

# Payout Restrictions and Bank Risk-Shifting

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# Motivation

## **Financial Sector 2008:**

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  - Example: Merrill Lynch raised dividends by 100%
- Same banks defaulted on debt and required public assistance
- How to align incentives across claim holders?

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## **How do payout restrictions affect bank equity and debt prices in a recession?**

- Effect on risk-taking?

# This Paper

## Three Theoretical Predictions

- ➊ Payout restrictions lower equity value
- ➋ Payout restrictions raise debt value
- ➌ Complementarity of payouts and risk-taking

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## High-frequency empirical evidence consistent with risk-shifting

- 06/25/2020: Equity values fall by 2 percent
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- 12/18/2020: Both effects reverse

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## Implications for risk-taking

- Riskier lending surges after lifting of restrictions
- Spreads on risky lending fall

# Literature Review

**Banking Regulation (Micro and Macro):** Acharya et al (2011), Acharya-Drechsler-Schnabl (2013), Acharya-Le-Shin (2016), Allen et al. (2018), Admati et al. (2012), Atkeson et al. (2018), d'Avernas-Bigio (2019), Baron (2020), Begenau (2020), Begenau-Landvoigt (2021), Bergant-Forbes (2021), Berndt-Duffie-Zhu (2020), Brunnermeier-Sannikov (2014, 2016), Corbae-D'Erasmus (2020), Corbae-Levine (2020), Flannery-Hirtle-Kovner (2017), Floyd-Li-Skinner (2015), Gennaioli et al. (2014), Gropp et al. (2019), Hirtle (2014), Kelly-Lustig-van Nieuwerburgh (2016), Repullo-Suarez (2013), Sarin-Summers (2016), Smets (2014)

**Corporate Finance: Payout Policy, Risk-Shifting and Multi-Tasking:**

Acemoglu-Kremer-Mian (2008), Damodaran (1989), Handjinicolaou-Kalay (1984), Jensen-Meckling (1976), Kahle-Stulz (2020), Kroen (2021), Ma (2020), Mota (2021)

**Banking and Regulatory Response to COVID crisis:** Acharya-Engle-Steffen (2020), Becker-Benmelech (2021), Chodorow-Reich et al. (2021), Demirguc-Kunt et al. (2020), Greenwald-Krainer-Paul (2021), Haddad-Moreira-Muir (2021), Hardy (2021), Kargar et al. (2020), Schrimpf-Shin-Sushko (2020), Svoronos-Vrbaski (2020)



Model

# Model I

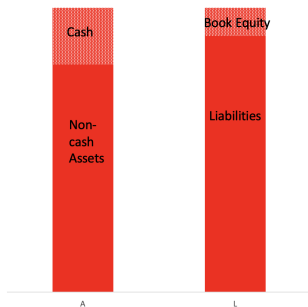
## Setup

- Partial Equilibrium;  $t = 0, 1$
- Assets ( $c, a$ ) and Liabilities  $\ell$  in place at  $t = 0$ ,  $a \sim U(\underline{a}, \bar{a})$ ,  $\underline{a} > 0$
- Franchise value  $V > 0$  if solvent at  $t = 1$
- Key decision: Dividend  $d \in [0, c]$  paid at  $t = 0$

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Comparison: Unconstrained shareholders vs. Payout restriction ( $d = 0$ )

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### Property I Risk-shifting region

- Mathematically:  $V < V^*$
- There is a region where debt and equity strictly diverge
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  - 2 Debt Value  $\uparrow$  if payout restriction

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Add 2nd choice:  $a \sim U(\underline{a}, \bar{a})$  vs.  $a \sim U(\underline{a} - \epsilon, \bar{a} + \epsilon)$

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## Property II Complementarity of payouts and risk-taking

- No restriction:  $d = c, a \sim U(\underline{a} - \epsilon, \bar{a} + \epsilon)$
- Payout restriction:  $d = 0, a \sim U(\underline{a}, \bar{a})$
- Condition: Intermediate continuation value  $V$  and leverage  $\ell$

## Empirical Setting



# Data and Institutional Setting

## Data

Equity Prices

CRSP, TAQ

Debt Pricing

TRACE, Markit

Accounting Data and Lending FR-Y9C, Compustat, Thomson One

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## Payout Restrictions for Largest US Banks

06/25/2020 4.30 ET  $Div_{it} \leq \min\{Div_{i,t-1}, \bar{\Pi}_{i,t-4}^t\} \quad \& \quad BB_{it} = 0$

12/18/2020 4.30 ET  $Div_{it} + BB_{it} \leq \bar{\Pi}_{i,t-4}^t$

03/25/2021 4.30 ET Remaining restrictions lifted for Jun 30, 2021

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## Identification Challenges

News about Assets vs. Wealth Redistribution  $\Rightarrow$  Debt response

Confounding industry-wide shocks  $\Rightarrow$  High-frequency approach

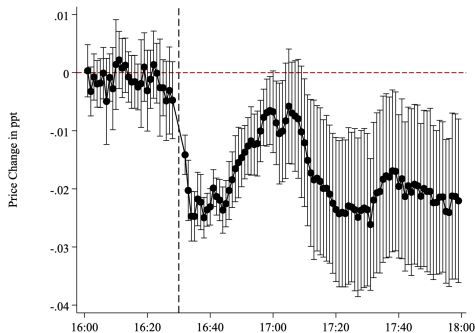
Event 1: June 25, 2020

# Equity Values fall and Debt Values rise

$$P_{it} = \alpha_i + \alpha_t + \sum_{\substack{\tau=16:00 \\ \tau \neq 16:30}}^{18:00} \beta_{\tau} \mathbf{1}_{t=\tau} CCAR\ Bank_i + \epsilon_{it}$$

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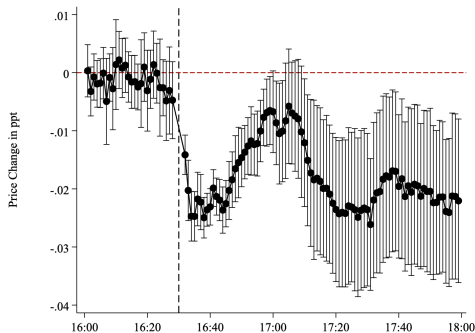
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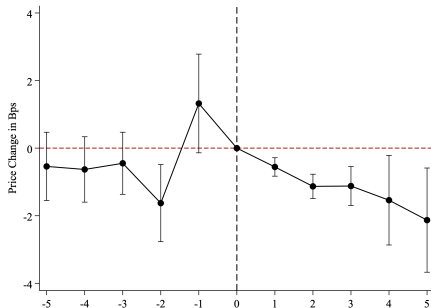
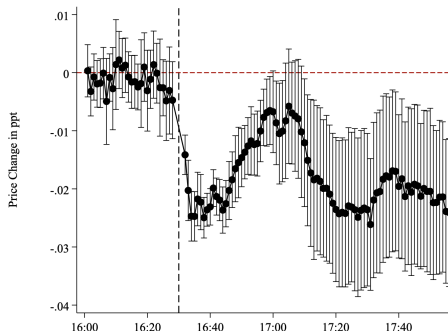
$$\text{Spread}_{it} = \alpha_i + \alpha_{t,r} + \sum_{\substack{\tau=-5 \\ \tau \neq 0}}^5 \gamma_{\tau} \mathbf{1}_{t=\tau} \text{CCAR Bank}_i + \delta_1 \text{CCAR Bank}_i + \delta_2 X_{it} + \epsilon_{it}$$



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- Equity and Debt Values diverge  $\Rightarrow$  Counter to Bad News
- Corporate Bond Yields fall
- Equity decline persists

Bond Response Jun 25

Stock Level Response

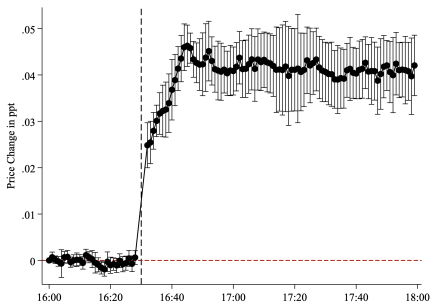
CAR



## Event 2: December 18, 2020

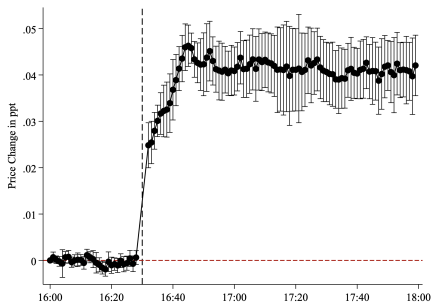
# Equity Values rise and Debt Values fall

## Equity Response

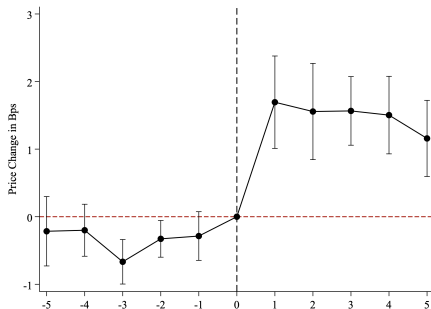


# Equity Values rise and Debt Values fall

## Equity Response



## CDS Response



- Reversal of previous effects
- Corporate bond yields rise
- Equity increase persists

Bond Response Dec 18

Stock Level Response

CAR

# Further Results on Equity and Debt Values

- March 25, 2021: Lifting of remaining restrictions Equity Response Mar 25
- International Evidence Eurozone UK
  - Eurozone equity response larger
- Heterogeneity Analysis Heterogeneity
  - Largest equity drops for least capitalized banks
- Government Guarantees: Break-even Analysis Government Guarantees
  - High insurance for short-term debt, no insurance for long-term debt

## Effects on Lending

## Riskier Lending surges when Restrictions are lifted

- Test if CCAR banks change risk-taking around Dec 18, 2020
- Risk measure: IG vs. below IG

$$\log(\text{Loans}_{ijbt}) = \alpha_{b,t} + \beta_1 \text{Post}_t \text{nonIG}_{ijb} + \beta_2 \text{nonIG}_{ijb} + \gamma X_{ijbt} + \epsilon_{ijbt}$$

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|                | (1)               | (2)               | (3)               |
|----------------|-------------------|-------------------|-------------------|
| Post           | 0.10<br>(0.06)    |                   |                   |
| nonIG          | 3.66*<br>(1.83)   | 3.73*<br>(1.90)   | 2.68<br>(1.77)    |
| Post x nonIG   | 0.34***<br>(0.08) | 0.37***<br>(0.08) | 0.33***<br>(0.08) |
| N              | 5022              | 5022              | 5022              |
| R <sup>2</sup> | 0.18              | 0.19              | 0.21              |
| Bank Controls  | x                 | x                 |                   |
| Bank FE        |                   | x                 |                   |
| Time FE        |                   | x                 |                   |
| Bank-Time FE   |                   |                   | x                 |

# Lower Spreads despite Riskier Loans

- ① Riskier lending and higher interest rates
- ② Riskier lending but interest rates constant or falling



# Lower Spreads despite Riskier Loans

- 1 Riskier lending and higher interest rates
- 2 Riskier lending but interest rates constant or falling

$$Spread_{ijbt} = \alpha_{b,t} + \beta_1 Post_t nonlG_{ijb} + \beta_2 nonlG_{ijb} + \gamma X_{ijbt} + \epsilon_{ijbt}$$

|                | (1)                   | (2)                  | (3)                 |
|----------------|-----------------------|----------------------|---------------------|
| Post           | 0.43<br>(3.58)        |                      |                     |
| nonlG          | 436.99***<br>(141.36) | 335.76**<br>(138.72) | 358.31*<br>(172.14) |
| Post x nonlG   | -26.40***<br>(8.73)   | -29.09**<br>(9.76)   | -22.35**<br>(9.67)  |
| N              | 3814                  | 3814                 | 3814                |
| R <sup>2</sup> | 0.37                  | 0.40                 | 0.42                |
| Bank Controls  | x                     | x                    |                     |
| Bank FE        |                       | x                    |                     |
| Time FE        |                       | x                    |                     |
| Bank-Time FE   |                       |                      | x                   |

# Conclusion

## This Paper

- Study imposing & lifting of payout restrictions on banks

## Lessons

- ➊ Payout restrictions redistribute between equity and debtholders
  - With restrictions, equity values fall and debt values rise
  - Higher capital buffers (\$60 billion Tier-1 capital)
- ➋ Payout restrictions mitigate risk-taking

## Outlook

- Trade-off: Safer banks vs. excessively cautious banks
- Expectations about payout restrictions in next crisis?

Backup

## Model Details

- $\ell \in [c + \underline{a}, c + \bar{a}]$
- If default: fraction  $\phi < 1$  of loss re-imbursed to debtholders

Solvency at  $t = 1$  requires  $a \geq \hat{a}(d)$  where:

$$\hat{a}(d) = \ell + d - c$$

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Solvency at  $t = 1$  requires  $a \geq \hat{a}(d)$  where:

$$\hat{a}(d) = \ell + d - c$$

- If default: fraction  $\phi < 1$  of loss  $\ell + d - c - a$  re-imbursed to debtholders
  - Reduced-form government guarantees
- Shareholders:
  - $\max_d \underbrace{d}_{t=0 \text{ Payoff}} + \underbrace{Pr(a \geq \hat{a}(d))}_{\text{Survival Probability}} \underbrace{(E[a - \hat{a} | a \geq \hat{a}(d)] + V)}_{t=1 \text{ Payoff}}$
- Derive equilibrium debt value as a function of  $d$

## Model Details II

Payoff remains convex in  $d \implies d = 0$  or  $d = c$

|         | $U(\underline{a}, \bar{a})$ | $U(\underline{a} - \epsilon, \bar{a} + \epsilon)$ |
|---------|-----------------------------|---|
| $d = 0$ | $EV(0, \text{safe})$        | $EV(0, \text{risky})$                             |
| $d = c$ | $EV(c, \text{safe})$        | $EV(c, \text{risky})$                             |

Conditions for Complementarity:

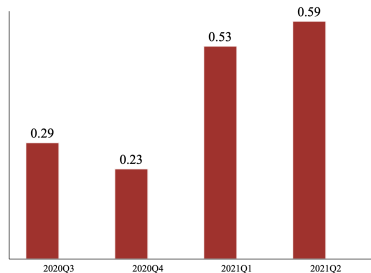
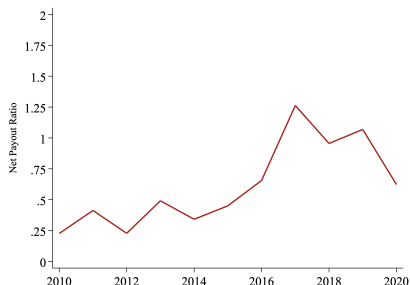
- 1  $EV(c, \text{risky})$  is unconstrained optimal choice
- 2  $EV(0, \text{safe}) > EV(0, \text{risky})$

Technically:

- 1  $\underline{\ell} = \max\left\{\frac{\bar{a} + \underline{a}}{2}, \underline{a} + c\right\} < \ell < \frac{\bar{a} + \underline{a}}{2} + c$
- 2  $\underline{V} < V < \bar{V}$ 
  - $\bar{V} = \ell - \underline{a} - \frac{c}{2}$
  - $\underline{V} = \frac{\ell^2 - \bar{a}\ell - \underline{a}\ell + \bar{a}\underline{a}}{2\ell - \bar{a} - \underline{a}}$

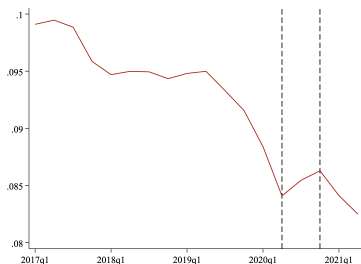
# Evolution of Payouts

$$\text{Net Payout Ratio} = \frac{\text{Div}_t + \text{BB}_t - \text{Iss}_t}{\text{Net Income}_t}$$

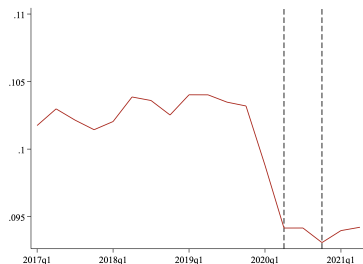


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# Leverage falls when Payouts are restricted



CCAR Banks



non-CCAR banks

- ▶ Leverage falls for CCAR banks when payout restrictions are imposed
- ▶ No such development for large banks outside CCAR



# Summary Statistics Banks

|                   | CCAR Banks 2019 |        | Large non-CCAR Banks 2019 |       |
|-------------------|-----------------|--------|---------------------------|-------|
|                   | mean            | sd     | mean                      | sd    |
| Total Assets      | 675.86          | 796.98 | 74.46                     | 62.39 |
| Total Liabilities | 604.48          | 717.28 | 67.07                     | 58.34 |
| Capital Ratio     | 11.26           | 1.65   | 12.90                     | 4.43  |
| RoE               | 0.03            | 0.02   | 0.04                      | 0.03  |
| Dividends         | 0.61            | 0.81   | 0.07                      | 0.07  |
| Share Repurchases | 1.77            | 2.59   | 0.19                      | 0.33  |
| Issuance          | 0.20            | 0.49   | 0.04                      | 0.12  |
| Net Payout Ratio  | 0.92            | 0.60   | 0.65                      | 0.89  |
| Observations      | 88              |        | 61                        |       |

Average over 2019 summary statistics for banks

|                   | CCAR Banks 2020 Q3 |        | Large non-CCAR Banks 2020 Q3 |       |
|-------------------|--------------------|--------|------------------------------|-------|
|                   | mean               | sd     | mean                         | sd    |
| Total Assets      | 757.82             | 922.89 | 91.18                        | 92.80 |
| Total Liabilities | 685.12             | 842.18 | 83.18                        | 86.61 |
| Capital Ratio     | 11.82              | 2.03   | 12.40                        | 4.12  |
| RoE               | 0.03               | 0.01   | 0.03                         | 0.03  |
| Dividends         | 0.58               | 0.76   | 0.08                         | 0.08  |
| Share Repurchases | 0.04               | 0.13   | 0.03                         | 0.09  |
| Issuance          | 0.10               | 0.23   | 0.00                         | 0.00  |
| Net Payout Ratio  | 0.23               | 0.35   | 0.09                         | 1.00  |
| Observations      | 22                 |        | 16                           |       |

Balance Sheet variables in billions. RoE is quarterly.

# Summary Statistics I

| Variable                     | Obs   | Mean     | Std. Dev. | P10      | P50     | P90      |
|------------------------------|-------|----------|-----------|----------|---------|----------|
| Normalized Price             | 57295 | 1.001    | .038      | .986     | 1       | 1.011    |
| Shares Outstanding in 1,000s | 57436 | 409611.1 | 988584.5  | 12934    | 108613  | 948380   |
| Size of Trade                | 57436 | 4531.284 | 32203.92  | 2        | 75      | 4630.667 |
| Market Value in \$1,000      | 57436 | 3.02e+07 | 1.30e+08  | 29984.55 | 1057751 | 5.87e+07 |

TAQ Summary statistics: June 25, 2020

| Variable                     | Obs   | Mean     | Std. Dev. | P10     | P50     | P90      |
|------------------------------|-------|----------|-----------|---------|---------|----------|
| Normalized Price             | 85372 | 1.003    | .022      | .996    | 1       | 1.012    |
| Shares Outstanding in 1,000s | 85906 | 366738.7 | 1041450   | 18732   | 99236   | 789392   |
| Size of Trade                | 85906 | 24022.6  | 155797.2  | 3       | 125     | 17827    |
| Market Value in \$1,000      | 85906 | 3.18e+07 | 1.34e+08  | 85190.4 | 2687889 | 6.60e+07 |

TAQ Summary statistics: December 18, 2020

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# Summary Statistics II

|              | Financial Sector (excl. CCAR Banks) |      | CCAR Banks |      |
|--------------|-------------------------------------|------|------------|------|
|              | mean                                | sd   | mean       | sd   |
| Spread - 1Y  | 0.77                                | 1.41 | 0.35       | 0.20 |
| Spread - 2Y  | 0.94                                | 1.47 | 0.48       | 0.26 |
| Spread - 3Y  | 1.12                                | 1.60 | 0.56       | 0.29 |
| Spread - 5Y  | 1.44                                | 1.74 | 0.77       | 0.38 |
| Spread - 10Y | 1.74                                | 1.74 | 1.05       | 0.48 |
| Spread - 20Y | 1.73                                | 1.58 | 1.19       | 0.55 |
| Spread - 30Y | 1.76                                | 1.56 | 1.22       | 0.53 |
| Observations | 5497                                |      | 350        |      |

CDS spreads around 06/25/2020

|              | Financial Sector(excl. CCAR Banks) |      | CCAR Banks |      |
|--------------|------------------------------------|------|------------|------|
|              | mean                               | sd   | mean       | sd   |
| Spread - 1Y  | 0.64                               | 1.25 | 0.26       | 0.10 |
| Spread - 2Y  | 0.78                               | 1.31 | 0.36       | 0.17 |
| Spread - 3Y  | 0.95                               | 1.47 | 0.44       | 0.22 |
| Spread - 5Y  | 1.27                               | 1.65 | 0.65       | 0.32 |
| Spread - 10Y | 1.58                               | 1.64 | 0.92       | 0.38 |
| Spread - 20Y | 1.61                               | 1.54 | 1.04       | 0.43 |
| Spread - 30Y | 1.63                               | 1.50 | 1.07       | 0.42 |
| Observations | 7700                               |      | 495        |      |

CDS spreads around 12/18/2020

## Summary Statistics III

|                   | Economy (excl. CCAR Banks) |       | CCAR Banks |       |
|-------------------|----------------------------|-------|------------|-------|
|                   | mean                       | sd    | mean       | sd    |
| Daily Close Price | 105.97                     | 11.47 | 103.95     | 11.13 |
| Daily Close Yield | 3.30                       | 2.19  | 2.76       | 1.47  |
| Maturity in Years | 9.49                       | 10.08 | 6.35       | 6.56  |
| Observations      | 3507585                    |       | 642250     |       |

### Corporate Bond Trade Summary Statistics

|                               | mean   | sd     |
|-------------------------------|--------|--------|
| Loan Amount (Million Dollars) | 126.63 | 300.51 |
| Loan Spread (bps)             | 234.84 | 146.20 |
| Leveraged Loan Flag           | 0.65   | 0.48   |
| Observations                  | 51127  |        |

### Syndicated Loans: Summary Statistics

# Empirical Strategy

## Equity Response

- Use high-frequency data around announcements (at 16.30 EDT)
- Normalize prices to one at 16:00

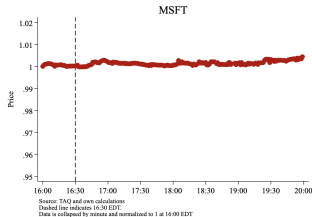
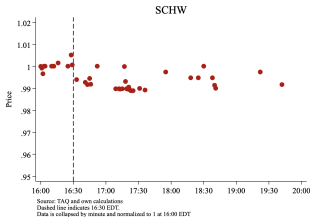
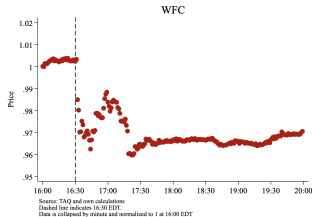
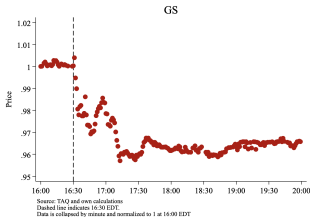
$$P_{it} = \alpha_i + \alpha_t + \sum_{\substack{\tau=16:00 \\ \tau \neq 16:30}}^{18:00} \beta_{\tau} \mathbf{1}_{t=\tau} CCAR Bank_i + \epsilon_{it}$$

## CDS Response

- US \$-denominated CDS on senior unsecured debt
- Daily Event-Study

$$Spread_{it} = \alpha_i + \alpha_{t,r} + \sum_{\substack{\tau=-5 \\ \tau \neq 0}}^5 \gamma_{\tau} \mathbf{1}_{t=\tau} CCAR Bank_i + \delta_1 CCAR Bank_i + \delta_2 X_{it} + \epsilon_{it}$$

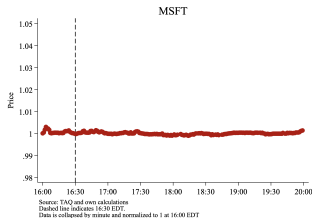
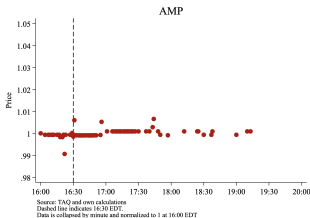
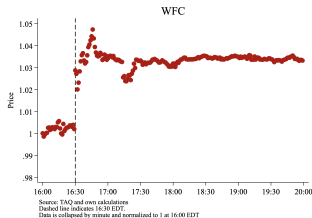
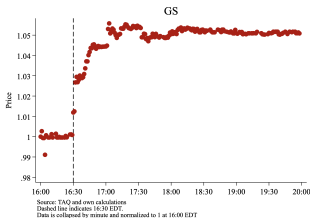
# High Frequency Equity Market Evidence



Stock Price Reaction around Fed announcement for Goldman Sachs, Wells Fargo, Charles Schwab, Microsoft

[Back](#)

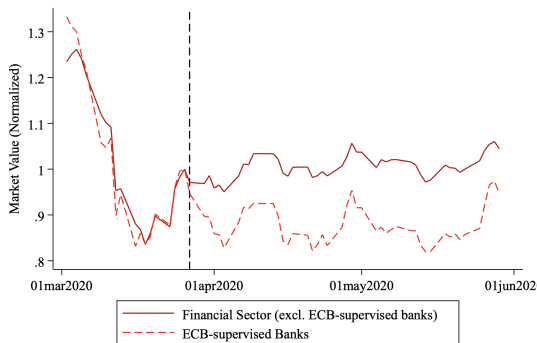
# High Frequency Equity Market Evidence Dec 18, 2020



Stock Price Reaction around Fed announcement for Goldman Sachs, Wells Fargo, Ameriprise, Microsoft [Back](#)

# Eurozone: Large Announcement Effect on 03/27/2020

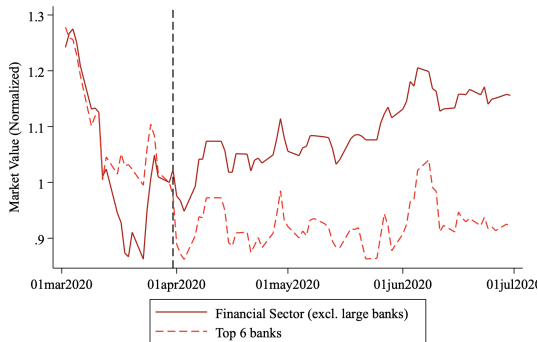
- Dividends and share buybacks fully suspended from 03/27/2020 to 12/15/2020
  - Prolonged, with exceptions, until September 2021
- New aspects: Selling pressure by dividend-affine investors?



Source: Compustat Global and own calculations  
Market values normalized on 03/26/2020. Dashed line indicates 03/27/2020.



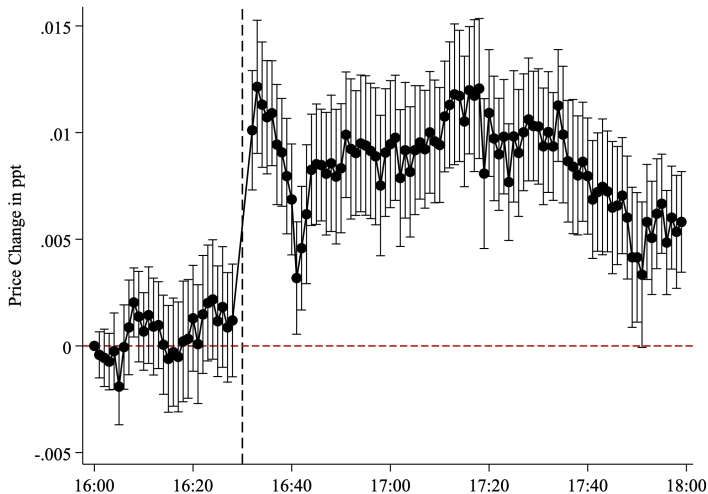
# Evidence from the UK: Announcement Effect on 03/31/2020



Source: Compustat Global and own calculations  
Market values normalized on 03/30/2020. Dashed line indicates 03/31/2020.

## Financial Firms vs. Large Banks

# High-frequency Evidence Mar 25, 2020



# CAR over time

$$AR_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{m,t})$$

$$CAR_{it} = \sum_{\tilde{t}=1}^t AR_{i,\tilde{t}}$$

CAR after 06/25/2020 Weighted Regression (Banks only)

| Date       | Coefficient | SE      |
|------------|-------------|---------|
| 06/26/2020 | -.0135***   | (.0050) |
| 06/29/2020 | -.0305***   | (.0037) |
| 06/30/2020 | -.0336***   | (.0047) |
| 07/01/2020 | -.0351***   | (.0047) |
| 07/02/2020 | -.0380***   | (.0053) |
| 07/06/2020 | -.0350***   | (.0066) |
| 07/07/2020 | -.0423***   | (.0073) |
| 07/08/2020 | -.0423***   | (.0090) |
| 07/09/2020 | -.0422***   | (.0099) |
| 07/10/2020 | -.0211**    | (.0087) |

## CAR after 12/18/2020 Weighted Regression (Banks Only)

| Date       | Coefficient | SE      |
|------------|-------------|---------|
| 12/21/2020 | .03196***   | (.0049) |
| 12/22/2020 | .01844***   | (.0047) |
| 12/23/2020 | .02493***   | (.0055) |
| 12/24/2020 | .02299***   | (.0051) |
| 12/28/2020 | .02279***   | (.0053) |
| 12/29/2020 | .02646***   | (.0055) |
| 12/30/2020 | .02332***   | (.0054) |
| 12/31/2020 | .02873***   | (.0053) |
| 01/04/2021 | .02893***   | (.0067) |
| 01/05/2021 | .02701***   | (.0072) |

# Higher Frequency Bond Market Evidence

|                  | (1)                | (2)                |
|------------------|--------------------|--------------------|
| Post             | 0.04**<br>(0.02)   |                    |
| CCAR Bank        | -0.89***<br>(0.19) |                    |
| CCAR Bank x Post | -0.09***<br>(0.03) | -0.08***<br>(0.02) |
| Constant         | 3.02***<br>(0.09)  | 2.95***<br>(0.00)  |
| N                | 47171.00           | 47126.00           |
| R <sup>2</sup>   | 0.01               | 0.79               |
| Firm FE          |                    | x                  |
| Time FE          |                    | x                  |

\* \* \*  $p < .01$ , \* \*  $p < .05$ , \*  $p < .1$

Daily Differences-in-Differences Estimation around 06/25/2020

# Bond Response 12/18/2020

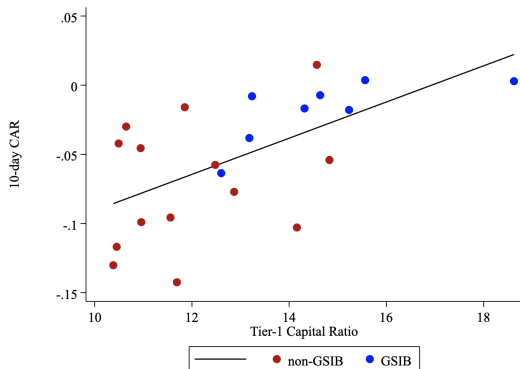
|                  | (1)                | (2)               |
|------------------|--------------------|-------------------|
| Post             | -0.03**<br>(0.01)  |                   |
| CCAR Bank        | -0.42***<br>(0.15) |                   |
| CCAR Bank x Post | 0.04**<br>(0.02)   | 0.05***<br>(0.02) |
| Constant         | 2.16***<br>(0.06)  | 2.11***<br>(0.00) |
| N                | 33576              | 33574             |
| R <sup>2</sup>   | 0.00               | 0.64              |
| Firm FE          |                    | x                 |
| Time FE          |                    | x                 |

\* \*\* \*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Corporate Bonds: Daily Differences-in-Differences Estimation around 12/18/2020

# Heterogeneity Analysis

- Risk-shifting incentives strongest for banks with low capitalization
- GSIB vs. non-GSIB



Heterogeneity in 10-day CAR by Tier-1 Capital Ratio after 06/25/2020

# Inferring Change in Government Guarantees

- Risk-shifting also between equity holders and public sector
  - Attenuates debt response  $\Delta DV$  by a degree  $\phi$
- Break-even analysis:  $\Delta EV = \Delta DV + \Delta GG$

## Three Assumptions

- 1 3 types of debt:  $DV^{ST, \text{fully insured}}$ ,  $DV^{ST, \text{partly insured}}$ ,  $DV^{LT}$
- 2 Degree of insurance measured by:  $\phi^{ST}$ ,  $\phi^{LT}$
- 3  $\frac{\Delta DV^{ST, \text{partly insured}}}{DV^{ST, \text{partly insured}}} = \frac{\Delta DV^{LT}}{DV^{LT}}$

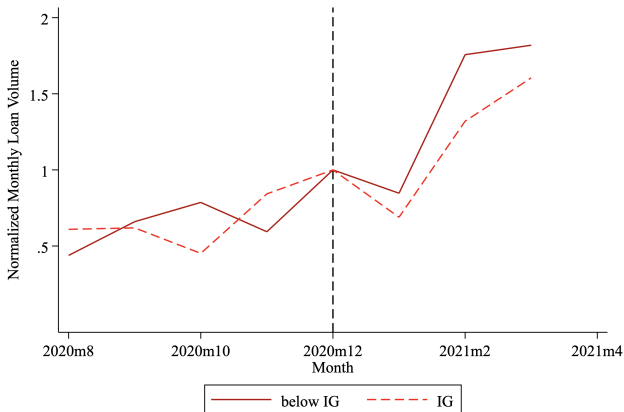
## Findings

- $\phi^{ST} = .9044$ ,  $\phi^{LT} = -.37$
- $\Delta GG = \$25.37$  billion on 06/25/2020
- Reversal in December 2020



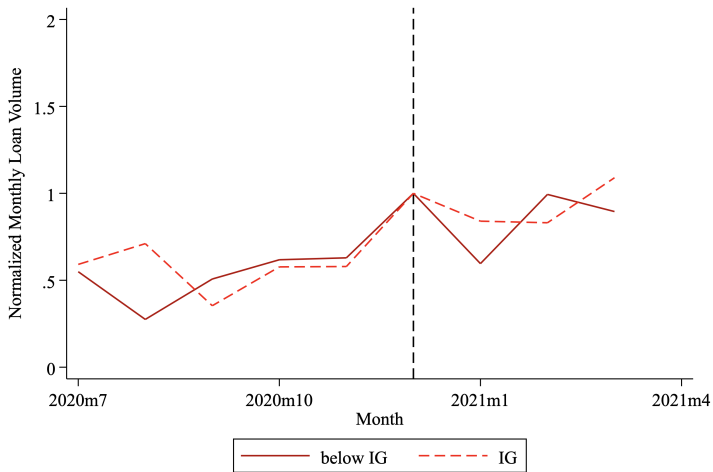
# Lending of CCAR banks

- Use Thomson Reuters monthly syndicated loan data
  - Data allows to separate IG from non-IG loans



Source: Thomson One

# Lending for non-CCAR Banks



Source: Thomson One