How Detrimental is the Unrelieved Debt During the Pandemic? The Case of Commercial Mortgages

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Motivation

- The COVID-19 pandemic has a devastating impact on economic activities
  - Expectation: push borrowers into financial distress **Mian et al., 2015; Piskorski and Seru, 2021**
  - Response: large-scale debt forbearance
- What happened?
  - Household debt default dropped even below the pre-pandemic level
  - 70% said they could've made their payments, but just wanted a break from their normal payments. **Kapfidze, 2020**
- Was the government too generous?

Residential Mortgage Delinquency Rate

Source: **Cherry et al, 2021**

Research Question

1. Would defaults surge during the pandemic if the debt is not relieved?
2. What real impact the debt defaults can generate?

- Empirical laboratory: **Retail Commercial Mortgages**
- Why Commercial?
  - Commercial mortgage borrowers have no access to debt relief
- Why Retail?
  - hit the hardest by the pandemic
  - track the business conditions of the retail stores accurately using up-to-date store visits (cellphone data)

Identification Strategy

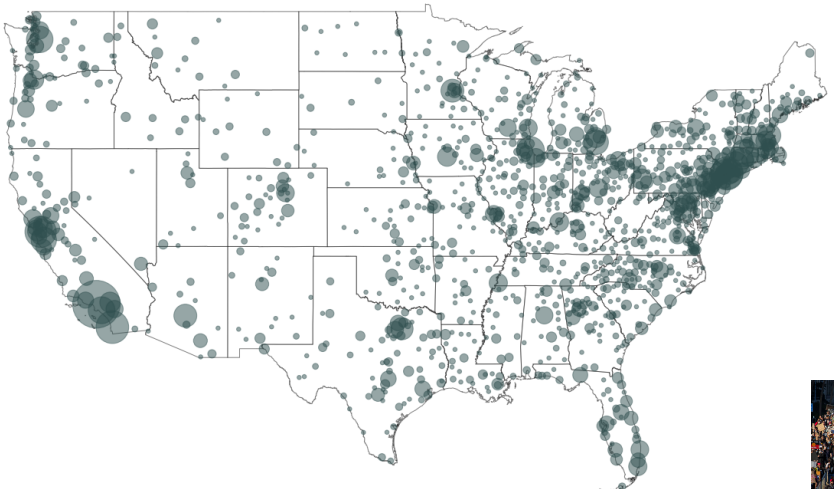
Identification challenges:

1. Aggregate Trend: a mix of pandemic and policy effect
2. **Cross-sectional:** COVID-19 spread endogenously correlated with the socioeconomic characteristics

Solution:

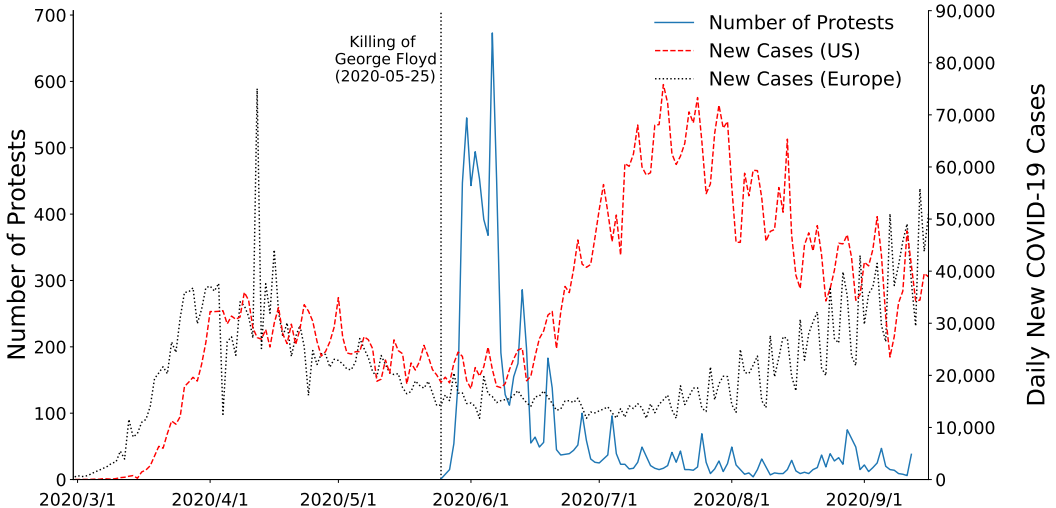
1. Focus on the second wave of the COVID-19 after BLM protests
2. Exploit the exogenous variations of COVID-19 spread induced by the rainfall during the protests

The Death of George Floyd Sparked Unprecedented Nationwide BLM Protests



Note: the size of the circles reflects the number of protests.

The Second COVID-19 Wave in the US Following the BLM Protests



Preview of This Paper

1. Would defaults surge during the pandemic if the debt is not relieved?
   - Rise of COVID-19 infections reduces customer visits to local retail stores, and leads to more closures of the retail businesses
   - Spread of COVID-19 increased debt delinquencies and foreclosures of retail commercial mortgage borrowers
2. What real impact the debt defaults can generate?
   - In defaulted commercial properties, in-line tenants' closures persist after their landlords' defaults.
   - Mandated eviction moratoriums mitigate the closure of affected tenants.

Literature Review

Economic consequences of the public health crisis

- Agrawal et al., 2021; Albanesi and Kim, 2021; Alsan et al., 2021; Baker et al., 2020; Bartik et al., 2020; Coibion et al., 2020; Cox et al., 2021; Fuster et al., 2021; Horvath et al., 2021; Ling et al., 2020
- This paper studies the debt performance in an environment without debt relief interventions

Effect of debt relief programs in a public health crisis

- Cherry et al., 2021; An et al., 2021; Kim et al., 2021; Bandyopadhyay, 2021
- While all these papers look at the household debt, we focus on a counterfactual lending field where the debt forbearance is not available.

Real consequences of the debt distress

- Negative externalities Diamond et al., 2020; Campbell et al., 2011; Harding et al., 2009; Immergluck and Smith, 2006; Leonard and Murdoch, 2009; Lin et al., 2009; Rogers and Winter, 2009; Schuetz et al., 2008 Decrease local tax revenues Schuetz et al., 2008; Apgar et al., 2005 Violent crimes Baumer et al., 2012; Immergluck, 2011; Stucky et al., 2012
- This paper studies the setting of commercial properties.

Outline

IV Strategy

- Why do we need an instrument?
  - The OLS results indicates the BLM protests are not randomly assigned to difference counties.
  - The OLS analysis might suffer from serious omitted variable bias, even with the controlled regressions.
  - For example, protests tend to happen in politically liberal counties, where people practice better social distancing and mask wearing in response to COVID-19.
- Identification strategy
  - Instrument variable: rainfall during the following two weeks of the killing of George Floyd, conditional on historical rainfall level
  - weight each day by the total number of protests in the US
  - more rainfall $\longrightarrow$ less protests $\longrightarrow$ less COVID-19 cases

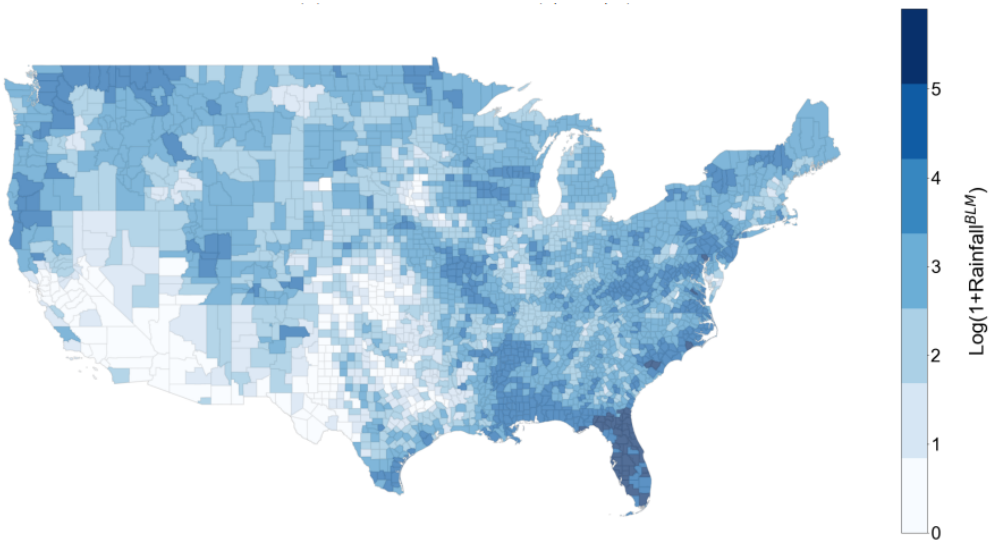
Outline

Data

- BLM Protest: The Armed Conflict Location & Event Data Project (ACLED)
  - collects the dates, actors, locations, fatalities, and types of all media-reported political violence and protest events globally.
- Rainfall: the PRISM Climate Group based at Oregon State University
  - daily precipitation estimates at any location in the US using weather station observations
- COVID-19 Case and Death Data: Johns Hopkins University CSSE COVID-19 Data
- Mobility: SafeGraph
  - measures the time people spend at or away from home using mobile phone GPS data
- Commercial Mortgage Data: Trepp CMBS
  - Loan-level characteristics and performances of commercial mortgages
- Demographic Data: MIT Election Data and Science Lab, American Community Survey (ACS), CDC

Summary Statistics

IV: Rainfall by Counties (5/26-6/8)

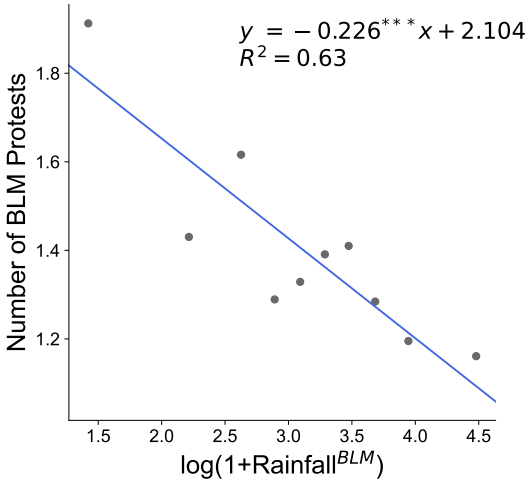


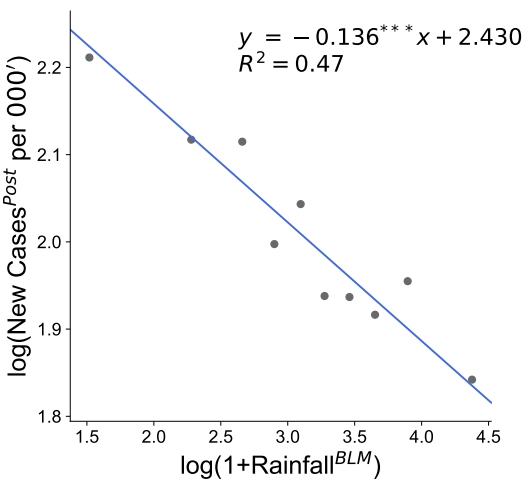
Balance test: IV is quasi-random

Table 1: Balance Tests: The Effect of Rainfall on Pre-Protest Covid-19 Cases and Deaths

Dependent Variable	log(New Cases per 000′) (5/1-5/25)		log(New Deaths per 000′) (5/1-5/25)		log(Cases per 000′) (Cum @5/25)		log(Deaths per 000′) (Cum @5/25)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(1+Rainfall^{BLM})	-0.008	-0.035	0.030	0.004	0.028	-0.012	0.036	-0.007
	(0.062)	(0.041)	(0.035)	(0.028)	(0.056)	(0.036)	(0.037)	(0.032)
log(Population)	0.081**	-0.250***	-0.414***	-0.470***	0.203***	-0.121	-0.227***	-0.352***
	(0.039)	(0.087)	(0.056)	(0.092)	(0.039)	(0.078)	(0.060)	(0.106)
Demagraphic Controls		✓		✓		✓		✓
Fixed Effects:								
Rainfall^{Historical} Decile	✓	✓	✓	✓	✓	✓	✓	✓
Population Density Decile		✓		✓		✓		✓
Sample Counties	All	All	All	All	All	All	All	All
Dianostics:								
R-Squared	0.03	0.27	0.30	0.49	0.10	0.32	0.10	0.34
F-test:IV=0	0.0	0.7	0.7	0.0	0.3	0.1	0.9	0.0
Observation	2,883	2,883	2,883	2,883	2,883	2,883	2,883	2,883
Dep. Var. Mean	-0.58	-0.58	-2.59	-2.59	0.30	0.30	-2.20	-2.20

First Stage: More Rainfall ⟶ Less Protests ⟶ Less COVID-19





Outline

Impact of COVID-19 Case Growth on Visits to Retail Stores

	$\log(\text{VISIT}^{Retail})$							
	Jun.2020-Aug.2020				Jun.2020-Dec.2020			
	RF	2SLS	RF	2SLS	RF	2SLS	RF	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\widehat{\text{Case Growth}}$		-0.0275**		-0.0219*		-0.0250**		-0.0202*
		(-2.32)		(-1.96)		(-2.12)		(-1.82)
$\log(\text{Rainfall}^{BLM})$	0.0137***		0.0131***		0.0123***		0.0118***	
	(3.64)		(3.33)		(2.91)		(2.75)	
$\log(\text{Rainfall}^{Historical})$	-0.0095	-0.0324***	-0.0082	-0.0269**	-0.0054	-0.0221**	-0.0046	-0.0184*
	(-1.33)	(-2.98)	(-1.10)	(-2.64)	(-0.76)	(-2.26)	(-0.62)	(-1.87)
Median outdoor minutes	0.0010***	-0.0004	0.0013***	0.0001	0.0011***	-0.0001	0.0014***	0.0004
	(2.84)	(-0.69)	(3.39)	(0.24)	(4.27)	(-0.17)	(5.22)	(1.05)
Lagged Case Growth	✓	✓	✓	✓	✓	✓	✓	✓
Weather Control	✓	✓	✓	✓	✓	✓	✓	✓
Demographic Control	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Sample:								
Full Sample	✓	✓			✓	✓		
Protest>0			✓	✓			✓	✓
First Stage Diagnostics:								
Cragg-Donald Wald F		54.71		42.43		54.67		42.43
Kleibergen-Paap Wald Rk F		9.95		14.20		9.96		14.20
R^2	0.71		0.72		0.76		0.77	
Obs.	3,024	3,024	1,498	1,498	3,022	3,022	1,498	1,498

Impact of COVID-19 Case Growth on Retail Business Closure

	Closure Rate^{Retail}							
	Jun.2020-Aug.2020				Jun.2020-Dec.2020			
	RF	2SLS	RF	2SLS	RF	2SLS	RF	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\widehat{\text{Case Growth}}$		0.0016**		0.0017**		0.0011*		0.0014**
		(2.41)		(2.46)		(1.97)		(2.37)
log(Rainfall^{BLM})	-0.0010***		-0.0011***		-0.0008***		-0.0008***	
	(-3.30)		(-3.58)		(-2.94)		(-3.26)	
log(Rainfall^{Historical})	-0.0022***	-0.0005	-0.0023***	-0.0038*	-0.0026***	-0.0009	-0.0028***	-0.0043**
	(-2.91)	(-0.58)	(-3.19)	(-1.98)	(-4.19)	(-1.34)	(-4.69)	(-2.64)
Median outdoor minutes	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0001*	-0.0000	-0.0000
	(-0.85)	(-1.30)	(-0.84)	(-0.55)	(-1.19)	(-1.94)	(-1.15)	(-0.88)
Lagged Case Growth	✓	✓	✓	✓	✓	✓	✓	✓
Weather Control	✓	✓	✓	✓	✓	✓	✓	✓
Demographic Control	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Sample:								
Full Sample	✓	✓			✓	✓		
Protest>0			✓	✓			✓	✓
First Stage Diagnostics:								
Cragg-Donald Wald F		58.38		50.44		58.38		50.44
Kleibergen-Paap Wald Rk F		8.95		11.38		8.95		11.38
R^2	0.58		0.65		0.60		0.68	
Obs.	2,920	2,920	1,490	1,490	2,920	2,920	1,490	1,490

Outline

COVID-19 Case Growth and CMBS Mortgage Delinquency

	1(DELINQUENT)							
	All		Retail		Office		Multi-Family Housing	
	RF	2SLS	RF	2SLS	RF	2SLS	RF	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\widehat{\text{Case Growth}}$		0.0022***		0.0064***		0.0030**		0.0001
		(3.80)		(4.12)		(1.99)		(0.20)
$\log(\text{Rainfall}^{BLM})$	-0.0012**		-0.0058***		-0.0015**		-0.0002	
	(-2.09)		(-2.90)		(-2.08)		(-0.86)	
$\log(\text{Rainfall}^{Historical})$	0.0005	0.0020**	0.0022	0.0022	-0.0012	0.0000	0.0000	0.0000
	(0.42)	(2.15)	(0.56)	(0.78)	(-0.47)	(0.00)	(0.13)	(0.06)
Median outdoor minutes	0.0002**	0.0002***	0.0008**	0.0007***	0.0001	-0.0000	0.0001	0.0001***
	(2.13)	(5.71)	(2.40)	(6.93)	(0.64)	(-0.06)	(1.40)	(4.10)
Loan Control	✓	✓	✓	✓	✓	✓	✓	✓
Lagged Case Growth	✓	✓	✓	✓	✓	✓	✓	✓
Weather Control	✓	✓	✓	✓	✓	✓	✓	✓
Demographic Control	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Origin Year-Month FE	✓	✓	✓	✓	✓	✓	✓	✓
Sample:								
Full Sample	✓	✓	✓	✓	✓	✓	✓	✓
Protest>0								
First Stage Diagnostics:								
Cragg-Donald Wald F		4389.34		987.58		737.53		1984.28
R^2	0.06		0.28		0.11		0.03	
Obs.	84,014	84,014	15,889	15,889	8,614	8,614	50,324	50,324

COVID-19 Case Growth and CMBS Property Foreclosure

	1(FORECLOSED)							
	All		Retail		Office		Multi-Family Housing	
	RF	2SLS	RF	2SLS	RF	2SLS	RF	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\widehat{\text{Case Growth}}$		0.0003*		0.0010**		-0.0002		0.0002
		(1.75)		(2.22)		(-0.35)		(1.45)
$\log(\text{Rainfall}^{BLM})$	-0.0002		-0.0012		0.0002		-0.0001	
	(-1.23)		(-1.24)		(0.35)		(-1.14)	
$\log(\text{Rainfall}^{Historical})$	0.0002	0.0004	0.0014	0.0014	-0.0010	-0.0012	-0.0001	-0.0000
	(0.71)	(1.44)	(1.01)	(1.64)	(-1.16)	(-1.10)	(-0.95)	(-0.11)
Median outdoor minutes	0.0000	0.0000**	0.0001	0.0001***	0.0000	0.0000	0.0000	0.0000
	(0.53)	(1.97)	(0.79)	(4.48)	(0.37)	(0.09)	(0.11)	(0.66)
Loan Control	✓	✓	✓	✓	✓	✓	✓	✓
Lagged Case Growth	✓	✓	✓	✓	✓	✓	✓	✓
Weather Control	✓	✓	✓	✓	✓	✓	✓	✓
Demographic Control	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Origin Year-Month FE	✓	✓	✓	✓	✓	✓	✓	✓
Sample:								
Full Sample	✓	✓	✓	✓	✓	✓	✓	✓
Protest>0								
First Stage Diagnostics:								
Cragg-Donald Wald F		4389.34		987.58		737.53		1984.28
R^2	0.01		0.08		0.03		0.01	
Obs.	84,014	84,014	15,889	15,889	8,614	8,614	50,324	50,324

Outline

CMBS Mortgage Delinquency and Long-Run Business Closure of Retail Stores

	Closure Rate^{Retail}					
	Anchor Retail Tenants			Peripheral Retail Tenants		
	Jan-Feb.2021	Mar-Apr.2021	May-Jun.2021	Jan-Feb.2021	Mar-Apr.2021	May-Jun.2021
	(1)	(2)	(3)	(4)	(5)	(6)
1(DELINQUENT)×Case $\widehat{\text{Growth}}$	-0.0003	-0.0000	-0.0001	0.0001	0.0023***	0.0024***
	(-0.89)	(-0.12)	(-0.24)	(0.06)	(2.74)	(2.74)
Case $\widehat{\text{Growth}}$ per 000'	-0.0010	-0.0013*	-0.0016*	0.0055**	0.0021	0.0032
	(-1.12)	(-1.73)	(-1.85)	(2.44)	(1.14)	(1.61)
log(Rainfall^{Historical})	0.0007	-0.0014	-0.0020*	0.0017	0.0045*	0.0011
	(0.53)	(-1.24)	(-1.66)	(0.51)	(1.67)	(0.40)
Median outdoor minutes	-0.0001	-0.0000	-0.0000	0.0008***	0.0007***	0.0008***
	(-1.18)	(-0.71)	(-0.63)	(5.85)	(6.07)	(7.10)
Loan Control	✓	✓	✓	✓	✓	✓
Lagged Case Growth	✓	✓	✓	✓	✓	✓
Weather Control	✓	✓	✓	✓	✓	✓
Demographic Control	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Origin Year-Month FE	✓	✓	✓	✓	✓	✓
Sample:						
Full Sample	✓	✓	✓	✓	✓	✓
Protest> 0						
R^2	0.01	-0.01	-0.01	0.00	0.03	0.03
Obs.	2,094	2,094	2,094	3,105	3,105	3,105

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Eviction Moratorium Eases Tenant Eviction

	Closure Rate^{Retail} (Peripheral Tenants)					
	Regions With Eviction Moratorium			Regions Without Eviction Moratorium		
	Jan-Feb.2021	Mar-Apr.2021	May-Jun.2021	Jan-Feb.2021	Mar-Apr.2021	May-Jun.2021
	(1)	(2)	(3)	(4)	(5)	(6)
1(DELINQUENT)×$\widehat{\text{Case Growth}}$	-0.0032	-0.0005	-0.0014	0.0063***	0.0068***	0.0065***
	(-1.32)	(-0.29)	(-0.77)	(3.93)	(5.43)	(5.24)
$\widehat{\text{Case Growth}}$	0.0039	0.0026	0.0055*	0.0145	0.0052	-0.0013
	(1.08)	(0.92)	(1.86)	(1.52)	(0.68)	(-0.18)
log(Rainfall^{Historical})	-0.0068	-0.0006	0.0016	0.0036	0.0010	-0.0075
	(-0.83)	(-0.10)	(0.26)	(0.51)	(0.16)	(-1.20)
Median outdoor minutes	-0.0011	-0.0001	-0.0003	0.0013***	0.0009***	0.0008***
	(-1.43)	(-0.24)	(-0.57)	(3.44)	(3.10)	(2.82)
Loan Control	✓	✓	✓	✓	✓	✓
Lagged Case Growth	✓	✓	✓	✓	✓	✓
Weather Control	✓	✓	✓	✓	✓	✓
Demographic Control	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Origin Year-Month FE	✓	✓	✓	✓	✓	✓
Sample:						
Full Sample	✓	✓	✓	✓	✓	✓
Protest> 0						
R^2	0.11	0.05	0.03	-0.26	0.02	0.10
Obs.	754	820	820	2,316	2,249	2,249

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Conclusion

- We investigate the commercial mortgages for retail properties, where debt forbearance is not enforced.
- The widespread COVID-19 indeed leads to reduced customer visits to the retail businesses, thus a surge of debt defaults.
- more business closures in the defaulted retail properties in the following year, especially in areas where tenant eviction moratorium is not enforced.
- The real impact on the local businesses can be mitigated by either debt forbearance or eviction moratorium policy.

Thank You!

The Death of George Floyd Sparked Unprecedented Nationwide BLM Protests