No Longer Too Big to Fail

EXTREMELY PRELIMINARY RESULTS

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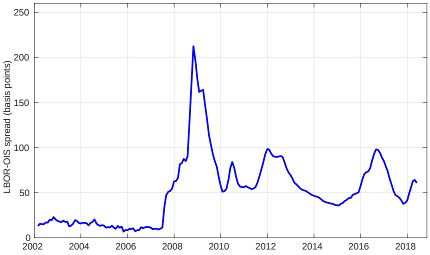
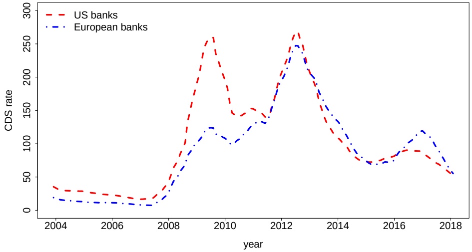
Big-bank credit spreads got much higher after the crisis



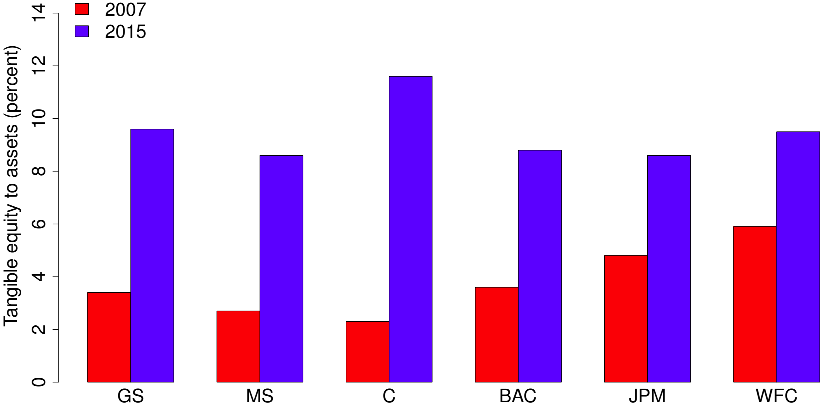
(a) One-year LIBOR-OIS spreads



(b) 5-year CDS rates.

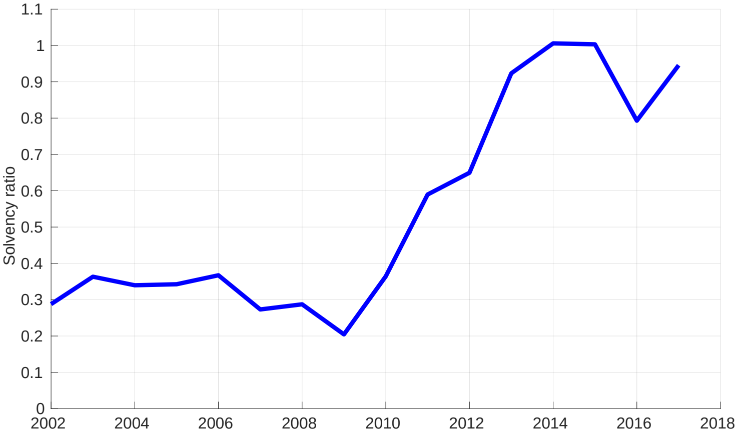
Figure: (a) Spread between one-year USD LIBOR and one-year OIS (Fed funds). (b) Averages of the 5-year CDS rates of five U.S. banks (JPM, Citi, BAC, MS, GS) and of five European banks (Deutsche Bank, BNP, SocGen, Barclays, RBS). Data source: Bloomberg.

Is this consistent with the improved capitalization of big banks?



Ratio of tangible equity to assets. Data source: Holding company 10K filings.

The solvency buffers of big U.S. banks have gotten much larger

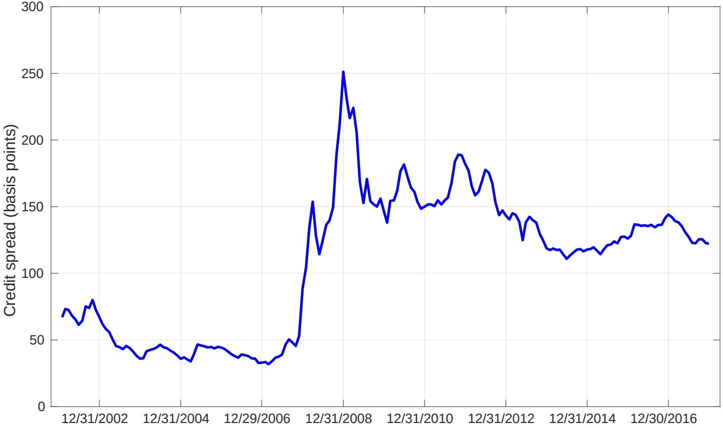


Tangible equity divided by an estimate of the standard deviation of the annual change in asset value. Asset-weighted averages. Data: 10Ks of JPM, BOA, CITI, WF, GS, MS, ML, LB, BS, including preceding mergers, pro forma.

Presumably, lenders to large banks have reduced their beliefs in bailouts

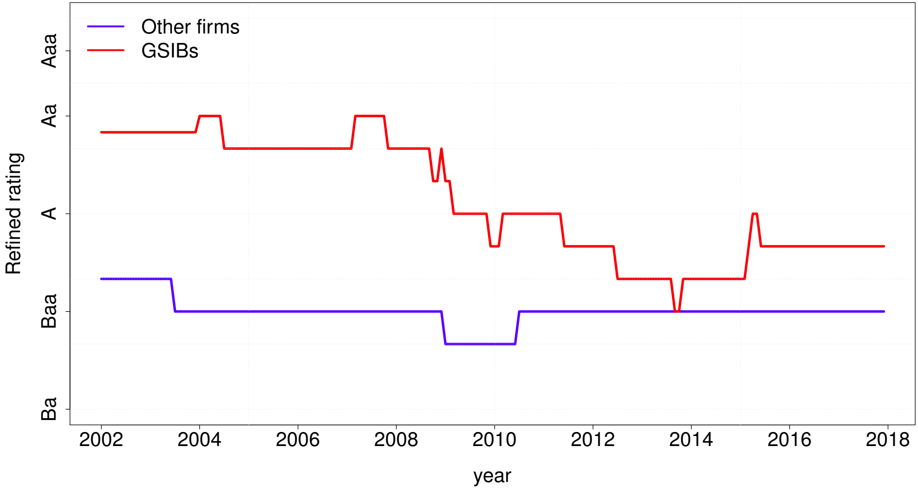
- The EU Bank Recovery and Resolution Directive and Title II of the U.S. Dodd-Frank Act have shifted expected insolvency losses from taxpayers to wholesale creditors.
- Similar single-point-of-entry failure resolution approaches apply in Switzerland (FINMA) and Japan.
- Conditional on the insolvency of a big bank, we estimate significantly reduced market-implied probabilities of bailout.
- We estimate corresponding increases in credit spreads at a given distance to default, and associated reductions in equity subsidies and subsidy-induced leverage.

Estimated 5-year CDS rates of big banks at a fixed distance to default



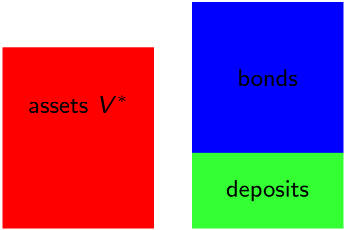
Preliminary estimate for U.S. G-SIB holding companies at a distance to default of 2.

Sovereign uplifts have disappeared from big-bank credit ratings



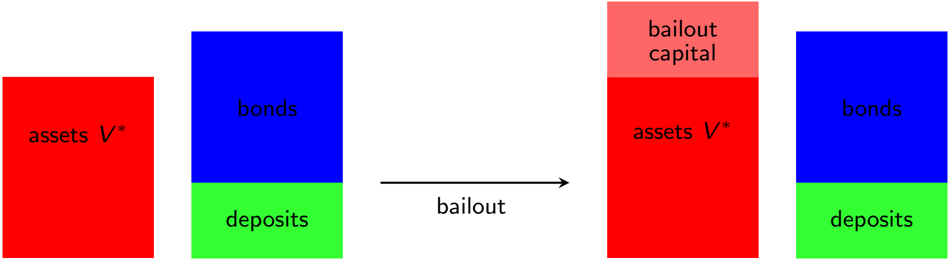
Data source: Moody's Investor Service. Ratings are adjusted for Watchlist and Outlook

Balance sheet at insolvency



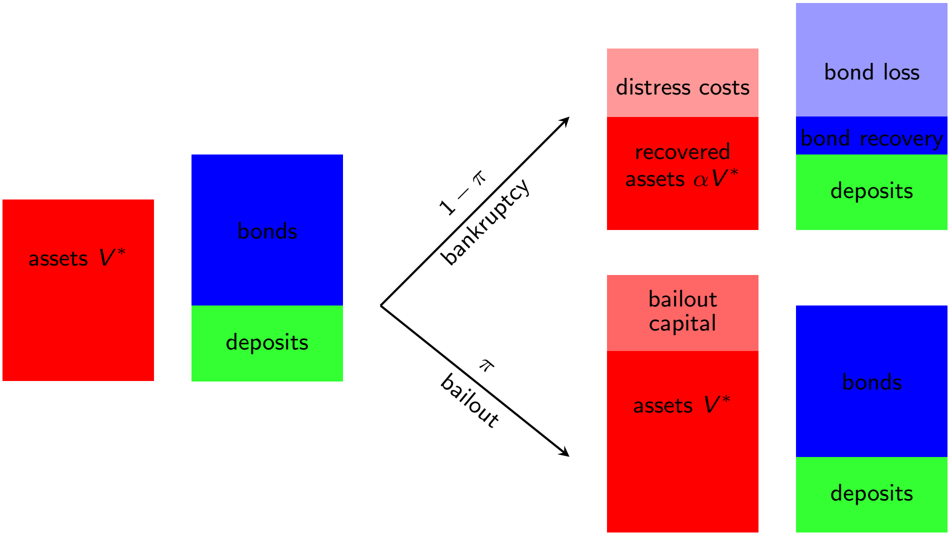
The firm chooses to default when its assets hit some endogenous boundary V^*.

The bailout model

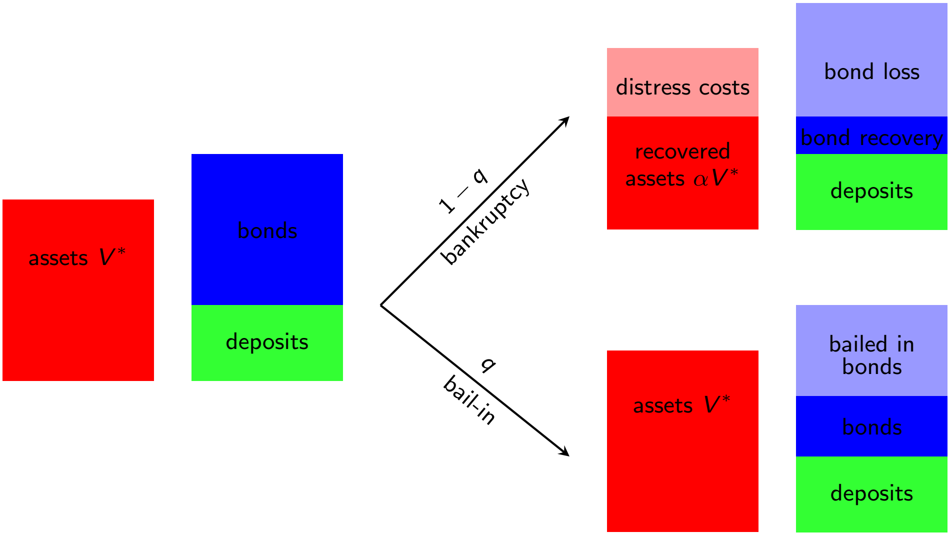


The modeled bailout, if it occurs, injects enough government capital to increase the market value of the bonds to par, giving all equity to the government.

Unpredictable bailout



Conditional on no bailout: bankruptcy or bail-in



Reference: Neuberg, Glasserman, Kay, Rajan (2016).

Simplified model of a bank

- The bank's assets in place satisfy

$$dV_t = (r - k)V_t\,dt + \sigma V_t\,dZ_t,$$

  for a "risk-neutral" standard brownian motion Z, where r is the risk-free rate and k is the proportional rate of net revenue.

- Risk-free deposits of size D bear interest at rate R.

- Bonds have constant total principle P and coupon rate c, with an exponentially decaying maturity structure and average maturity $1/m$. (Leland, 1994)

- Maturing bonds are replaced with new issues at competitive market prices.

The optimal default time

- Extending Leland (1994), the optimal default time is $\inf\{t : V_t \leq V^*\}$, where V^* is an explicitly solved optimal default boundary.

- The market value of the bailout subsidy is

$$\pi \left(\frac{V_t}{V^*} \right)^{-\gamma} (V_0 - V^* - H_0),$$

where V_0 is the asset level at which bonds are par valued and equity value is H_0, and where

$$\gamma = \frac{r - k - \sigma^2/2 + \sqrt{(r - k - \sigma^2/2)^{1/2} + 2r\sigma^2}}{\sigma^2}.$$

The panel regression step

- For a given firm i, time t, fixing the default boundary V^*, the market CDS rate is proportional to the estimated no-bailout probability $1 - p_{it}$.
- The distance to default $d_{it}(p_{it})$ of firm i at date t is the number of standard deviations of annual asset growth separating $\log V_0$ from $\log V^*$.
- For given p_{it} and from 1.6 million observed CDS rates from 2002-2017 for 855 public firms including a subset B of GSIBs, we estimate

$$\log \frac{\mathrm{CDS}_{it}}{1 - p_{it}} = \alpha + \beta d_{it}(p_{it}) + \gamma 1_{i \in B} + \sum_m \delta_m 1_{t \in m} + \phi 1_{i \in B,\, t \,\in\, \mathrm{post\,crisis}} + \epsilon_{it}.$$

- We also include crisis fixed effects, DSIB fixed effects, sectoral fixed effects, and other controls.

Fitting post-crisis reductions in bailout probabilities

- We allow non-zero bailout probabilities for big banks only:

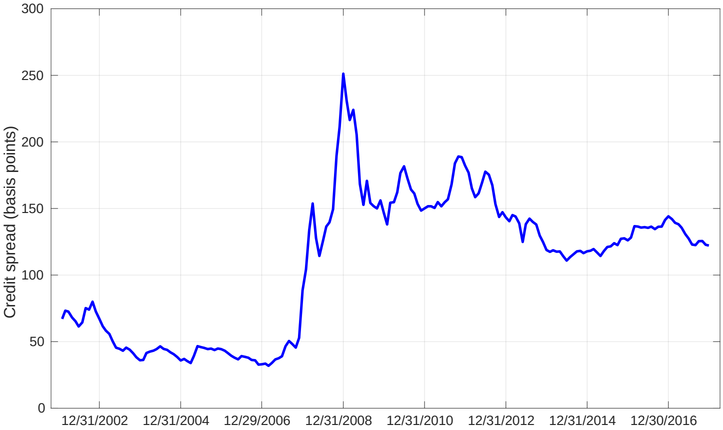
$$\begin{aligned} p_{it} &= \pi_{\text{pre}}, \qquad \text{pre crisis} \\ &= \pi_{\text{post}}, \qquad \text{post crisis.} \end{aligned}$$

- We assume no post-crisis change in average default-risk premia for big banks relative to other firms.

- We therefore search for π_{pre} and π_{post} that generate a zero estimate for ϕ, the big-bank post-crisis fixed effect.

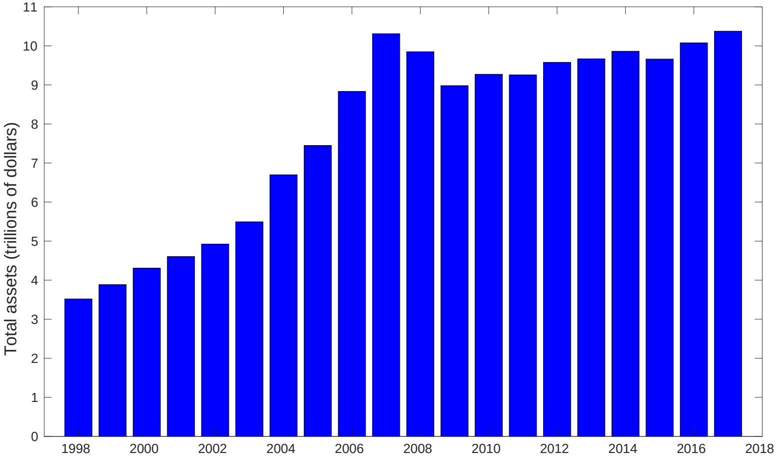
- π_{pre} and π_{post} cannot both be identified, so we estimate π_{pre} for stipulated π_{post}.
  - For example, setting $\pi_{\text{post}} = 0.2$, we estimate $\pi_{\text{pre}} = 0.65$.
  - For $\pi_{\text{post}} = 0.0$, we estimate $\pi_{\text{pre}} = 0.55$.

Estimated 5-year CDS rates of a big bank at a fixed distance to default



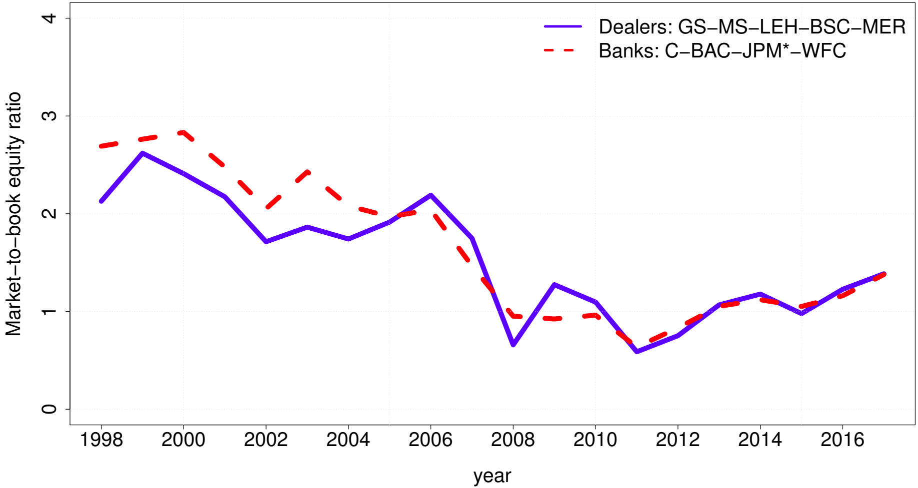
U.S. G-SIBs at a distance to default of 2, for $\pi_{\text{post}} = 0.2$ and fitted $\pi_{\text{pre}} = 0.65$.

Total tangible assets of the largest U.S. banks



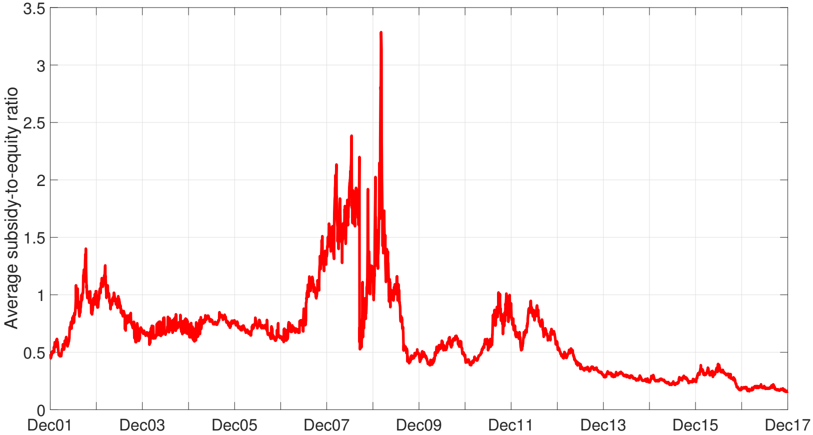
Data source: Tangible assets, from 10Ks of JPM, BOA, CITI, WF, GS, MS, LB, BS.
JPM and BOA include preceding mergers, pro forma.

Market-to-book equity ratios of big banks



Asset-weighted averages. J.P. Morgan includes preceding mergers, pro forma.

Average ratio of GSIB estimated bailout subsidy to equity market value



For $\pi_{\mathrm{post}} = 0.2$ and fitted $\pi_{\mathrm{pre}} = 0.65$, average of BoA, MS, C, JPM, GS, BNYM, WF.

Appendix: Theoretical default boundary with bailout

For the case $D < \alpha V^*$,

$$V^* = \frac{\gamma\left(\frac{\frac{RD}{r} - \kappa(cP+RD)}{r} - D + \pi(V_0 - H_0)\right) + \eta\left(\frac{cP+mP}{r+m} - \pi P + (1-\pi)D\right)}{1 + \gamma(1-\pi)(1-\alpha) + \gamma\pi + \eta\alpha(1-\pi)}.$$

For the case $D > \alpha V^*$,

$$V^* = \frac{\gamma\left(\frac{\frac{RD}{r} - \kappa(cP+RD)}{r} - D + \pi(V_0 - H_0)\right) + \eta\left(\frac{cP+mP}{r+m} - \pi P\right)}{1 + \gamma(1-\pi)(1-\alpha) + \gamma\pi}.$$