The views expressed here should not be interpreted as reflecting the views of the Federal Reserve Board of Governors, the Federal Reserve Bank of Philadelphia, the International Monetary Fund or any other person associated with the Federal Reserve System or the International Monetary Fund.
Objective

- Explore the interaction between bank regulation, sovereign default risk and economic activity
**OBJECTIVE**

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▶ Banks play a key role in financing productive investment projects.

▶ They are also one of the major holders of domestic sovereign debt.
**Objective**

- Explore the interaction between bank regulation, sovereign default risk and economic activity
  - Banks play a key role in financing productive investment projects.
  - They are also one of the major holders of domestic sovereign debt.

- **Question:** What are the effects of changes in risk-weighted capital requirements and the introduction of leverage ratios (as in Basel III) on credit, sovereign risk and welfare?
Financial Sector - Sovereign Risk Link

- Recent crisis in Eurozone periphery
  - Domestic financial institutions own a large portion of country sovereign debt
  - Government bond spreads rose.
  - Banks charged higher rates for loans to nonfinancial corporations and cut back on lending.
- 1998 Russian default
- 2001 Argentinean default
Exposure to Domestic Sovereign Debt

Figure 1: This graph uses data from the European bank stress test in 2011 to show the fraction of sovereign debt held in the form of domestic sovereign debt, aggregating across the banks in the data sample in each country. Country key: PL Poland, HU Hungary, MT Malta, NO Norway, PT Portugal, ES Spain, IT Italy, DE Germany, IE Ireland, SI Slovenia, LU Luxembourg, GB United Kingdom, FR France, NL Netherlands, FI Finland, BE Belgium, AT Austria, SE Sweden, DK Denmark, CY Cyprus.
STRESS IN BANKING SECTOR

**Figure**: Net Loans to Nonfinancial Corporations
Background: Capital Regulation

- Basel II:
  - Capital adequacy ratio = capital/risk-weighted assets
  - For riskier assets, banks need to set aside more capital
BACKGROUND: CAPITAL REGULATION

- **Basel II:**
  - Capital adequacy ratio = capital/risk-weighted assets
  - For riskier assets, banks need to set aside more capital
  - All Eurozone sovereigns’ bonds are treated risk-free by all members
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  - National discretion to assign zero-risk weight to domestic sovereigns
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▶ Basel II:

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▶ Basel III

▶ Retains the same risk-weighting idea but increases the minimum capital requirement (keeps preferential treatment).
BACKGROUND: CAPITAL REGULATION

- Basel II:
  - Capital adequacy ratio = capital/risk-weighted assets
  - For riskier assets, banks need to set aside more capital
  - All Eurozone sovereigns’ bonds are treated risk-free by all members
  - National discretion to assign zero-risk weight to domestic sovereigns

- Basel III
  - Retains the same risk-weighting idea but increases the minimum capital requirement (keeps preferential treatment).
  - Adds a leverage ratio that takes into account total assets.
Model Ingredients

- Bank intermediates resources between households, firms and the government.
MODEL INGREDIENTS

- **Bank** intermediates resources between households, firms and the government.
  - It faces a minimum capital requirement constraint that limits lending.
- **Firms’** technology is risky and they borrow from the bank to fund investment projects.
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- **Government** issues bonds and may default indiscriminately on all bonds.
- **Households** supply labor, consume and make deposits to the bank and foreign investors.
- **Foreign Investors** Buy bonds and take deposits.
Results: Workings of the Model

- Captures the behavior of bank portfolio over the business cycle and around default episodes.
  - Bank holds more sov. bonds and extends fewer loans just before a debt crisis.
  - After a default, capital requirement is more likely to bind...
**RESULTS: WORKINGS OF THE MODEL**

- Captures the behavior of bank portfolio over the business cycle and around default episodes.
  - Bank holds more sov. bonds and extends fewer loans just before a debt crisis.
  - After a default, capital requirement is more likely to bind
- Endogenous cost of default.
  - A rise in default risk leads to a decline in bank lending to firms.
  - The reduction in loan supply increases financing costs for firms, hampers investment and induces a drop in output.
  - The decline in output increases default risk further
POLICY COUNTERFACTUALS

- Higher capital requirement and a leverage ratio improves welfare.
  - Sovereign issues fewer bonds and the bank holds more of them
  - Yet, the default probability goes up
    - Risk-weighted capital ratios are higher which results in smaller decline in loans during default.
    - A smaller decline in consumption and output
    - Overall, consumption variability goes down.

- Replacing the capital adequacy requirement with a leverage ratio seems to lower welfare.
Related Literature

- **Sovereign default:**


- **Banking:**

**Households**

- Standard preferences: 
  
  \[ u(c, h) = \left( c_t - \frac{h_t^\eta}{\eta} \right)^{1-\sigma} / (1 - \sigma) \]

- Endowed with a unit of labor, \( h_t \) and \( \bar{d} \) units of perishable good

- Supply labor at a wage rate, \( w_t \),

- Deposit \( d^b \) to domestic banks (at rate \( r^d \)) and \( d^i \) to foreign investors (at rate \( r \))

- Buy/sell shares \( S_t \) of domestic banks.

- Receive firm profits \( \pi^f \) and transfers from the government, \( T_t \).
Firms

- One period lived heterogenous firms with access to an investment project
- Projects require a unit of loan from the bank at rate $r^\ell$
- The return to investment is

$$f(z_{t+1}, a^i, h_{t+1}) = \begin{cases} 
  z_{t+1}a^i h_{t+1}^\alpha & \text{with prob } p(z_{t+1}) \\
  0 & \text{with prob } 1 - p(z_{t+1})
\end{cases}$$

where
- $a^i \sim A$ is idiosyncratic productivity.
- $z_{t+1}$ is aggregate productivity with trans. matrix $F(z_t, z_{t+1})$
Firms (cont.)

- There is limited liability
- At the beginning of the period: observe $a^i$, decide to invest or not.
- If invest and successful decide whether to operate or not.
  - Operating firms are a subset of those that invested/successful ($p_t^+$)
- Firm expected profits are
  $$\pi_t^f = E \left[ \max \left\{ \max_{h_{t+1} \geq 0} \left\{ z_{t+1} a^i h_{t+1}^\alpha - w_{t+1} h_{t+1} - r_{t+1}^l \right\}, 0 \right\} \right]$$
Banking Sector

- Banks maximize expected discounted dividends

- At the beginning of the period
  - Extend loans to firms, $\ell_t$ (monopolist in the domestic loan market)
  - Purchase bonds $b_{t+1}$, if the bond market is open, at price $q_t$ (acts competitively in the bond market)
  - Using deposits, $d_t$, government bonds $b_t$ (if the sovereign did not default) and external funds, $-\tilde{s}_t$ at a cost $\phi(\tilde{s}_t)$

- Feasibility constraint in case of no default:
  \[ \ell_t + q_t b_{t+1} = d^b_t + b_t - \tilde{s}_t. \]
At this point, we can define bank equity capital

\[ e_t = \ell_t + q_t b_{t+1} - (\text{assets} - \text{liabilities}) \]

- Minimum capital requirements (risk-weighted)

\[ e_t \geq \varphi (\ell_t + \omega q_t b_{t+1}) \]

- Leverage ratio

\[ e_t \geq \varphi^{lev} (\ell_t + q_t b_{t+1}) \]
At the end of the period, $z_{t+1}$ realizes, and firm success/failure shocks are realized

- Receives returns on loans to firms ($p_{t+1}^+ \text{ fraction pays back}$)
- Pays interest on deposits,

Net available funds:

$$s_{t+1} = \tilde{s}_t + p_{t+1}^+ (1 + r_t^e) \ell_t - (1 + r^b) d_t - \phi(\tilde{s}_t)$$

Net payment to shareholders is

$$\Pi_{t+1} = s_{t+1} - \phi(s_{t+1}).$$
SOVEREIGN

- Maximizes utility of domestic households and has access to international bond markets

- It is not committed to repay, it chooses whether to default or not every period.

- If does not default, it issues debt, $B_{t+1}$, at a discount price $q_t$,

- Transfers the proceeds as a lump-sum to households $T_t$

- In case of default, the sovereign remains in autarky for a stochastic period of time (returns to credit markets with prob. $\mu$)
INTERNATIONAL INVESTORS

- They are risk-neutral and have unlimited access to funds at interest rate equal to $r \geq 0$.

- Expected profits on a loan of size $B_{t+1}$ at price $q_t$ are equal to

$$\Omega_t = -q_t(-B_{t+1}) + \frac{(1 - \lambda_t)}{(1 + r)}(-B_{t+1}),$$

where $\lambda_t$ is the probability of default.
TIMING

Initial sub-period:

1. Starting in state \( \{b_t, B_t, z_t\} \), firms draw \( a^i \).

2. If credit markets are open, government chooses \( D_t = \{0, 1\} \).
   - If \( D_t = 0 \), government decides \( B_{t+1} \) and bank \( b_{t+1} \) at price \( q_t \).
   - If \( D_t = 1 \), move into financial autarky and no bonds are issued.

3. The bank collects \( d_t \), extends loans \( \ell_t \) and decides on \( \tilde{s}_t \).

4. Firms choose whether to invest or not. Loan demand and supply determine \( r^\ell \).
Timing (cont.)

Final sub-period:

1. $z_{t+1}$ is realized and $p(z_{t+1})$ is determined.

2. Successful projects decide whether to operate or not: $p^+$.

3. HH's decide labor supply. Labor demand and supply determine $w_t$.

4. Total output and bank profits are determined.

5. Households receive government transfers, wages, payments from the bank and the corporate sector and consume.
**Households’ Problem**

Households maximize lifetime utility

\[
\max_{\{d^b_t, d^i_t, h_t, S_{t+1}\}_{t=0}^{\infty}} E_0 \left[ \sum_{t=0}^{\infty} \beta^t \left( \frac{c_t - h_t}{\eta} \right)^{1-\sigma} \right]
\]

s.t.

\[
d^b_t + d^i_t = \bar{d}
\]

\[
c_t + P_t S_{t+1} = w_t h_t + (1 + r)\bar{d} + (P_t + \Pi^b_t) S_t + \Pi^f_t - T_t.
\]
**Households’ Problem**

Households maximize lifetime utility

\[
\max_{\{d^b_t, d^i_t, h_t, S_{t+1}\}_{t=0}^\infty} \quad E_0 \left[ \sum_{t=0}^\infty \beta^t \frac{(c_t - \frac{h^\eta_t}{\eta})^{1-\sigma}}{1 - \sigma} \right]
\]

s.t.

\[
d^b_t + d^i_t = \bar{d} \\
c_t + P_t S_{t+1} = w_t h_t + (1 + r)\bar{d} + (P_t + \Pi^b_t)S_t + \Pi^f_t - T_t.
\]

FOC

\[
P = E_{z''|z'} \left[ \tilde{R} \cdot (\Pi'^b + P') \right],
\]

where \( \tilde{R} = \beta E_{z''|z'} \left[ \left( c' - \frac{h'^\eta}{\eta} \right)^{-\sigma} / \left( c - \frac{h^\eta}{\eta} \right)^{-\sigma} \right] \)
Firms’ Problem

- The investment threshold \( a^*(z, r^l, w) \) can be obtained from
  \[
  \pi^f(a^*, z, r^l, w) = 0
  \]

- The operating threshold \( a^+(z, z', r^l, w) \) can be determined from
  \[
  \pi^+(\hat{a}, z', r^l, w) = \max_{h \geq 0} \{ z' \alpha h^\alpha - wh - r^l \} = 0
  \]
  and
  \[
  a^+(z, z', r^l, w) = \max\{\hat{a}(z', r^l, w), a^*(z, r^l, w)\}
  \]
Firms’ Problem (cont.)

▶ Aggregate loan demand is

\[ \ell^d(z, r^\ell, w) = \int_{a^*(z, r^\ell, w)}^{\bar{a}} dA(a) = 1 - A(a^*(z, r^\ell, w)). \]

▶ The fraction of firms that repays the loan is

\[ p^+(z, w, r^\ell, z') = p(z') \frac{1 - A(a^+(z, w, r^\ell, z'))}{1 - A(a^*(z, w, r^\ell))}. \]

▶ Similarly, labor demand is

\[ H^d(z, w, r^\ell, z') = p(z') \int_{a^+(z, w, r^\ell, z')}^{\bar{a}} h(a, w, z') dA(a). \]
Investment Threshold and Loan Demand

Investment/Production Threshold $a^*$ and $a^+$

Panel (ii): Loan Demand $\ell(r^\ell, z_M)$
Domestic Bank Problem when $D = 0$

\[
W^{D=0}(b, B, z) = \max_{\ell, d \in [0, \tilde{d}], b', \tilde{s}} E \left[ \tilde{R}^{-1} (\Pi^b + W(b', B', z')) \right]
\]

s.t.

\[
\begin{align*}
\tilde{s} &= d + b - \ell - q(b', B', z)b', \\
e &= \ell + q(b', B', z)b' - d^b, \\
e &\ge \varphi (\ell + \omega q(b', B', z)b'), \\
s' &= \tilde{s} + p^+(z, r^\ell, z')(1 + r^\ell)\ell - (1 + r)d - \phi(\tilde{s}), \\
\Pi^b(s') &= s' - \phi(s'), \\
\ell &= \ell^d(z, w, r^\ell)
\end{align*}
\]
DOMESTIC BANK PROBLEM (CONT.)

\[ W^{D=1}(z) = \max_{\ell, d \in [0, \bar{d}], \tilde{s}} E \left[ \tilde{R}^{-1} (\Pi^b + \mu W^{D=0}(0, 0, z') + (1 - \mu)W^{D=1}(z)) \right] \]

s.t.

\[ \tilde{s} = d - \ell, \]
\[ e = \ell - d \geq \varphi \ell, \]
\[ s' = \tilde{s} + p^+(z, r^\ell, z')(1 + r^\ell)\ell - (1 + r)d - \phi(\tilde{s}), \]
\[ \Pi^b(s') = s' - \phi(s'), \]
\[ \ell = \ell^d(z, w, r^\ell) \]

\[ W(b, B, z) = D(b, B, z)W^{D=1}(z) + (1 - D(b, B, z))W^{D=0}(b, B, z). \]
**SOVEREIGN**

- Default decision is given by:

\[
V(b, B, z) = \max_{D\{0,1\}} \{V^{D=0}(b, B, z), V^{D=1}(z)\}.
\]
SOVEREIGN

- Default decision is given by:
  \[ V(b, B, z) = \max_{D\{0,1\}} \{ V^{D=0}(b, B, z), V^{D=1}(z) \} . \]

- Value of repayment is
  \[ V^{D=0}(b, B, z) = \max_{B'} E\beta \{ U(c', h^*) + V(b', B', z') \} \]

  \[ c' = p^+(z, r^\ell, z')(h^*)^\alpha + (B + b) \]

  \[ -q(b', B', z)(B' + b') - \phi(\tilde{s}) - \phi(s') - (1 - p^+(z, r^\ell, z')\ell) \]
**SOVEREIGN**

- Default decision is given by:
  \[
  V(b, B, z) = \max_{D \{0,1\}} \left\{ V_{D=0}^D(b, B, z), V_{D=1}^D(z) \right\}.
  \]

- Value of repayment is
  \[
  V_{D=0}^D(b, B, z) = \max_{B'} E\beta \left\{ U(c', h^*) + V(b', B', z') \right\}
  \]
  \[
  c' = p^+(z, r^l, z')z'(h^*)^\alpha + (B + b) - q(b', B', z)(B' + b') - \phi(\tilde{s}) - \phi(s') - (1 - p^+(z, r^l, z')\ell)
  \]

- Value of default is
  \[
  V_{D=1}^D(z) = E\beta \left\{ U(c', h^*) + [\mu V_{D=0}^D(0, 0, z') + (1 - \mu)V_{D=1}^D(z')] \right\}.
  \]
  \[
  c' = p^+(z, r^l, z')z'(h^*)^\alpha - \phi(\tilde{s}) - \phi(s') - (1 - p^+(z, r^l, z')\ell)
  \]
FOREIGN LENDERS

- Foreign lenders make zero expected profits.

- The equilibrium schedule of prices is

\[ q(b', B', z) = \frac{1 - \lambda(b', B', z)}{(1 + r)}. \]
**Recursive Competitive Equilibrium**

A recursive competitive equilibrium is defined as a set of policy functions \([c, h, ℓ, b', d, \tilde{s}, s', B', D, \Pi^b, \pi^f]\), thresholds \(\{a^*, a^+\}\) and prices \([q, r^ℓ, w]\) such that

- The allocations \([c, h]\) solve the household’s problem
- Policy functions \([b', d, \tilde{s}, s', \Pi^b]\) are consistent with bank optimization
- \([\pi^f, a^*, a^+]\) are derived from the solution to firm’s problem
- Default \(D\), bond \(B'\) and transfers \(T\) policies are the solution to government's problem
- Markets for loans, labor, shares and goods clear
- The price schedule \(q\) is such that investors make zero expected profits and the default probability is consistent with \(D\)
Quantitative Analysis

- Calibration using Spanish data.
  - Still rough
- Positive analysis: capital requirement a la Basel II
  - Decision rules
  - Long-run statistics and default event study
- Normative analysis: Policy counterfactuals
# Calibration

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk-Aversion</td>
<td>$\sigma$</td>
<td>2</td>
</tr>
<tr>
<td>Disc. Factor</td>
<td>$\beta$</td>
<td>0.96</td>
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<tr>
<td>Reentry prob.</td>
<td>$\mu$</td>
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<tr>
<td>Labor Supply Elast.</td>
<td>$\eta$</td>
<td>1.30</td>
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<tr>
<td>Avg. Agg. Prod.</td>
<td>$\bar{z}$</td>
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<tr>
<td>Labor Share</td>
<td>$\alpha$</td>
<td>0.66</td>
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<tr>
<td>Risk-free rate</td>
<td>$r$</td>
<td>0.02</td>
</tr>
<tr>
<td>Dep interest rate</td>
<td>$r^b$</td>
<td>0.02</td>
</tr>
<tr>
<td>Autocorrelation $z$</td>
<td>$\rho$</td>
<td>0.54</td>
</tr>
<tr>
<td>Min. failure prob.</td>
<td>$p(z^{min})$</td>
<td>0.96</td>
</tr>
<tr>
<td>Max. failure prob.</td>
<td>$p(z^{max})$</td>
<td>0.99</td>
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<tr>
<td>Capital Requirement</td>
<td>$\varphi$</td>
<td>0.04</td>
</tr>
<tr>
<td>Risk-weight</td>
<td>$\omega$</td>
<td>0.00</td>
</tr>
<tr>
<td>Std. Dev. TFP (%)</td>
<td>$\sigma_{\varepsilon}$</td>
<td>2.56</td>
</tr>
<tr>
<td>Max. value deposits</td>
<td>$\bar{d}$</td>
<td>0.28</td>
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<tr>
<td>Equity issuance</td>
<td>$\phi_0^{D=0}$</td>
<td>0.20</td>
</tr>
<tr>
<td>Equity issuance</td>
<td>$\phi_0^{D=1}$</td>
<td>0.18</td>
</tr>
<tr>
<td>Min prod.</td>
<td>$a$</td>
<td>0.20</td>
</tr>
<tr>
<td>Max prod.</td>
<td>$\bar{a}$</td>
<td>0.45</td>
</tr>
</tbody>
</table>
## Calibration Targets

<table>
<thead>
<tr>
<th>Moment</th>
<th>Model</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std. Dev. Output</td>
<td>2.58</td>
<td>3.13</td>
</tr>
<tr>
<td>Deposit to Loan Ratio</td>
<td>95.69</td>
<td>94.83</td>
</tr>
<tr>
<td>Loans to Asset Ratio</td>
<td>63.69</td>
<td>84.62</td>
</tr>
<tr>
<td>Bank Equity to Asset Ratio</td>
<td>12.33</td>
<td>19.13</td>
</tr>
<tr>
<td>Bank bonds to Gov. Bond ratio</td>
<td>43.00</td>
<td>79.15</td>
</tr>
<tr>
<td>Avg. spreads in Spain</td>
<td>1.49</td>
<td>1.96</td>
</tr>
</tbody>
</table>
Capital Requirements in Periods of Distress

- Capital requirement restricts banks leverage ratio $\ell \geq d/(1 - \varphi)$
- Costly equity issuance results in a binding capital requirement
Role of Bank’s Bond Holdings and Cap. Req.

- Holdings of sovereign bonds expands the sources of funds
- New savings relaxes the capital requirement constraint
- When government debt is risk-free loan mkt eq. not affected
LoAN MARKET: DEFAULT - NON-DEFAULT

- Sovereign risk affects the risk/return trade-off and balance sheet composition
Balance Sheet Composition and Default Risk

Panel (i): Loan Decision $\ell(b, B, z)$ at $z_M$

Panel (ii): Bond Decision $b'(b, B, z)$ at $z_M$

- Low equity issuance costs translate reinforces the role of sovereign risk in shaping the balance sheet composition
Government Default Set

Government Default Decision $D(b,B,z_M)$

Gov. Debt (B)
Bank Bond Holdings (b)

Boz, D'Erasmo, Durdu
**Equilibrium Price Schedule**

Government Bond Price Schedule $q(b, B, z_M)$

Bank Bond Holdings ($b$) vs. Gov. Debt ($B$)
DYNAMICS AROUND DEFAULT: MACRO AGGREGATES
DYNAMICS AROUND DEFAULT: INTEREST RATES
Counterfactuals
# Counterfactual Experiments

<table>
<thead>
<tr>
<th>Moment</th>
<th>Benchmark</th>
<th>Higher CR</th>
<th>Basel III</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\phi = 0.04$</td>
<td>$\omega = 0$</td>
<td>$\phi = 0.06$</td>
<td>$\omega = 0$</td>
</tr>
<tr>
<td>$\omega = 0$</td>
<td></td>
<td></td>
<td>$\omega = 0$</td>
</tr>
<tr>
<td>$\phi_{lev} = 0.04$</td>
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<tr>
<td>Bank cap. Ratio %</td>
<td>19.59</td>
<td>19.71</td>
<td>19.72</td>
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<tr>
<td>Bank Loans / Assets %</td>
<td>84.23</td>
<td>84.20</td>
<td>84.20</td>
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<tr>
<td>$r^\ell$ %</td>
<td>23.74</td>
<td>23.72</td>
<td>23.72</td>
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<tr>
<td>$b/B$ %</td>
<td>82.47</td>
<td>90.39</td>
<td>90.39</td>
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<tr>
<td>$B/y$ %</td>
<td>12.84</td>
<td>11.96</td>
<td>11.96</td>
</tr>
<tr>
<td>Sov. Spread %</td>
<td>1.05</td>
<td>1.33</td>
<td>1.33</td>
</tr>
<tr>
<td>$\sigma(c)$ %</td>
<td>1.76</td>
<td>1.62</td>
<td>1.62</td>
</tr>
<tr>
<td>$\alpha(b, B, z)$ %</td>
<td>0.0342</td>
<td>0.0341</td>
<td></td>
</tr>
</tbody>
</table>

- Reduction in level of government debt but a larger fraction in domestic hands
- Spread increase, restricting leverage reduces costs of default
- Welfare increases in both cases: consumption volatility diminishes
Relaxing Preferential Treatment

<table>
<thead>
<tr>
<th>Moment</th>
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<th>Basel III</th>
<th>Higher weights</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>$\varphi = 0.06$</td>
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<tr>
<td></td>
<td></td>
<td>$\omega = 0$</td>
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<tr>
<td></td>
<td></td>
<td>$\varphi^{lev} = 0.04$</td>
<td>$\varphi^{lev} = 0.04$</td>
</tr>
<tr>
<td>Cap. Ratio %</td>
<td>19.59</td>
<td>19.72</td>
<td>19.72</td>
</tr>
<tr>
<td>Loans / Assets %</td>
<td>84.23</td>
<td>84.20</td>
<td>84.20</td>
</tr>
<tr>
<td>$b/B$ %</td>
<td>82.47</td>
<td>90.39</td>
<td>90.39</td>
</tr>
<tr>
<td>$B/y$ %</td>
<td>12.84</td>
<td>11.96</td>
<td>11.96</td>
</tr>
<tr>
<td>Sov. Spread %</td>
<td>1.050</td>
<td>1.333</td>
<td>1.333</td>
</tr>
<tr>
<td>$\sigma(c)$ %</td>
<td>1.76</td>
<td>1.62</td>
<td>1.62</td>
</tr>
<tr>
<td>$\alpha(b, B, z)$ %</td>
<td>0.0341</td>
<td>0.0342</td>
<td>0.0346</td>
</tr>
</tbody>
</table>

- Welfare increases with risk weight: significant reduction in consumption volatility
- Non linear response of spreads and debt levels

Boz, D’Erasmo, Durdu
CONCLUSION

▶ The model captures salient features of the behavior of bank loans and banks holdings of sovereign debt.

▶ Increasing risk-weighted capital requirements as well as introducing leverage ratios in addition to capital requirements improve welfare.

▶ A lot of work to do:
  ▶ Improve calibration and perform further tests
  ▶ More counterfactuals: counter-cyclical buffers