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

Valuation and Subsidy Measures
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?
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:

\[
\text{Net Present Value (NPV)} = \text{Project Value} - \text{Project Cost}
\]

Net present value is what an investor would pay \textit{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)
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
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.
Default rates vary:
Over time, by credit rating, and with the business cycle

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.

Graph showing yield against maturity with a line for BBB Corporate and another for Treasury's, illustrating the spread between them.
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
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

Source: Congressional Budget Office.
Notes: This figure assumes a recovery rate of 60 percent.
* = Initial principal outlay of $100 million.
Title XVII: adjusting cash flows for expected defaults

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.
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.
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

<table>
<thead>
<tr>
<th>Ratings Category</th>
<th>Bond Yield Over U.S. Treasuries</th>
<th>Risk Premium</th>
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<tbody>
<tr>
<td>AAA</td>
<td>83</td>
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<tr>
<td>AA</td>
<td>90</td>
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<td>B</td>
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</table>

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
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 Estimates

Fair-Value Estimates
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
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
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
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)
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
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)

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### Fair-Value Estimates

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<td><strong>Total</strong></td>
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<td><strong>Under President's Proposal</strong></td>
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<td>14</td>
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<td>16</td>
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<tr>
<td><strong>Change in Fair Value</strong></td>
<td>*</td>
<td>-3</td>
<td>-4</td>
<td>-5</td>
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<td>-4</td>
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<td>-3</td>
<td>-3</td>
<td>-4</td>
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<td>-40</td>
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</table>

Source: Congressional Budget Office.

Notes: FCRA = Federal Credit Reform Act of 1990; * = between 4500 million and 700 million.
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>
<thead>
<tr>
<th>Table 1.</th>
<th>Projections of Mandatory Outlays for Fannie Mae and Freddie Mac Under Alternative Budgetary Treatments</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(By fiscal year, in billions of dollars)</td>
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<tr>
<td>FCRA</td>
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<tr>
<td>Fair Value</td>
<td>14</td>
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<tr>
<td>Cash</td>
<td>20</td>
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</tbody>
</table>

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

  \[
  E(r_A) = r_f + \beta_A (r_f - E(r_m))
  \]

  \[
  = D E(r_D) + E E(r_E)
  \]

  \[
  D = \text{Debt}
  
  E = \text{Equity}
  
  V = D + E
  
  E(R_A) = \text{expected return on firm assets}
  
  E(R_E) = \text{expected return on firm equity}
  
  E(R_D) = \text{expected return on firm debt}
  
  R_f = \text{risk-free rate}
  
  E(r_m) = \text{expected return on market portfolio}
  
  \beta_A = \text{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.

• Example: 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:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risky loan $100m</td>
<td>Government Debt $100m</td>
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</tbody>
</table>
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:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash $103m</td>
<td>Government Debt $102m</td>
</tr>
</tbody>
</table>

“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:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash $80m</td>
<td>Government Debt $102m</td>
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<tr>
<td></td>
<td>Taxpayers -$22m</td>
</tr>
</tbody>
</table>

- 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.
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?