Beyond the Fed: Incorporating Government Financial Institutions and Policies into Macro Models

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Overview

1. Need for a new policy paradigm
2. Importance of government financial institutions
3. Application: the fiscal effects of credit policies
4. Application: government as a source of systemic risk
5. Related research topics
The need for a new policy paradigm

- Policy analysis in traditional macro models
  - Fiscal policy
    - Taxes and aggregate government spending
    - Deficits provide stimulus
  - Monetary policy
    - e.g., Taylor rule trades off inflation and output
      \[ i_t = \pi_t + r_t^* + a_\pi (\pi_t - \pi_t^*) + a_y (y_t - \bar{y}_t) \]
  - Regulation of private financial institutions (sometimes)

- Two polar views of government policy
  - Benevolent: Acts optimally to maximize a well-specified objective function
  - Incompetent: Fiscal policy destroys value through distortionary taxes and wasteful spending (that does not appear in the utility function)
The need for a new policy paradigm

- What is missing?
  - A *behavioral* approach to policy
    - Observed gov’t actions are at odds with either benevolent or incompetent frameworks
    - The insights of behavioral finance apply to policymakers too:
      - rules of thumb and long-standing policies
      - inconsistent and time-varying objectives
      - Hence the potential for education to improve policies and outcomes
  - Recognition of the many ways that government policies affect markets and the economy beyond conventional monetary and fiscal policy
    - Government-run financial institutions
    - Government control of major investment decisions
    - Regulatory policy
Academics often focus on the government as just a regulator of private financial institutions.
But in fact, the U.S. government is the world’s largest financial institution in its own right…
Largest U.S. federal credit activities

Federally-Backed Credit Outstanding, 2014
($000s)

- Deposit Insurance (FDIC)
- Fannie and Freddie
- Pension Guarantees (PBGC)
- Traditional Credit Programs
- Home Loan Banks (FHLBs)
- Farm Credit (FCS)
Largest U.S. financial institutions

Assets or Insured Obligations ($000s)

- Federal Government
- JPMorgan Chase
- Bank of America
- Citigroup
- Wells Fargo
- Goldman Sachs
Outstanding Government-Guaranteed Bonds and Debt of Government-Related Enterprises, OECD Countries (percent of GDP)

(Excludes contingent guarantees and national credit programs)

Source: IMF 2012 Fiscal Monitor
Governments as financial institutions

- As the world’s largest financial institutions, governments have a first-order effect on the distribution of risk and allocation of capital in the world economy through their real and financial investments.
- The same fundamental issues arise as for private financial institutions...
  - What are the systemic/macroeconomic effects of gov’t financial activities?
  - How should a gov’t assess its cost of capital?
  - How should its financial activities be accounted for?
  - Are the institutions well-managed?
Governments as a financial institutions

- The same fundamental issues arise as for private financial institutions...
  - Are its financial products well-designed (e.g., conforming mortgages, student loans, reverse mortgages)?
    - Consumer protection and behavioral finance
    - Systemic risk
    - Pricing
The amount of recent stimulus to the U.S. economy has been seriously underestimated because the fiscal effects of federal credit policies have been overlooked.

- Exception is William Gale (1991)

In 2010, U.S. citizens **borrowed $1.6 trillion** through federal credit programs.

The spending resulting from that incremental borrowing provided roughly **$344 billion of stimulus** in 2010.

- Similar amount to the American Recovery and Reinvestment Act
- A fraction of the $1.6 trillion
- Reported budgetary cost close to zero
Application: Fiscal effects of credit policies

- **Theory**
  - How credit support increases borrowing volume
    - Credit subsidies induce incremental volume along intensive and extensive margins
  - From incremental loan volume to aggregate output

- **Calibration**
  - Subsidy costs
  - Elasticities
  - Fiscal multipliers
  - Borrowing increases on extensive & intensive margins
  - Results and sensitivity analysis

- **Discussion**
A simple model of credit rationing that highlights role of gov’t

- In spirit of Rothschild & Joseph Stiglitz (1976)
- 2 types: safe and risky borrowers; lenders can’t tell them apart
- Safe borrowers may not participate at competitive equilibrium pooling interest rate
- Subsidized loan guarantees can restore a pooling equilibrium, which increases borrowing at the **extensive margin**
- Subsidy also lowers borrowing cost, which through a demand elasticity effect increases borrowing at the **intensive margin**
  - Tricky to interpret because subsidy is the capitalized interest rate advantage, and it has a wealth effect rather than an income effect
Here we get a modest intensive margin effect; larger extensive margin effects.

Model also suggests importance of imposing quantity limits to prevent excessive loans to risky borrowers.
\[ \Delta B = dA + S(dB/dS) - C \]

- \( \Delta B \) = incremental aggregate borrowing
- \( dA \) = incremental borrowing on extensive margin
- \( S(dB/dS) \) = incremental borrowing on intensive margin
- \( C \) = crowding out of other private lending

A fiscal multiplier approach is used to translate \( \Delta B \) into \( \Delta Y \)

- \( \Delta Y \) is the change in aggregate output
- \( \Delta b_i \) is total incremental loan volume in program \( i \)
- \( \mu_i \) is the corresponding output multiplier

\[ \Delta Y = \sum_i \Delta b_i \mu_i - C \mu_C \]
Subsidy costs

- Separate estimates for each major credit program + Fannie and Freddie as input into extensive margin calculations
- Subsidies estimated on a “fair value” basis
  - What the gov’t would have to pay a private lender up front to make the loan on the same terms as under the gov’t program
  - Estimates based on large body of CBO studies and academic papers (& roughly adjusting gov’t estimates for other programs).
    - Total subsidy used here is $71 billion in 2010
    - “Subsidy rate” is present value subsidy per dollar of loan principal
- Contrast to official budgetary costs
  - Understates subsidies because uses Treasury rates as the cost of capital and neglects of essential admin costs
  - Total is -21 billion in 2010 for traditional programs
## Subsidy costs

<table>
<thead>
<tr>
<th>Category</th>
<th>Agency</th>
<th>Disbursements/Purchases ($ billions)</th>
<th>Fair Value Subsidy Rate (%)</th>
<th>Fair Value Subsidy ($ billions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>Federal Housing Administration</td>
<td>319</td>
<td>2.5</td>
<td>8.0</td>
</tr>
<tr>
<td>Housing</td>
<td>Department of Veteran’s Affairs</td>
<td>63</td>
<td>3.2</td>
<td>2.0</td>
</tr>
<tr>
<td>Housing</td>
<td>Rural Housing Service</td>
<td>17</td>
<td>4.4</td>
<td>0.7</td>
</tr>
<tr>
<td>Student Loans (guaranteed)</td>
<td>Department of Education</td>
<td>20</td>
<td>16.0</td>
<td>3.1</td>
</tr>
<tr>
<td>Student Loans (direct)</td>
<td>Department of Education</td>
<td>85</td>
<td>13.0</td>
<td>11.0</td>
</tr>
<tr>
<td>Business</td>
<td>Small Business Administration</td>
<td>17</td>
<td>6.5</td>
<td>1.1</td>
</tr>
<tr>
<td>Other Traditional</td>
<td>Various</td>
<td>64</td>
<td>6.0</td>
<td>3.8</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td><strong>584</strong></td>
<td></td>
<td><strong>29.8</strong></td>
</tr>
<tr>
<td>Housing</td>
<td>Fannie Mae and Freddie Mac</td>
<td>1,011</td>
<td>4.1</td>
<td>40.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>1,595</strong></td>
<td></td>
<td><strong>70.8</strong></td>
</tr>
</tbody>
</table>

*The sum of disbursements is lower than the total in OMB's Analytical Perspectives because Treasury TARP and MBS transactions and ED purchases of seasoned student loans are excluded.*
Supply elasticity in 2010 is assumed to be large, hence no crowding out of other private lending by gov’t

- High level of bank reserves and loose monetary policy

Credit demand elasticities

- Answer question of incremental amount borrowed as function of dollar subsidy
- Taken from Gale (1991); literature is inconclusive
  - Housing 1.8
  - Student loans .65
  - Business and other .8
Fiscal multipliers

- Literature
  - CBO’s definition: change in economic output per dollar of budgetary cost
  - Auerbach and Gorodnichenko (2012) emphasize variation over the business cycle

- Most budgetary costs are cash spent in that year
- For credit, incremental borrowing is additional cash available to households or businesses
- Hence multipliers from literature applied to incremental borrowing rather than to subsidy cost
- However, “bang-for-the-buck” is the multiple of output over subsidy cost
Different programs assumed to have different multipliers
- Student and business loans like “transfer payments to individuals”
- Mortgages have much smaller multiplier because of refinancings and purchase of existing structures
- I assume higher multipliers in scenario with financial distress

CBO suggests very wide range for ARRA multipliers

<table>
<thead>
<tr>
<th>Type of Activity</th>
<th>Estimated Multipliers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Estimate</td>
</tr>
<tr>
<td>Purchases of Goods and Services by the Federal Government</td>
<td>0.5</td>
</tr>
<tr>
<td>Transfer Payments to State and Local Governments for Infrastructure</td>
<td>0.4</td>
</tr>
<tr>
<td>Transfer Payments to State and Local Governments for Other Purposes</td>
<td>0.4</td>
</tr>
<tr>
<td>Transfer Payments to Individuals</td>
<td>0.4</td>
</tr>
<tr>
<td>One-Time Payments to Retirees</td>
<td>0.2</td>
</tr>
<tr>
<td>Two-Year Tax Cuts for Lower- and Middle-Income People</td>
<td>0.3</td>
</tr>
<tr>
<td>One-Year Tax Cut for Higher-Income People</td>
<td>0.1</td>
</tr>
<tr>
<td>Extension of First-Time Homebuyer Credit</td>
<td>0.2</td>
</tr>
</tbody>
</table>
Incremental borrowing on intensive margin

\[ S(dB/dS) \]

<table>
<thead>
<tr>
<th>Category</th>
<th>Agency</th>
<th>2010 Volume ($ billions)</th>
<th>Elasticity</th>
<th>Subsidy Rate</th>
<th>Incremental borrowing ($ billions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>FHA</td>
<td>319</td>
<td>1.8</td>
<td>2.5</td>
<td>14.3</td>
</tr>
<tr>
<td>Housing</td>
<td>VA and RHS</td>
<td>80</td>
<td>1.8</td>
<td>3.5</td>
<td>5.0</td>
</tr>
<tr>
<td>Student Loans</td>
<td>ED</td>
<td>105</td>
<td>0.65</td>
<td>14.0</td>
<td>9.6</td>
</tr>
<tr>
<td>Business</td>
<td>SBA</td>
<td>17</td>
<td>0.8</td>
<td>6.2</td>
<td>0.8</td>
</tr>
<tr>
<td>Other Traditional</td>
<td>Various</td>
<td>64</td>
<td>0.8</td>
<td>6.0</td>
<td>3.1</td>
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<tr>
<td><strong>Subtotal</strong></td>
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<td><strong>584</strong></td>
<td></td>
<td></td>
<td><strong>33</strong></td>
</tr>
<tr>
<td>Housing</td>
<td>Fannie &amp; Freddie</td>
<td><strong>1,011</strong></td>
<td>1.8</td>
<td>4.1</td>
<td>74.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>1,595</strong></td>
<td></td>
<td></td>
<td><strong>107</strong></td>
</tr>
</tbody>
</table>
By necessity largely judgmental, but informed by observations of markets and programs

As theory showed, no simple relation to subsidies

Two scenarios considered: normal times and financial market distress
  - 2010 taken to be in the middle
Putting it all together: aggregate stimulus

\[ \Delta Y = \sum_i \Delta b_i \mu_i - C \mu C \]

Table 4 Panel A: Incremental Output in a Normal Period

<table>
<thead>
<tr>
<th>Category</th>
<th>Agency</th>
<th>2010 loan volume ($ billions)</th>
<th>Constrained share</th>
<th>Incremental loan volume extensive margin</th>
<th>Incremental loan volume intensive margin</th>
<th>Multiplier</th>
<th>Incremental Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>FHA</td>
<td>319</td>
<td>0.10</td>
<td>31.9</td>
<td>14.3</td>
<td>0.3</td>
<td>13.9</td>
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<tr>
<td>Housing</td>
<td>VA and RHS</td>
<td>80</td>
<td>0.10</td>
<td>8.0</td>
<td>5.0</td>
<td>0.3</td>
<td>3.9</td>
</tr>
<tr>
<td>Student Loans</td>
<td>ED</td>
<td>105</td>
<td>0.75</td>
<td>78.8</td>
<td>9.6</td>
<td>0.5</td>
<td>44.2</td>
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<td>Business</td>
<td>SBA</td>
<td>17</td>
<td>0.75</td>
<td>12.5</td>
<td>0.8</td>
<td>0.5</td>
<td>6.6</td>
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<tr>
<td>Other Traditional</td>
<td>Various</td>
<td>64</td>
<td>0.50</td>
<td>31.9</td>
<td>3.1</td>
<td>0.5</td>
<td>17.5</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td><strong>584</strong></td>
<td></td>
<td><strong>163</strong></td>
<td><strong>33</strong></td>
<td></td>
<td><strong>86</strong></td>
</tr>
<tr>
<td>Housing</td>
<td>Fannie &amp; Freddie</td>
<td>1,011</td>
<td>0.00</td>
<td>0.0</td>
<td>74.6</td>
<td>0.2</td>
<td>15</td>
</tr>
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<td><strong>Total</strong></td>
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<td></td>
<td><strong>163</strong></td>
<td><strong>107</strong></td>
<td></td>
<td><strong>101</strong></td>
</tr>
</tbody>
</table>
Putting it all together: aggregate stimulus

\[ \Delta Y = \sum_i \Delta b_i \mu_i - C \mu C \]

<table>
<thead>
<tr>
<th>Category</th>
<th>Agency</th>
<th>2010 loan volume ($ billions)</th>
<th>Constrained share</th>
<th>Incremental loan volume extensive margin</th>
<th>Incremental loan volume intensive margin</th>
<th>Multiplier</th>
<th>Incremental Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>FHA</td>
<td>319</td>
<td>0.90</td>
<td>286.8</td>
<td>14.3</td>
<td>0.4</td>
<td>120.5</td>
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<td>VA and RHS</td>
<td>80</td>
<td>0.50</td>
<td>40.0</td>
<td>5.0</td>
<td>0.4</td>
<td>18.0</td>
</tr>
<tr>
<td>Student Loans</td>
<td>ED</td>
<td>105</td>
<td>0.95</td>
<td>99.8</td>
<td>9.6</td>
<td>2.0</td>
<td>218.6</td>
</tr>
<tr>
<td>Business</td>
<td>SBA</td>
<td>17</td>
<td>0.85</td>
<td>14.1</td>
<td>0.8</td>
<td>2.0</td>
<td>29.9</td>
</tr>
<tr>
<td>Other Traditional</td>
<td>Various</td>
<td>64</td>
<td>0.75</td>
<td>47.8</td>
<td>3.1</td>
<td>2.0</td>
<td>101.7</td>
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<tr>
<td><strong>Subtotal</strong></td>
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<td><strong>584</strong></td>
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<td><strong>488</strong></td>
<td><strong>33</strong></td>
<td></td>
<td><strong>488.6</strong></td>
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<tr>
<td>Housing</td>
<td>Fannie &amp; Freddie</td>
<td>1,011</td>
<td>0.25</td>
<td>252.8</td>
<td>74.6</td>
<td>0.3</td>
<td>98</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>1,595</strong></td>
<td></td>
<td><strong>741</strong></td>
<td><strong>107</strong></td>
<td></td>
<td><strong>587</strong></td>
</tr>
</tbody>
</table>
$344 billion of stimulus, at cost of $71 billion
  - Midpoint estimate of normal and financial distress scenarios
    - $587 billion in distress scenario
    - $101 billion in normal scenario
  - Bang-for-the-buck of $5 per $1 of taxpayer cost

Sensitivity analysis
  - Might take normal and distress estimates as lower and upper bounds on plausible range
  - Student loans and mortgages are the big drivers
    - $219 billion from distressed student loan market is tighter lower bound
  - Considering support to tax exempt bonds and other credit activities would raise estimate of stimulus
Discussion

- How do results change interpretation of depth of recession and effects of other policies?
  - Not much on depth: Added stimulus within uncertainty bounds of stimulus effects of other policies
  - Credit policy may have been more important than monetary policy in reviving the mortgage and housing markets

- Is this fiscal policy or monetary policy or something else?
  - Case for fiscal policy is that root cause of incremental borrowing is gov’t subsidies although channel different than most spending
  - Contrast to special monetary policies that provided liquidity but minimal subsidies
How much do these effects play out in other countries?
- E.g., Europe relies much less on credit programs

This is not a welfare analysis!
- Credit policies likely to have a big bang-for-the-buck as fiscal stimulus during recessions accompanied by financial upheavals
- But benefits have to be compared with the (very large) costs:
  - Target-inefficient
  - Opaque
  - Distort capital allocation and crowd out private capital
  - Encourage excessive indebtedness
  - Incentives for excessive risk-taking with systemic consequences
  - Gov’t credit policies may have helped cause the 2007 financial crisis
Government as a source of systemic risk

- A simple idea:
  - After the financial crisis, laws passed to address concern that policymakers and investors lacked sufficient data to anticipate emerging threats to financial stability or assess how shocks to one financial firm could impact the system as a whole
    - (e.g., as part of the Dodd-Frank Act, Congress created FSOC/OFR)
  - Most discussions of the need for more information about systemic risk focus on private sector institutions.
  - Yet governments function as the world’s largest and most interconnected financial institutions, and represent a major source of systemic risk.
  - Hence more research is needed on governments as a source of risk
    - and it arguably falls under the mandate of institutions like the FSOC and OFR to devote resources to monitoring and studying it
Government as a source of systemic risk

Overview

- Make the case that government is a source of systemic risk.
- Identify and discuss the major reasons why:
  - Size and influence as a financial institution
  - Incentives created by its rules and regulations
  - Lack of transparency
  - Other objectives may conflict with goal of promoting financial stability

- Present examples
- Suggest specific areas where institutions like the U.S. Office of Financial Research (OFR) could help to mitigate those risks.

Discussion today draws on ongoing work and two papers:
- “Government as a Source of Systemic Risk” *Journal of Financial Policy*
Government as a source of systemic risk

Caveats:

- Government can also act as an important counterweight to systemic risk
- The work summarized here is not comprehensive:
  - Neglects most regulatory activities, and the risk from fiscal imbalances
  - Does not rank the sources of risk by importance
  - Does not compare the magnitudes with risks arising from private-sector activities
  - A research agenda, not a completed project
Government as a source of systemic risk

- Attributes that give rise to systemic risk are similar for private-sector and government financial institutions
  - Size (absolute and relative to important sectors)
  - Interconnectedness through the financial infrastructure
  - Lack of transparency
  - Inadequate supervision
Government as a source of systemic risk

- But the resulting risks and their causes are different than for private-sector institutions for a number of reasons:
  - The government makes the rules (and exempts itself from many of them, it cannot tie its own hands)
  - The government responds to political rather than financial incentives
  - The government is slow in its ability to react and make changes
  - The government doesn’t engage in high frequency trading
  - The government is generally not a source of counterparty risk
Already established that it is enormous.

But that only matters if it affects prices, allocations, or incentives.

It does (e.g., previous analysis of fiscal policy effects and references therein)
Interconnections via the financial infrastructure

- Financial infrastructure is the “legal and accounting procedures, the organization of trading and clearing facilities, and the regulatory structures that govern the relations among the users of the financial system” (Merton and Bodie, 1995)

- Clearly the government has a first order effect on incentives through the financial infrastructure
  - Example is the interaction of bank capital requirements and rules requiring fair value accounting
    - Could exacerbate downward liquidity spirals
    - Could cause capital requirements to be too low in booms and too high in busts
    - Problems could be mitigated by better regulation (Heaton, Lucas and McDonald, 2010)
Government financial institutions lack transparency

There are many shortcomings related to financial disclosure:
  - The quality and scope of financial disclosures vary markedly across government agencies.
  - Accounting standards differ across government entities, and between the public and private sectors.
  - There is no central data repository like the SEC’s Edgar for private firms
  - Market price or fair value information is generally not available
  - Government accounting
    - Cash basis accounting used for budgeting (except for limited naïve accrual in U.S.)
    - Government wrongly treats its cost of capital as its own borrowing cost
    - Creates incentives for risk-taking by government financial institutions
Robust principles from finance theory point to importance of fair value cost recognition for gov’ts

- The cost of capital is **related** to the undiversifiable market risk (β) of the project financed
- The cost of capital is **not related** to the proportion of debt and equity used to finance the project
  - This is a first approximation—taxes, etc. also affect cost

**Key relations:**

\[
E(r_A) = r_f + \beta_A (r_f - E(r_m)) \\
= \frac{D}{V} E(r_D) + \frac{E}{V} E(r_E)
\]

- \(D = \text{Debt}\)
- \(E = \text{Equity}\)
- \(V = D + E\)
- \(E(R_A) = \text{expected return on firm assets}\)
- \(E(R_E) = \text{expected return on firm equity}\)
- \(E(R_D) = \text{expected return on firm debt}\)
- \(r_f = \text{risk-free rate}\)
- \(E(r_m) = \text{expected return on market portfolio}\)
- \(\beta_A = \text{beta of firm assets}\)
Why a government’s cost of capital exceeds its borrowing rate

- The government makes a direct loan for $100 million, due in one year, notionally funded with Treasury debt.
- Loan interest rate = Treasury rate = 3%

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risky loan $100m</td>
<td>Treasury Debt $100m</td>
</tr>
</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>Treasury Debt $103m</td>
</tr>
</tbody>
</table>
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 $73:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash $73m</td>
<td>Treasury Debt $103m</td>
</tr>
<tr>
<td></td>
<td>Taxpayers -$30m</td>
</tr>
</tbody>
</table>

- Treasury borrowing costs are low because of taxpayer backstop.
- Taxpayers are equity partners in government credit obligations.
- The government’s cost of capital is a weighted average of the cost of debt and equity (as for a private sector firm).
- “Fair value” estimates calculated using risk-adjusted discount rates provide the most accurate picture of costs.
Inadequate supervision

- Although government institutions are tasked with achieving public purposes, they may still need special oversight to control systemic risk.

- As for private firms, government institutions have objectives that are narrowly mission-focused and not directed at financial stability.

- The reasons for creating a new systemic risk regulator to oversee already-regulated private financial institutions also apply to government institutions.
Example: Systemic risk from government activities in the U.S. mortgage market

Through Fannie, Freddie, FHA, VA, etc. backed 86% of new originations in 2010.

The federal share grew to over 98% in 2013.
Clearly the government is in a position to influence allocation of mortgage credit and its riskiness.

- Sets rules for eligibility, underwriting, guarantee pricing, products offered (e.g., toxic 30-year mortgages)
- Incentives for risk-taking created by underpriced guarantees

But there is disagreement about how much the government contributed to the housing bubble and subsequent crisis.

- Also about whether it is supplying too much or too little mortgage credit now.

What is clear is that those activities turned out to be costly to taxpayers.

- (Net) payments from Treasury to Fannie and Freddie of $130 billion through March 2011
- Upward reestimates of budgetary cost of FHA guarantees of $40 billion between 1999 to 2011
Example 2: Callable Capital for the EFSF/ESM

- The EFSF was created in May 2010 to respond to Eurozone crisis
- A rescue mechanism with the mandate of safeguarding financial stability by providing financial assistance to euro area Member States
  - ESM is the permanent version
- Authority to issue bonds backed by member capital and callable capital
  - Bonds are rated AA+ because of the EUR 620 billion callable capital
- Governments recognize no cost of the call exposure until losses are realized
- Callable capital can be valued using a generalized options-pricing approach with jumps (following Lucas & McDonald, 2010)
- Cost of committed callable capital to members over 20 years for EFSF/ESM estimated to be EUR 20 to 80 billion
Methodology (in brief)

- “Risk-neutral” Monte Carlo valuation model
  - Parallel model under actual measure to compute physical probability of loss events
- Risky assets of ESM evolve stochastically
  - A jump process indicates occurrence of infrequent crisis state
  - Asset volatility process can be time- and state varying; tricky to calibrate
- Liabilities increase by the amount of new loans made in a crisis
- Capital is called when the ratio of liabilities-to-equity exceeds a trigger threshold
  - The amount called is set to restore target liability-to-equity ratio
  - New capital is invested in safe liquid assets
- Cost of callable capital is present value of model-predicted call amounts, averaged over 20,000 Monte Carlo runs over 20 years
Table 4.6: Prospective Cost and Call Probability for EFSF/ESM Callable Capital
Sensitivity to Key Parameters

(EUR billions)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>0</th>
<th>.03</th>
<th>.06</th>
<th>.09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual crisis probability</td>
<td>1</td>
<td>13</td>
<td>36</td>
<td>71</td>
</tr>
<tr>
<td>Annual call probability</td>
<td>0.0%</td>
<td>1.3%</td>
<td>3.1%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Risky asset multiplier in crisis</td>
<td>1.25x</td>
<td>1.5x</td>
<td>1.75x</td>
<td>2x</td>
</tr>
<tr>
<td>Cost</td>
<td>8</td>
<td>36</td>
<td>80</td>
<td>139</td>
</tr>
<tr>
<td>Annual call probability</td>
<td>1.0%</td>
<td>3.1%</td>
<td>4.4%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Asset jump frequency, annual, no crisis</td>
<td>0</td>
<td>.05</td>
<td>.1</td>
<td>.2</td>
</tr>
<tr>
<td>Cost</td>
<td>35</td>
<td>36</td>
<td>36</td>
<td>37</td>
</tr>
<tr>
<td>Annual call probability</td>
<td>2.9%</td>
<td>3.0%</td>
<td>3.1%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Risky asset volatility (non-jump component), annual</td>
<td>.05</td>
<td>.1</td>
<td>.15</td>
<td>.2</td>
</tr>
<tr>
<td>Cost</td>
<td>35</td>
<td>35</td>
<td>36</td>
<td>37</td>
</tr>
<tr>
<td>Annual call probability</td>
<td>2.7%</td>
<td>2.8%</td>
<td>3.1%</td>
<td>3.4%</td>
</tr>
<tr>
<td>Trigger liabilities-to-assets (relative to target ratio)</td>
<td>1.05x</td>
<td>1.1x</td>
<td>1.2x</td>
<td>1.3x</td>
</tr>
<tr>
<td>Cost</td>
<td>39</td>
<td>38</td>
<td>36</td>
<td>34</td>
</tr>
<tr>
<td>Annual call probability</td>
<td>6.4%</td>
<td>4.5%</td>
<td>3.1%</td>
<td>2.4%</td>
</tr>
</tbody>
</table>

Note: Each row varies only the listed parameter from its base case value.
Watchdog institutions for systemic risk (like the OFR) could undertake a variety of initiatives and analyses that could help to mitigate the risks that have been identified.

**Regulatory audit.**
- Undertake a comprehensive evaluation of federal financial regulations to identify unintended systemic consequences.

Commence a study that *compares government and private sector accounting standards* and assesses *best practices.*
- Study could serve as an input and impetus to more rapid harmonization of accounting standards and practices.
Mitigating the Risks: Data Initiatives and Analyses

- Undertake initiatives to **improve and standardize financial disclosures**.
  - Work with government financial institutions, and with academic and private accounting experts, to develop more uniform and informative reporting standards.
  - House a website that would make those disclosures readily available to the public.

- **Encourage the provision of fair value disclosures**.
  - To help address the lack of market price information that would make more transparent the cost and risks of government financial activities.
Mitigating the Risks: Data Initiatives and Analyses

- **Evaluate unmet data needs** for assessing systemic risk from credit and insurance programs.
  - Information collected is primarily to determine eligibility.
  - It may be insufficient to assess systemic risk.
  - Example is lack of credit score data for student loans that make it more difficult to assess whether debt levels are sustainable, and lack of timely default statistics.

- **Create data sets** that combine information on federal and private credit at the household level.
  - For example, getting combined data on first and second mortgages would greatly improve understanding of stresses on households.
Mitigating the Risks: Data Initiatives and Analyses

- **Disseminate** data on government credit programs.
  - Loan level data from those programs is generally unavailable.
    - Exception is for mortgages in U.S., but that data is very expensive
    - Also FOIA
  - Would encourage more research on government finance
  - Could help private financial institutions better understand their own and aggregate risks
  - Fewer concerns about proprietary value than for private financial institutions; borrower privacy could be protected
  - Costly for agencies to undertake such initiatives on their own. Watchdog entity like OFR could make the data more useful through coordination and standardization.
Incorporate government financial institutions into systemic risk models

Estimating the government’s cost of capital
- Essential input for valuation of complex investment policies
- Essential for cost-benefit analysis of long-dated policies such as those aimed at abating climate change
- Many unexplored applications


Understanding the debt capacity of developed countries
Government financial policies have a first-order effects that macro-financial analyses traditionally have ignored

A fertile area for new research
  - Particularly a need for new models exploring theoretical channels
  - Also a dearth of empirical work

Barriers to entry
  - Hard to change mindset
  - Need to study institutional details and take them seriously
  - Risk that there are not referees conversant in this area

But high potential returns
  - Uncrowded research space
  - First order importance for understanding the world and offering sensible policy advice—people will care about what you have to say