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Investment, Q and epidemic diseases

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A B S T R A C T

We study the effects of epidemic diseases on corporate investment. Epidemic diseases tend to be unanticipated and exogenous to firms' decisions. Using difference-in-difference estimation strategy and a firm-level exposure to an epidemic disease measure, we find that corporate investment declines significantly following the onset of an epidemic disease. We also show that the COVID-19 pandemic has the strongest negative impact on investment when compared to the other most recent epidemic diseases.

1. Introduction

The extant literature has focused on macroeconomics shocks and their impacts on corporate real decisions.[1] But little attention has been paid to the effects of epidemic-induced shocks on corporate decisions. Epidemic diseases tend to be unexpected and are exogenous to firms' real decisions. The potential widespread of an epidemic disease impacts firms' willingness to take on risks during a market wide shock; creating financing frictions which affects the relative attractiveness of current period's investments vis-a-vise future investments. Managers might delay investments in the face of epidemic-induced market wide uncertainty shock.

In this paper, we focus on the impact of epidemic diseases on corporate investment amongst U.S firms. We focus on the five most recent epidemic diseases: COVID-19, SARS, H1N1, Ebola and Zika virus. To test our hypothesis, we employ two estimation strategies. First, since not all firms are impacted equally during an epidemic-induced shock, we use a firm-level measure of exposure to an epidemic disease extracted from Hassan et al. (2021). Second, so as take into account the aggregate effects of epidemic diseases, we use staggered difference-in-difference estimation strategy. Our second approach effectively compares the investment of firms before and after the onset of an epidemic disease. We find that corporate investment declines on average by about 7% to 10% relative to the unconditional mean, following the onset of an epidemic disease. We also find that COVID-19 has the strongest negative impact on corporate investments when compared to the other most recent epidemic diseases under study. Our results show that not all epidemic diseases are created equal; the duration and intensity of an epidemic disease are important considerations when evaluating the potential impacts on firms' real decisions.

Our paper contributes to the literature on the impacts of macroeconomics shocks and the impacts of the COVID-19 pandemic on corporate policy; (Eichenbaum et al., 2020; Ding et al., 2020; Au et al., 2020; Atkeson, 2020; Barrero et al., 2020; Guerrieri et al.,

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[1] See: Jaffee and Russell (1976), Dixit and Pindyck (1995), Abel and Eberly (1996), Bloom (2006), Caballero (1991), Tirole (2006), Holmstrom and Tirole (1997).

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Table 1
Summary statistics: Firm-level variables.

	Mean	Median	Std. dev	25th	75th
PANEL A:					
Investment	0.0292	0.0154	0.0436	0.006	0.03363
Tobin Q	2.0938	1.6266	1.4084	1.1999	2.4472
Size	6.7299	6.6958	1.9081	5.4514	7.9593
Cashflow	0.01719	0.02744	0.0744	0.0102	0.0426
Leverage	0.2585	0.2128	0.3047	0.0361	0.3809
Dividend dummy	0.06236	0.000	0.2418	0.000	0.000
Net working capital	0.0376	0.0386	0.2494	−0.0468	0.1412
PANEL B::					
COVID-19 exposure	1.3604	1.0329	1.3245	0.3862	1.9462
COVID-19 risk	0.1016	0.000	0.1854	0.0000	0.1530
SARS exposure	0.0436	0.000	0.1708	0.0000	0.0000
H1N1 exposure	0.0150	0.000	0.1378	0.0000	0.0000
Ebola exposure	0.0048	0.000	0.0869	0.0000	0.0000
Zika exposure	0.0028	0.000	0.0742	0.0000	0.0000

This table presents summary statistics for the sample, which consists of non-financial and non-utility U.S. incorporated firms in COMPUSTAT's quarterly files for the period 2002Q1–2021Q1. Investment is estimated as capital expenditure scaled by total assets. Tobin Q is estimated as the book value of total assets plus the market value of equity, less book value of equity scaled by total assets. Dividend is a dummy equal to "1" if a firm paid or issued dividends during period t. Net working capital is net working capital minus cash and marketable securities scaled by total assets. Leverage is estimated as short-term debt plus long-term debt scaled by total assets. Data on epidemic diseases is based on Hassan, Hollander, Van Lent, Schwedeler and Tahoun, 2021 measure. Panel A presents summary statistics for firm-level controls. Panel B presents summary statistics for firm-level exposure to epidemic diseases, for the timeline during which each epidemic disease was most intense and active in the U.S.

2020; Li et al., 2021; Krieger et al., 2020) and the literature on epidemiology and financial markets (Philipson, 2000). We show that epidemic-induced shocks have a real impact on corporate decisions.

2. Data

2.1. Firm-level controls

Our sample consists of quarterly firm-level data extracted from COMPUSTAT for the period 2002Q1–2021Q1. We require that a firm be incorporated in the U.S. We exclude financial firms (SIC 6000–6999) as it is difficult to assess liquidity levels and we exclude utilities (SIC 4900–4999) as they are subjected to heavy regulatory requirements from the government. We also require that a firm has positive asset levels.

Table 1 Panel A, presents summary statistics for the sample. Our main variable of interest is "Investment". Investment is estimated as capital expenditure (CAPXY) scaled by total assets (ATQ). Investment has a mean (median) of 0.029(0.0154). Observe that during our sample period, there is considerable variation in investments across firms. In particular, the bottom 25th percentile investment is about 0.6% of total assets and the top 75th percentile investment is about 3.3% of total assets. Our statistical distribution is consistent with the extant literature (Gulen and Ion, 2016; Duchin et al., 2010).

The remaining firm-level variables, determinants of investments are constructed as follow: Firm size is estimated as the natural logarithm of total assets, Tobin Q is estimated as the book value of total assets plus market value of equity less book value of equity scaled by total assets and bounded above 10, so as to control for outliers. Leverage is the sum of short-term debt and long-term debt scaled by total assets. Net working capital is estimated as net working capital less cash and marketable securities scaled by total assets. Dividend dummy takes the value of "1" if a firm pays dividend and zero if otherwise.

2.2. Measuring firm-level exposure to epidemic diseases

We use the text-based measure of firm-level exposure to epidemic diseases from Hassan et al. (2021). The measure is constructed from quarterly earnings conference calls and captures each firm's exposure to a given epidemic disease, making it appropriate for our analysis. The measure is constructed in a series of steps. First, the authors identify the most common symptoms associated with each epidemic disease. This step would then be followed by a human audit, subsample analysis, to sure the algorithm in use correctly classifies words or combinations of words associated with each epidemic disease in question. Hassan et al. (2021) exposure measure is then constructed as the number of times a combination appears in the transcript, scaled by the total words in each transcript. We report the summary statistics of firm-level exposure to an epidemic disease in Table 1 Panel B.[2]

[2] See Hassan et al. (2021) for detailed construction of the measure.

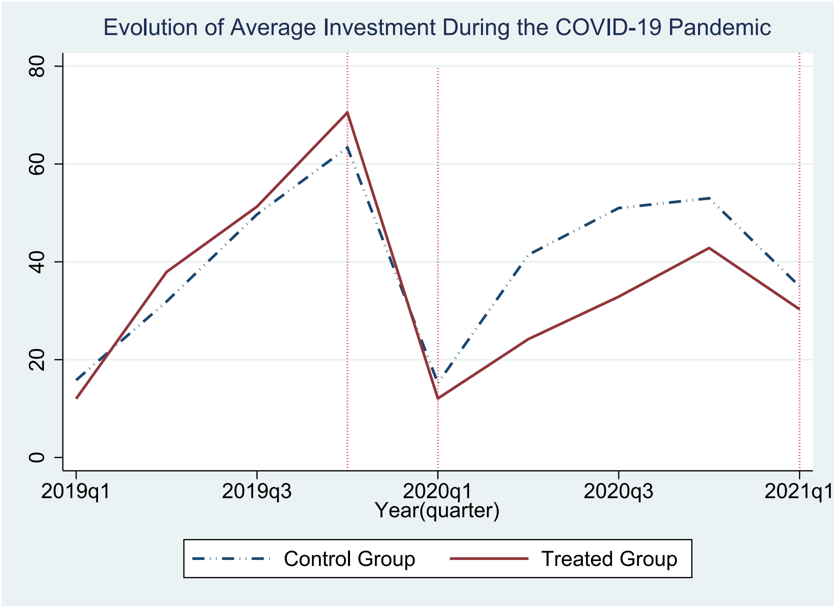

Fig. 1. Corporate investments. Fig. 1 presents cross-sectional average investments (standardized) for the period 2019Q1–2021Q1. Firms are matched on several dimensions/firm-level characteristics at the end of 2018Q4 to minimize any potential pandemic anticipation. Treatment status is based on the relative exposure to the pandemic. The **dotted** vertical reference lines are: 2019Q4, 2020Q1 and 2021Q1 respectively.

3. Identification strategy

In order to estimate the effects of firm-level exposure to an epidemic disease on corporate investments, we use the following augmented model of Investment-Tobin Q, commonly used in investment literature.[3‘4]

$$\mathbf{Investment_{it}} = \beta_0 + \beta_1^* \mathbf{Exposure} + \beta_2^* \mathbf{TobinQ} + \mathbf{X}'\beta + \delta_i + \epsilon_{it} \tag{1}$$

where "**Exposure**" is firm-level exposure to a given epidemic disease and the measure is extracted from Hassan et al. (2021). **X** is a vector of firm-level variables, determinants of investment, which include: Tobin Q, Firm Size, Leverage, cash flow, Capex, Net working capital, and a dividend dummy. In particular, consistent with extant literature, Tobin Q and cash flow controls for contemporaneous investment opportunities. All our firm-level variables are constructed as outlined in the data section above. δ_i are firm-level fixed effects. And ϵ_{it} is the error term. Standard errors are heteroskedasticity-consistent and clustered at the firm-level (Petersen, 2009; Bertrand et al., 2004). In order to check whether parallel trends assumption holds in our identification strategy, we follow the recommendation(s) in Goodman-Bacon and Marcus (2020), we first pre-match firms on size, MB and leverage at the end of 2018 and then sub-divided into "treated" and "control" groups based on the likelihood of exposure to the COVID-19 pandemic.[5] Underlying this exercise is the assumption that pre-treatment differences in trends are informative about post-treatment differences (counterfactuals).[6] The key idea being that if common trends assumption fails, the average investment for our treated group would have changed differently even without exposure to the pandemic itself. Fig. 1 demonstrate that while the treated group, on average, had higher level of investment before the COVID-19 pandemic relative to the control group, the difference is relatively small. Note that once the pandemic set in, the average investment for treated firms significantly declined and there is a noticeable divergence in the average investment between the treated group and the control group. The treated firms on average had much lower average investment following the onset of the pandemic.

4. Empirical results

Our central argument in this paper is that epidemic-induced shocks have a negative impact on corporate investment. We first examine the effect of each epidemic disease on corporate investment amongst U.S firms. We focus on the most recent epidemic

[3] See Fazzari et al. (1988), Gulen and Ion (2016), Alti (2003), Erickson and Whited (2006) and Duchin et al. (2010).

[4] We find similar results when we use alternative measures of corporate investments such as SG&A.

[5] Note that we recognize that "timing" is still an important consideration, thus we are focusing on the relative exposure and not assuming that our control sample remains unexposed even at the later stages of the pandemic. See: Goodman-Bacon (2021) for some important discussion on timing in difference-in-difference set up.

[6] See: Cunningham (2020), Manski and Pepper (2018), Rambachan and Roth (2019), Lovenheim and Willén (2019) and Greenstone and Hanna (2014).

Table 2
Corporate investments and firm-level exposure to epidemic diseases.

	(1) Investment	(2) Investment	(3) Investment	(4) Investment	(5) Investment	(6) Investment
COVID-19_exposure	−0.00207***					
	(−10.95)					
COVID-19_risk		−0.0112***				
		(−7.89)				
SARS_exposure			−0.00357			
			(−1.56)			
Ebola_exposure				−0.000281		
				(−0.26)		
H1N1_exposure					−0.00436***	
					(−5.54)	
Zika_exposure						0.00136
						(0.72)
Tobin_Q	0.00218***	0.00217***	0.00216***	0.00216***	0.00215***	0.00216***
	(13.04)	(12.95)	(12.90)	(12.91)	(12.89)	(12.90)
Size	−0.00226***	−0.00243***	−0.00255***	−0.00254***	−0.00255***	−0.00254***
	(−4.64)	(−5.04)	(−5.31)	(−5.29)	(−5.30)	(−5.29)
Leverage	−0.0162***	−0.0165***	−0.0167***	−0.0167***	−0.0167***	−0.0167***
	(−9.99)	(−10.22)	(−10.34)	(−10.35)	(−10.36)	(−10.35)
Cash_flow	0.00374	0.00373	0.00382	0.00378	0.00381	0.00379
	(0.40)	(0.40)	(0.41)	(0.41)	(0.41)	(0.41)
Dividend_dummy	−0.000850	−0.000850	−0.000881	−0.000888	−0.000893	−0.000888
	(−0.64)	(−0.63)	(−0.66)	(−0.66)	(−0.67)	(−0.66)
NWC	−0.00487**	−0.00468**	−0.00452**	−0.00451**	−0.00454**	−0.00451**
	(−2.46)	(−2.36)	(−2.28)	(−2.28)	(−2.29)	(−2.28)
Constant	0.0446***	0.0457***	0.0465***	0.0464***	0.0465***	0.0465***
	(13.62)	(14.11)	(14.45)	(14.43)	(14.45)	(14.43)
Firm F.E	YES	YES	YES	YES	YES	YES
Clustered Std Errors	YES	YES	YES	YES	YES	YES
N	144208	144208	144208	144208	144208	144208
R^2	0.0246	0.0276	0.0290	0.0291	0.0290	0.0291

This table presents estimates from panel regressions. investment (CAPXY/ATQ) is the dependent variable. Firm-level epidemic exposure are based on Hassan et al. (2021) firm-level exposure to epidemic diseases measure. All regressions include firm fixed effects. All standard errors are clustered at the firm-level. Within R^2 is reported.
NOTE: t- statistics in parentheses: *p:0.10, **p:0.05, ***p:0.01.

diseases: COVID-19, SARS, H1N1, Ebola and Zika virus. Table 2 presents our estimates from our panel regression model outlined in equation [1] above. Columns [1, 2, 5] show that the COVID-19 pandemic and H1N1 virus have a significant and statistically negative impact on corporate investments when compared to the other epidemic diseases under consideration. Our results show that epidemic-induced shocks are associated with an average decline of 7.8% in corporate investments over the unconditional mean.

To validate our results and in order to take the aggregate effects of the epidemic diseases under consideration into account, we employ a staggered difference-in-difference estimation strategy, our specification is as follows:

$$\mathbf{Investment_{it}} = \beta_0 + \beta_1^{*}\mathbf{Epidemic\_dummy} + \beta_2^{*}\mathbf{TobinQ} + \mathbf{X}'\beta + \delta_i + \epsilon_{it} \tag{2}$$

Where “**Epidemic_dummy**" is an indicator variable that takes a value of “1” for the timeline during which each disease was most active in the US: COVID-19 [2020–21], H1N1[2010–12], SARS [2003], Ebola [2014–15], and Zika[2015–16]. The “Epidemic_dummy” takes a value of zero if otherwise. Effectively, “Epidemic_dummy” captures the average effect of the epidemic diseases under study on corporate investment amongst U.S firms. **X** is a vector of firm-level variables. Construction of each variable is outlined in the data section above. δ_i are firm fixed-level effects. Standard errors are heteroskedasticity-consistent and clustered at the firm-level.

Table 4 presents our estimate from our base specification described in equation [2] above. Our results are consistent with those reported in Table 3, in particular columns [2–3] show that quarterly investments as a fraction of total assets declined by about 10% on average, following the onset of an epidemic disease.

4.1. The COVID-19 pandemic

The COVID-19 pandemic serves as an unanticipated and widespread exogenous economic shock. In order to take into account the aggregate effects of the COVID-19 pandemic on corporate investment, we use a difference-in-difference estimation strategy. We compare the investment of firms before and after the onset of the COVID-19 pandemic. Our specification is as follows:

$$\mathbf{Investments_{it}} = \beta_0 + \beta_1^{*}\mathbf{COVID19\_dummy} + \mathbf{X}'\beta + \delta_i + \epsilon_{it} \tag{3}$$

Where “**COVID19_dummy**" is an indicator variable that takes a value of “1” for the timeline: 2020Q1 to 2021Q1. And takes the value of “0” for the timeline: 2019Q1-Q4. **X** is a vector of firm-specific variables. δ_i and η_j are firm fixed effects. Standard errors

Table 3
Corporate investment and exposure to epidemic diseases.

	(1) Investment	(2) Investment	(3) Investment	(4) Investment
Epidemic_dummy	−0.00298***	−0.00282***	−0.00282***	−0.00282***
	(−17.27)	(−16.33)	(−16.33)	(−11.20)
Tobin_Q	0.00185***	0.00212***	0.00212***	0.00212***
	(19.68)	(21.78)	(21.78)	(12.69)
Size	−0.00101***	−0.00231***	−0.00231***	−0.00231***
	(−7.08)	(−13.85)	(−13.85)	(−4.80)
Leverage	−0.0145***	−0.0167***	−0.0167***	−0.0167***
	(−24.66)	(−27.17)	(−27.17)	(−10.34)
Cash_flow	0.0115***	0.00380*	0.00380*	0.00380
	(5.69)	(1.82)	(1.82)	(0.41)
Dividend_dummy	−0.000138	−0.00104**	−0.00104**	−0.00104
	(−0.27)	(−1.98)	(−1.98)	(−0.77)
NWC	−0.00548***	−0.00472***	−0.00472***	−0.00472**
	(−6.39)	(−5.22)	(−5.22)	(−2.39)
Constant	0.0363***	0.0462***	0.0462***	0.0462***
	(35.00)	(40.05)	(40.05)	(14.37)
Firm F.E	NO	YES	YES	YES
Clustered Std Errors	NO	NO	NO	YES
N	144209	144209	144209	144209
R^2	0.0215	0.0281	0.0281	0.0281

This table presents estimates from panel regressions. Investments (CAPXY/ATQ) is the dependent variable. Firm-level epidemic exposure are based on Hassan et al. (2021) firm-level exposure to epidemic diseases measure. All regressions include firm fixed effects. All standard errors are clustered at the firm-level. Within R^2 is reported.
NOTE: Statistics in parentheses: *p:0.10, **p:0.05, ***p:0.01.

Table 4
Corporate investment and COVID-19 pandemic.

	(1) Investment	(2) Investment	(3) Investment
COVID-19_dummy	−0.00851***	−0.00853***	−0.00853***
	(−28.46)	(−27.49)	(−17.99)
Tobin_Q	−0.00229	0.0106***	0.0106***
	(−0.13)	(4.47)	(5.07)
Size	0.00134***	0.00197**	0.00197*
	(5.85)	(2.40)	(1.71)
Leverage	−0.00162	−0.00443**	−0.00443**
	(−1.28)	(−2.50)	(−2.22)
Cash_flow	0.00935***	0.00264	0.00264
	(2.62)	(0.65)	(0.27)
Dividend_dummy	0.0483***	0.0568***	0.0568***
	(3.92)	(3.57)	(3.08)
NWC	−0.00828***	−0.0108***	−0.0108***
	(−4.91)	(−5.21)	(−3.76)
Constant	0.0150***	0.00935	0.00935
	(8.61)	(1.57)	(1.13)
Firm F.E	NO	YES	YES
Clustered Std Errors	NO	NO	YES
N	17347	17347	17347
R^2	0.0511	0.0528	0.0528

This table presents estimates from panel regressions. Investments (CAPXY/ATQ) is the dependent variable. Firm-level epidemic exposure are based on Hassan et al. (2021) firm-level exposure to epidemic diseases measure. All regressions include firm fixed effects. All standard errors are clustered at the firm-level. Within R^2 is reported.
NOTE: t-statistics in parentheses: *p:0.10, **p:0.05, ***p:0.01.

are heteroskedasticity-consistent and clustered at the firm-level. We report our estimates in Table 4, and find that the COVID-19 pandemic has a strong and statistically negative effect on corporate investments.

4.2. *Falsification test: Placebo test*

One potential concern might be that the results are potentially due to an ongoing trend in corporate investments amongst U.S firms and not due the Covid-19 pandemic. For external validation and in order to add credibility to our results, we have carried out

Table 5
Falsification test: Placebo.

	(1) Investment	(2) Investment	(3) Investment
Placebo_epidemic	0.00124	−0.00221	−0.00221
	(0.26)	(−0.53)	(−0.39)
Tobin_Q		−0.00231	−0.00231
		(−0.70)	(−0.66)
Size		0.00521***	0.00521***
		(5.10)	(3.27)
Leverage		−0.0162***	−0.0162***
		(−6.92)	(−2.75)
Cash_flow		−0.0297***	−0.0297
		(−6.12)	(−0.84)
Dividend_dummy		0.00781***	0.00781*
		(3.84)	(1.86)
NWC		−0.0149***	−0.0149**
		(−5.53)	(−2.49)
Constant	0.0276***	−0.00312	−0.00312
	(84.22)	(−0.43)	(−0.27)
Firm F.E	YES	YES	YES
Clustered Std Errors	YES	NO	YES
N	24442	22540	22540
R^2	0.00488	0.0661	0.0661

This table presents estimates from panel regressions. Investments (CAPXY/ATQ) is the dependent variable. Our Placebo_Epidemic dummy takes the value of "1" for the period 2017Q1 to 2018Q4 and "0" for 2015Q1 to 2016Q4. All regressions include firm-level fixed effects. All standard errors are clustered at the firm-level. Within R^2 is reported.
Note: t-statistics in parentheses: *p: 0.10, **p: 0.05, ***p:0.01.

a "Placebo" test and re-examine our main hypothesis. We first assume an occurrence of a "Placebo_Epidemic" starting in 2017Q1 and ending in 2018Q4. We end our placebo period in 2018Q4 to ensure that our estimates are free of any potential anticipation of the COVID-19 pandemic during the 2019 fiscal year. Our Placebo dummy takes the value of "1" for the period 2017Q1 to 2018Q4 and "0" for 2015Q1 to 2016Q4, allowing us to compare a balanced data. If our estimates are simply picking up a general ongoing trend in investment amongst U.S firms, then our placebo estimates should be statistically similar and consistent with our reported estimates. The results in Table 5 demonstrate that our results are not attributable to any ongoing trend(s) in corporate investments amongst the U.S firms.

5. Conclusion

"Do epidemic-induced shocks affect corporate investments?" We argue that epidemic diseases are generally unanticipated and their impacts can be widespread leading to uncertainty, increasing financing frictions and thus affecting the relative attractiveness of current period's investments when compared to future periods' investments. In anticipation of fluctuations in aggregate demand and supply, managers might delay investments as the option to do so during a period of high uncertainty is valuable.

Using difference-in-difference estimation strategy and a firm-level exposure to an epidemic disease measure, we find that corporate investment declined significantly following the onset of an epidemic disease. We also document that the COVID-19 pandemic has the strongest negative impact on investments when compared to the other most recent epidemic diseases. Our results show that epidemic-induced shocks have first-order effect on corporate decisions.

CRediT authorship contribution statement

Daniel Tut: Conceptualization, Formal analysis, Methodology, Data analysis, Software, Validation, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

Abel, A.B., Eberly, J.C., 1996. Optimal investment with costly reversibility. Rev. Econom. Stud. 63 (4).
Alti, A., 2003. How sensitive is investment to cash flow when financing is frictionless? J. Financ. 58 (2).
Atkeson, A., 2020. What will be the economic impact of COVID-19 in the US? Rough estimates of disease scenarios. Natl. Bureau Econ. Res.
Au, S.Y., Dong, M., Zhou, X., 2020. Does social interaction spread fear among institutional investors? Evidence from COVID-19. Evidence from COVID-19. (accessed 27 october 2020).
Barrero, J.M., Bloom, N., Davis, S.J., 2020. Covid-19 is also a reallocation shock. Natl. Bureau Econ. Res.
Bertrand, M., Duflo, E., Mullainathan, S., 2004. How much should we trust differences-in-differences estimates? Q. J. Econ. 119.
Bloom, N., 2006. The impact of uncertainty shocks: Firm level estimation and a 9/11 simulation. Cent. Econ. Perform. Lond. Sch. Econ. Political Sci.
Caballero, R.J., 1991. On the sign of the investment-uncertainty relationship. Am. Econ. Rev. 81 (1).
Cunningham, S., 2020. Causal inference. The Mixtape, https://www.scunning.com/mixtape.html.
Ding, W., Levine, R., Lin, C., Xie, W., 2020. Corporate immunity to the COVID-19 pandemic. Natl. Bureau Econ. Res.
Dixit, A.K., Pindyck, R.S., 1995. The options approach to capital investment. In: Real Options and Investment under Uncertainty-Classical Readings and Recent Contributions. vol. 6, MIT Press, Cambridge.
Duchin, R., Ozbas, O., Sensoy, B.A., 2010. Costly external finance, corporate investment, and the subprime mortgage credit crisis. J. Financ. Econ. 97.
Eichenbaum, M.S., Rebelo, S., Trabandt, M., 2020. The macroeconomics of epidemics. Natl. Bureau Econ. Res.
Erickson, T., Whited, T.M., 2006. On the accuracy of different measures of q. Financ. Manage. 35.
Fazzari, S., Hubbard, R., Petersen, B., 1988. Finance constraints and corporate investment. Brook. Pap. Econ. Activity 1.
Goodman-Bacon, A., 2021. Difference-in-differences with variation in treatment timing. J. Econometrics.
Goodman-Bacon, A., Marcus, J., 2020. Using difference-in-differences to identify causal effects of COVID-19 policies (May 2020). DIW Berlin Discussion Paper No. 1870, Available at SSRN: https://ssrn.com/abstract=3603970 or http://dx.doi.org/10.2139/ssrn.3603970.
Greenstone, M., Hanna, R., 2014. Environmental regulations, air and water pollution, and infant mortality in India. Am. Econ. Rev. 104 (10), 3038–3072.
Guerrieri, V., Lorenzoni, G., Straub, L., Werning, I., 2020. Macroeconomic implications of COVID-19: Can negative supply shocks cause demand shortages? Natl. Bureau Econ. Res.
Gulen, H., Ion, M., 2016. Policy uncertainty and corporate investment. Rev. Financ. Stud. 29.
Hassan, Hollander, van Lent, Schwedeler, Tahoun, A., 2021. Firm-level exposure to epidemic diseases: Covid-19, SARS, and H1N1. In: Working Paper.
Holmstrom, B., Tirole, J., 1997. Financial intermediation, loanable funds, and the real sector. Q. J. Econ. 112.
Jaffee, D., Russell, T., 1976. Imperfect information, uncertainty, and credit rationing. Q. J. Econ. 90.
Krieger, K., Mauck, N., Pruitt, S.W., 2020. The impact of the COVID-19 pandemic on dividends. Financ. Res. Lett.
Li, Z.F., Zhou, Q., Chen, M., Liu, Q., 2021. The impact of COVID-19 on industry-related characteristics and risk contagion. Financ. Res. Lett. 39.
Lovenheim, M.F., Willén, A., 2019. The long-run effects of teacher collective bargaining. Am. Econ. J.: Economic Policy 11 (3), 292–324.
Manski, C.F., Pepper, J.V., 2018. How do right-to-carry laws affect crime rates? Coping with ambiguity using bounded-variation assumptions. Rev. Econ. Stat. 100 (2), 232–244.
Petersen, M., 2009. Estimating standard errors in finance panel datasets: comparing approaches. Rev. Financ. Stud. 22.
Philipson, T., 2000. Economic epidemiology and infectious diseases. Handb. Health Econ. 1.
Rambachan, A., Roth, J., 2019. An Honest Approach To Parallel Trends. Unpublished Manuscript. Harvard University.[99].
Tirole, J., 2006. The Theory of Corporate Finance. Princeton University Press.