grade
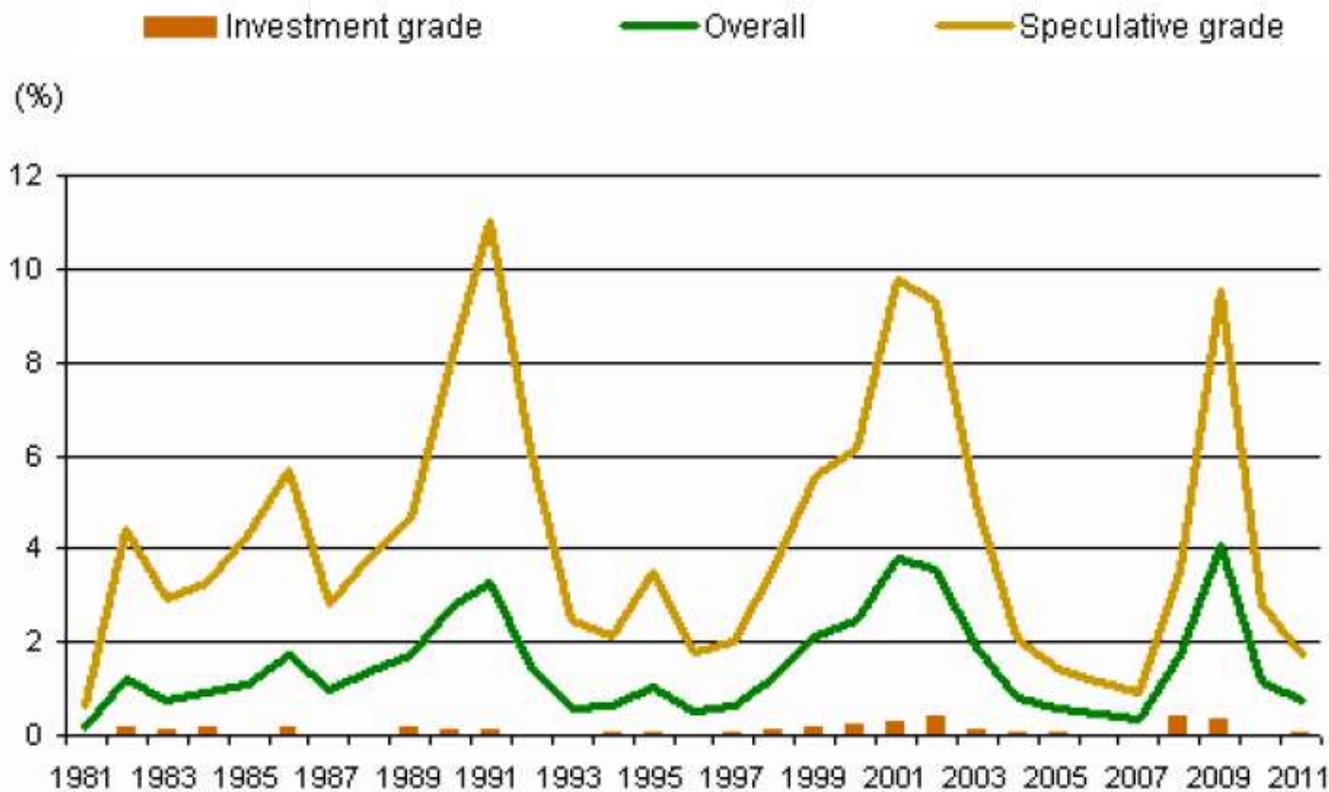
Sources: Standard & Poor's Global Fixed Income Research and Standard & Poor's CreditPro®.

# Decomposition of credit spreads

- – The "credit spread" is the difference between market interest rates and Treasury rates on credit instruments

- – Spread includes compensation to investors for expected losses, a market risk premium, illiquidity, taxes, etc.
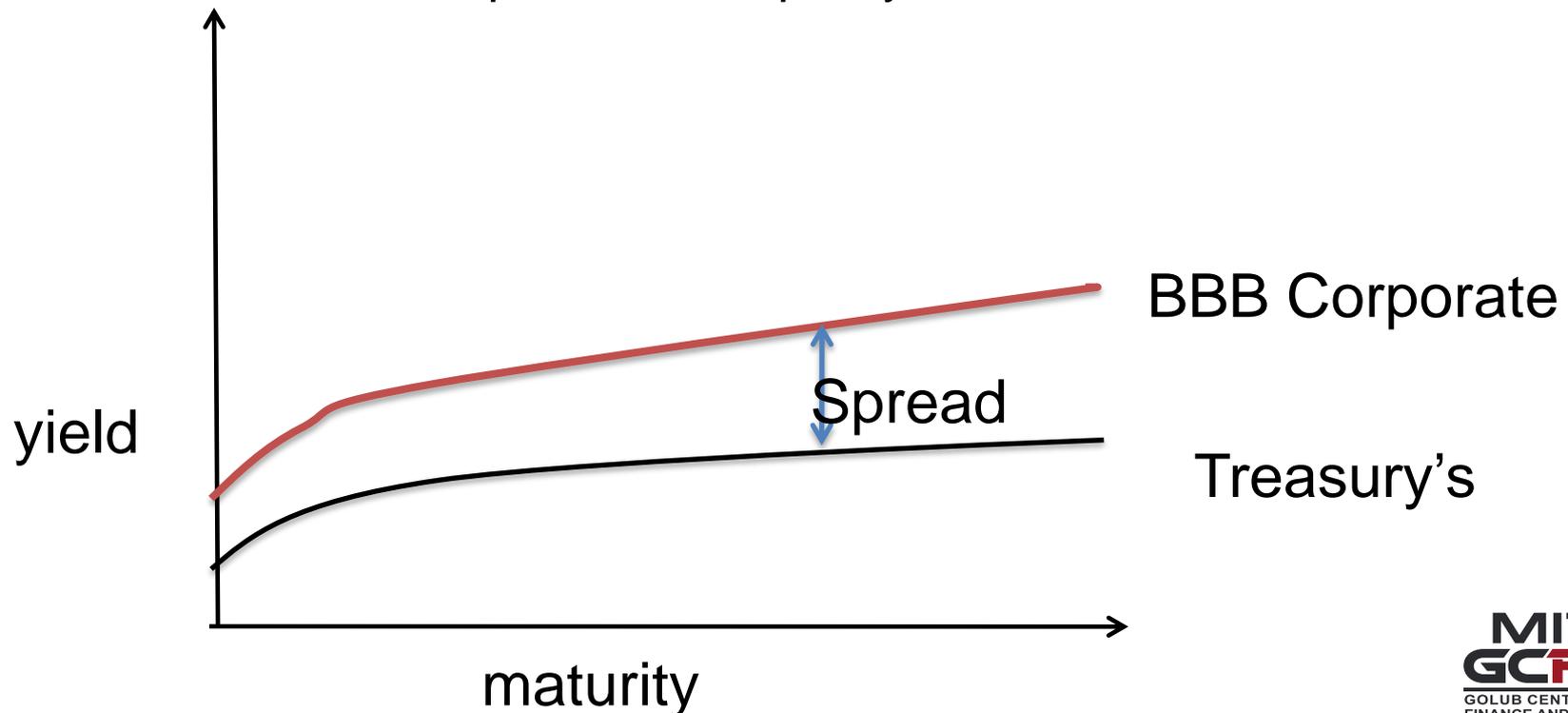
# Accounting for risk

- How do financial analysts identify the right risk-adjusted discount rate?

  – Goal is to choose rates consistent with observed market prices

  – Hence market prices and historical rates of return are the starting points

  – An important topic, but one for a longer class

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# Estimating the value of federal loan guarantees:
# The case of Title XVII loans for nuclear power plants

- DOE program to promote development of advanced nuclear technologies

- Mandated fees must cover subsidy cost

- Illustrates some of the challenges of projecting cash flows and identifying discount rates

# Title XVII: contractual cash flows



**A Typical Pattern of Contractual Payments on a Risky Loan for a Nuclear Construction Project**

(Millions of dollars)
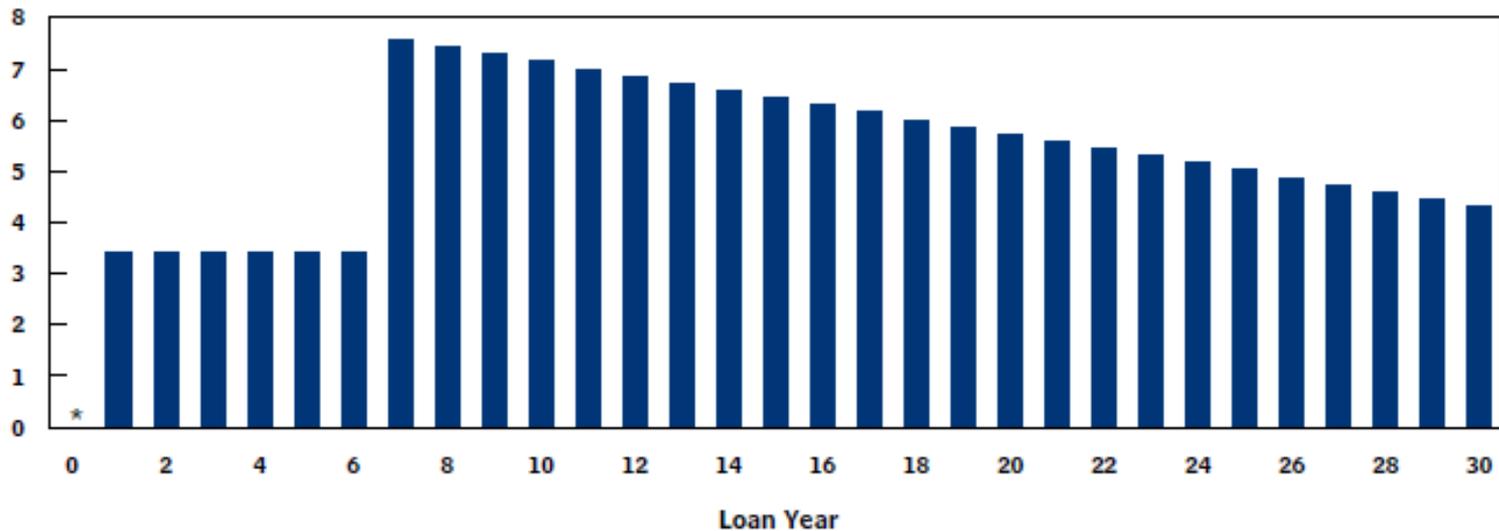
Source: Congressional Budget Office.

Note: * = Initial principal outlay of $100 million.

# Title XVII: example of cash flows with default

**An Example of the Cash Flows to a Lender on a Risky Loan for a Nuclear Construction Project, with Default in the 11th Year**

(Millions of dollars)
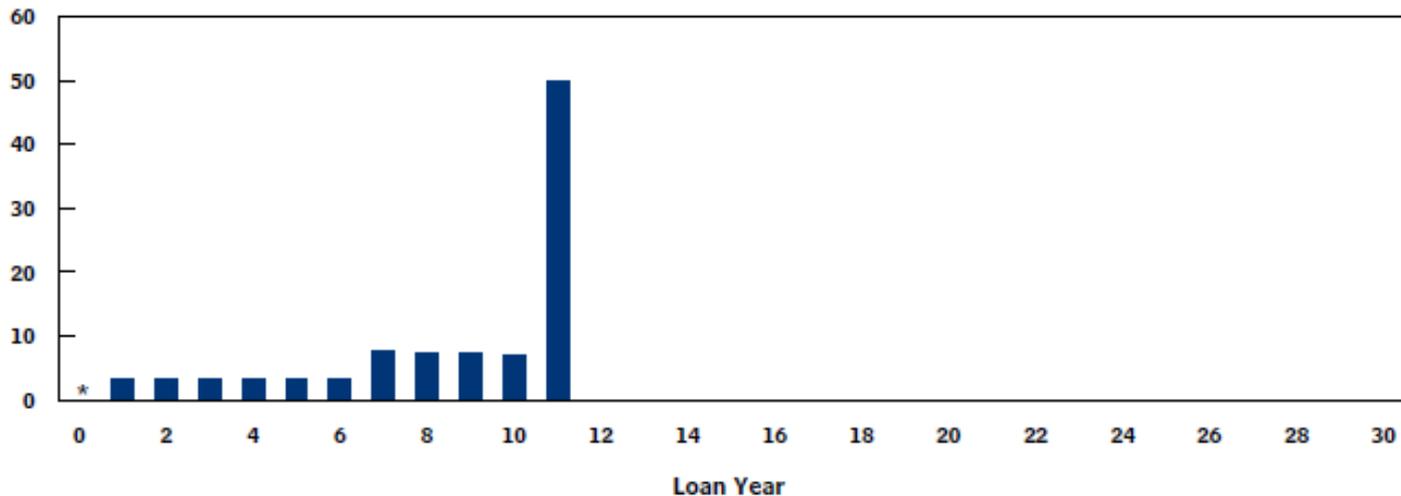


Source: Congressional Budget Office.

Notes: This figure assumes a recovery rate of 60 percent.

* = Initial principal outlay of $100 million.

**Expected Cash Flows and Contractual Cash Flows to a Lender on a Risky Loan for a Nuclear Construction Project**

(Millions of dollars)

Source: Congressional Budget Office.

Notes: The expected cash flows to a lender equal the contractual cash flows to the lender minus the average defaulted amount (net of recoveries) in each year.

\* = Initial principal outlay of $100 million.

# Title XVII: Projecting guarantee cash flows

## Expected Cash Flows from Guaranteeing a Risky Loan for a Nuclear Construction Project

(Dollars)
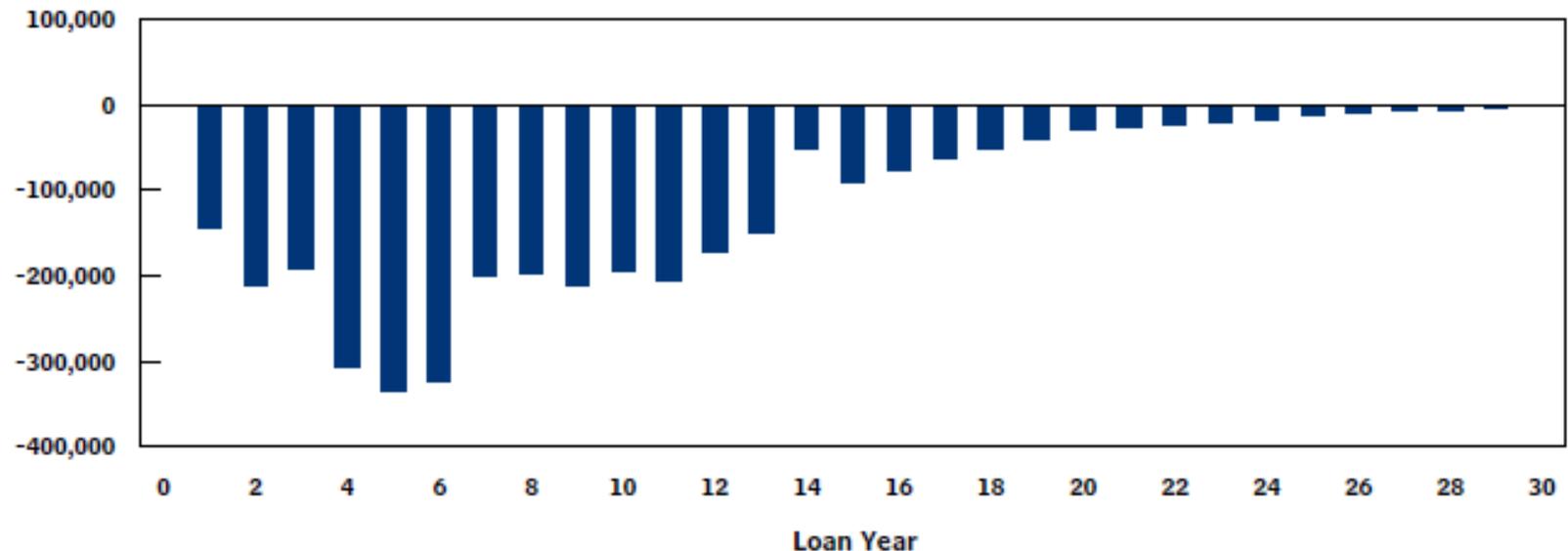


Source:   Congressional Budget Office.

Note:   The expected cash flows on a loan guarantee equal the average defaulted amount (net of recoveries) in each year.

Key insight: the value of the guarantee is the difference between the value of a safe loan with the same promised cash flows and the value of the risky loan

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# Title XVII: Discounting cash flows to value guarantee

- Used credit ratings as a guide to default and recovery behavior, and also to identifying market risk premium

## Credit Spreads and Estimated Risk Premiums

| Ratings Category | Bond Yield Over U.S. Treasuries | Risk Premium |
|---|---|---|
| AAA | 83 | 38 |
| AA | 90 | 43 |
| A | 120 | 69 |
| BBB | 186 | 115 |
| BB | 347 | 160 |
| B | 585 | 200 |

Source: John Hull, Mirela Prediscu, and Alan White, "Bond Prices, Default Probabilities, and Risk Premiums," *Journal of Credit Risk* vol. 1, no. 2 (Spring 2005), pp. 53–60

# Title XVII: Cost estimates



**Variations in the Estimated Cost of Loan Guarantees, by Credit Rating and Recovery Rate, as Measured Under the Federal Credit Reform Act and on a Fair-Value Basis**

(Guarantee costs as a percentage of loan principal)
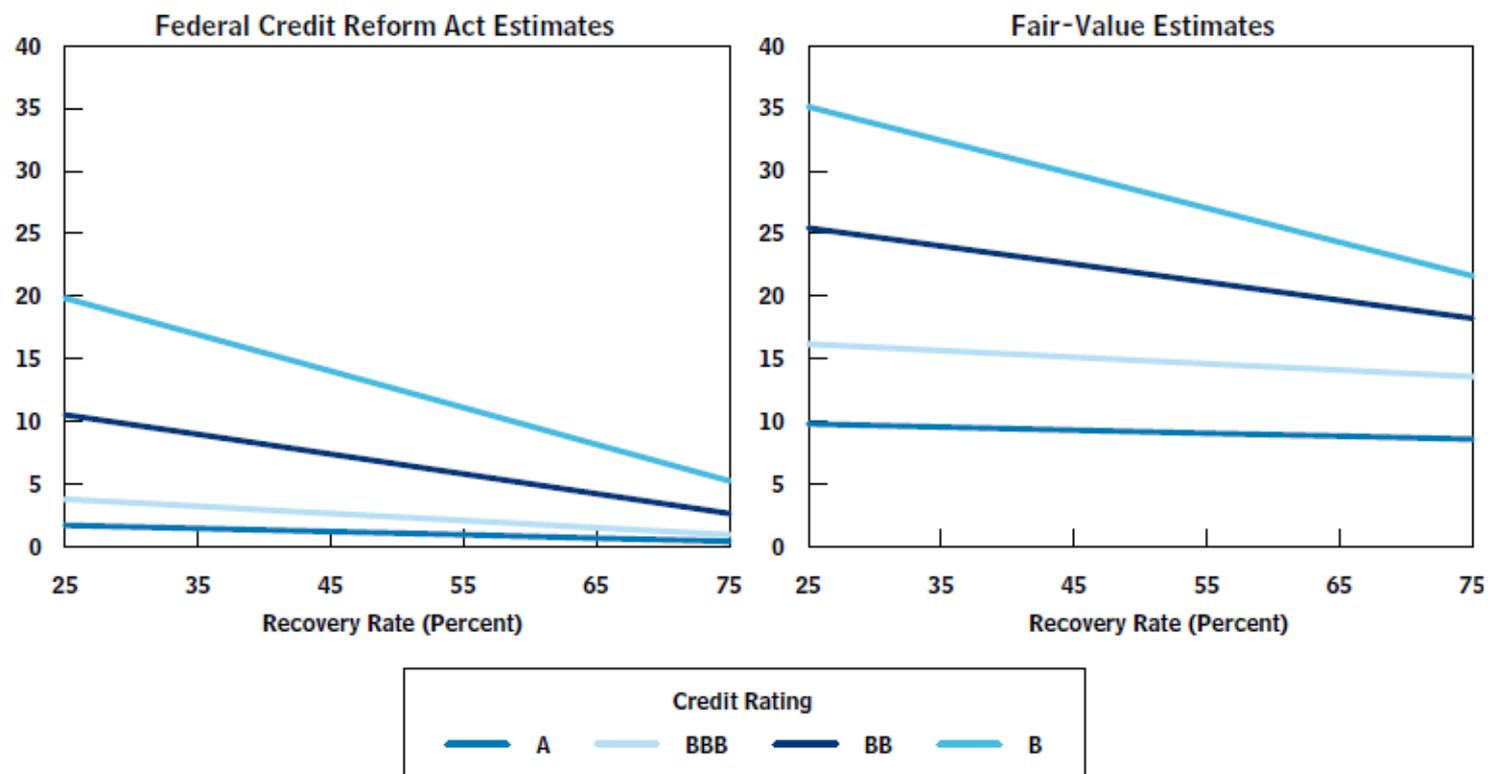
# Federal Credit Reform Act of 1990 (FCRA)

- Moved federal direct loan and loan guarantee programs from a cash to an accrual basis

- Main goal was to put cash and credit programs on equal footing
  - aiming for a **"grant equivalent" cost of credit**

- Codified the importance of accurate cost measurement over the tracking of cash flows for credit programs

  - Cash basis accounting made costly guarantees look like money makers

  - Cash basis accounting made profitable direct loans look like losers

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# Goals of FCRA

SEC. 501. PURPOSES.

The purposes of this title are to--

§ 501(1)

(1) measure more accurately the costs of Federal credit programs;

§ 501(2)

(2) place the cost of credit programs on a budgetary basis equivalent to other Federal spending;

§ 501(3)

(3) encourage the delivery of benefits in the form most appropriate to the needs of beneficiaries; and

§ 501(4)

(4) improve the allocation of resources among credit programs and between credit and other spending programs.

# Mechanics of FCRA

- Moved federal direct loan and loan guarantee programs **from a cash to an accrual basis**
- Subsidy cost of a direct loan or loan guarantee is the discounted value of expected net cash flows from gov't
  - Step 1: Project cash flows over life of loan
  - Step 2: Discount cash flows to the disbursement date at maturity-matched Treasury rates (basket of zeros)
- *Administrative costs are excluded from subsidy costs but included in the budget on a cash basis*

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# Distinction between "market value" and "fair value"

- Fair values reflect what market prices would be in an orderly market with willing buyers and sellers

- They are not liquidation or distress prices

- Private sector accounting standards and practice provide guidance that can be used to apply fair value principles to federal credit

# Comparing FCRA and fair value

- Projected cash flows should be the same under both approaches

- But discount rates are different

  – FCRA uses Treasury rates for discounting

  – Fair value estimates use market rates for discounting

    - Recall market rates compensate investors for bearing market (undiversifiable) risk

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# Consequences of FCRA's use of Treasury rates to account for risky credit obligations

- Favors providing credit over economically equivalent amounts of grant assistance

- Appears cheaper for the government to provide credit than for the private sector
  - The government's apparent advantage increases with the riskiness of the undertaking being financed

- Many credit programs have a negative or zero subsidy rate in the budget
  - Programs may show a zero cost by requiring participants to pay the FCRA subsidy cost (e.g., energy innovative technology program § 1703 self-pay loans)

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# Example 1: Comparing the FCRA and fair value costs of federal student loans

- A 2010 CBO study looked at the fair value cost of federal direct and guaranteed loan programs

- Note that:

  - Student loans (and other consumer credit) have market risk because credit losses rise in bad economic times

  - Fair values are inferred from interest rate spreads that were charged on private student loans prior to the financial crisis

  - Adjustments were made to account for administrative costs in direct and guaranteed programs more symmetrically than was done under FCRA rules

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# Federal Student Loans

- In a letter to Senator Judd Gregg, CBO compared the FCRA and fair value costs of the existing programs and the program proposed by the President:

## Costs of Federal Student Loan Programs Under Current Law and the President's Proposal

(Outlays by fiscal year, in billions of dollars)

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | Total, 2010–2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **FCRA Estimates** | | | | | | | | | | | | |
| **Under Current Law** | | | | | | | | | | | | |
| Loan programs[a] | | | | | | | | | | | | |
| Guaranteed loans[b] | -7 | * | 1 | 2 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 22 |
| Direct loans | -8 | -9 | -10 | -9 | -8 | -6 | -5 | -3 | -3 | -3 | -3 | -68 |
| Administrative costs[c] | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 21 |
| Total[d] | -13 | -8 | -7 | -6 | -4 | -1 | 1 | 3 | 3 | 3 | 3 | -25 |
| **Under President's Proposal[e]** | | | | | | | | | | | | |
| Loan programs[f] | -16 | -15 | -15 | -14 | -12 | -9 | -7 | -5 | -4 | -4 | -5 | -108 |
| Administrative costs[g] | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 21 |
| Total | -14 | -13 | -14 | -13 | -11 | -8 | -5 | -3 | -2 | -2 | -2 | -87 |
| Change in Outlays | -1 | -6 | -7 | -7 | -7 | -6 | -6 | -5 | -5 | -6 | -6 | -62 |
| **Fair-Value Estimates** | | | | | | | | | | | | |
| **Under Current Law** | | | | | | | | | | | | |
| Loan programs[a] | | | | | | | | | | | | |
| Guaranteed loans[b] | 2 | 10 | 11 | 9 | 9 | 10 | 10 | 11 | 11 | 11 | 12 | 105 |
| Direct loans | 1 | 3 | 3 | 2 | 2 | 4 | 6 | 7 | 8 | 8 | 8 | 52 |
| Total | 3 | 13 | 14 | 11 | 11 | 14 | 16 | 18 | 19 | 19 | 20 | 158 |
| Under President's Proposal[e,f] | 2 | 10 | 9 | 6 | 6 | 9 | 12 | 14 | 15 | 16 | 16 | 118 |
| Change in Fair Value | * | -3 | -4 | -5 | -5 | -4 | -4 | -4 | -3 | -3 | -4 | -40 |

Source: Congressional Budget Office.

Notes: FCRA = Federal Credit Reform Act of 1990; * = between -$500 million and zero.

# Example 2: Fannie Mae and Freddie Mac

- CBO (after consulting with the budget committees) classified them as governmental, and includes their activities in the baseline at fair value

- Imputing the fair value discount rate:

  - Risk premium for loan guarantees is inferred from (adjusted) spreads between jumbo and conforming mortgages

  - Fair value of portfolio holdings taken from Fannie and Freddie financial disclosures

# Example 2: Fannie Mae and Freddie Mac

- Responding to a query from Congressman Barney Frank, CBO estimated the cost of new GSE business in future years under alternative budgetary treatments:

## Table 1.

### Projections of Mandatory Outlays for Fannie Mae and Freddie Mac Under Alternative Budgetary Treatments

(By fiscal year, in billions of dollars)

|  | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2011–2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FCRA | -6 | -5 | -5 | -5 | -4 | -4 | -4 | -4 | -4 | -4 | -44 |
| Fair Value | 14 | 9 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 53 |
| Cash | 20 | 10 | 0 | -2 | -5 | -4 | -5 | -7 | -7 | -7 | -8 |

Source: Congressional Budget Office.
Note: Numbers do not add up to totals because of rounding.

# Fair value vs. FCRA

- What is the right way for governments to think about their cost of capital?

- My answer: The same way is any large financial entity would.

- Here's why…

# Robust principles from finance theory

- The cost of capital is **related** to the priced risk (e.g., β risk) of the project financed

- The cost of capital is **not related** to the proportion of debt and equity used to finance the project (Modigliani-Miller)

  – This is a first approximation—taxes, etc. also affect cost

- Key relations:

$$E(r_A) = r_f + \beta_A(r_f - E(r_m))$$

$$= \frac{D}{-}E(r_D) + \frac{E}{-}E(r_E)$$

$D$ = Debt
$E$ = Equity
$V = D + E$
$E(R_A)$ = expected return on firm assets
$E(R_E)$ = expected return on firm equity
$E(R_D)$ = expected return on firm debt
$R_f$ = risk-free rate
$E(r_m)$ = expected return on market portfolio
$\beta_A$ = beta of firm assets

# These robust principles also logically apply to government investments

- Importantly, the cost of capital for a risky government investment is higher than the interest rate it pays on its debt.

- <u>Example</u>:  The government makes a risky loan to finance an investment in new electrical generation.

  - Principal is $100 million

  - Interest rate charged is 3%

  - Government borrowing rate is 2%

  - Maturity is 1 year

# Why a government's cost of capital exceeds its borrowing rate

- Notional government balance sheet right after loan is made:

| Assets | Liabilities |
|---|---|
| Risky loan $100m | Government Debt $100m |

# Why a government's cost of capital exceeds its borrowing rate

- Notional balance sheet at end of the year if the loan pays off in full:

| Assets | Liabilities |
|---|---|
| Cash $103m | Government Debt $102m |

**"Profit"** of $1 million

# Why a government's cost of capital exceeds its borrowing rate

- Notional balance sheet at end of the year if the **loan defaults and recovery is only $80m:**

| Assets | Liabilities |
|---|---|
| Cash $80m | Government Debt $102m |
| | **Taxpayers -$22m** |

- Government borrowing costs are only low because of taxpayer backing, they are unrelated to the risk of a particular investment.

- **Taxpayers and the public are *de facto* equity holders in government investments**—they absorb any gains or losses.

- Hence, the government's cost of capital is logically a weighted average of the cost of debt and equity (as for a private sector firm).

- Cost depends on the risk of the project, not on how it is funded

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# Discussion questions

- How does FCRA accounting affect Agencies' ability to sell loans?

- Does a FCRA or fair value approach make more sense to you? Why? Which seems likely to lead to better gov't decision-making?

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RES.15-002 Mission and Metrics: Finance Training for Federal Credit Program Professionals
Summer 2016