

A First Look at the Impact of COVID-19 on Commercial Real Estate Prices: Asset-Level Evidence

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Motivation

- **Capital markets**
- Most studies examine how stock returns have responded to changes in investors' expectations about COVID-19 at the *index*-level or *firm*-level.
 - Alfaro et al. (2020), Gormsen and Koijen (2020), Ramelli and Wagner (2020)
- The price effects are driven by the perceived productivity of the firm's *underlying assets*.

Motivation cont.

- **Property Markets**

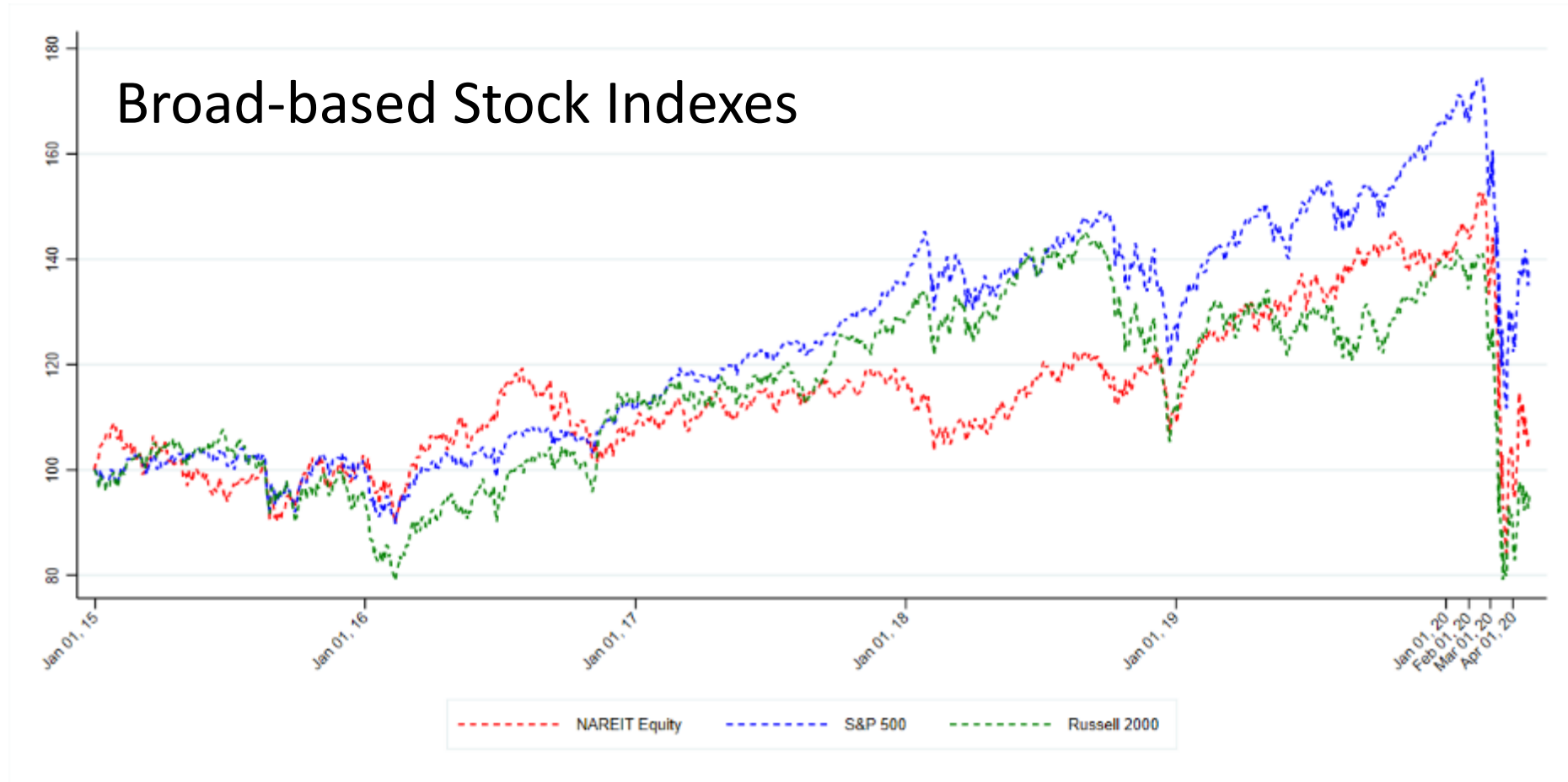
- Property market liquidity has declined substantially. The relation between price & liquidity might no longer hold (Van Dijk et al., 2020)
 - The health crisis might limit our ability to detect rent and price movements in “real time”
- Local COVID-19 policy effectiveness
 - These policies might influence property markets and user markets
 - Non-pharmaceutical interventions (e.g., Correia et al., 2020; Lilley et al., 2020)
 - Reopenings (e.g., Chetty et al., 2020; Bartik et al., 2020; Villas-Boas et al., 2020)

This Paper...

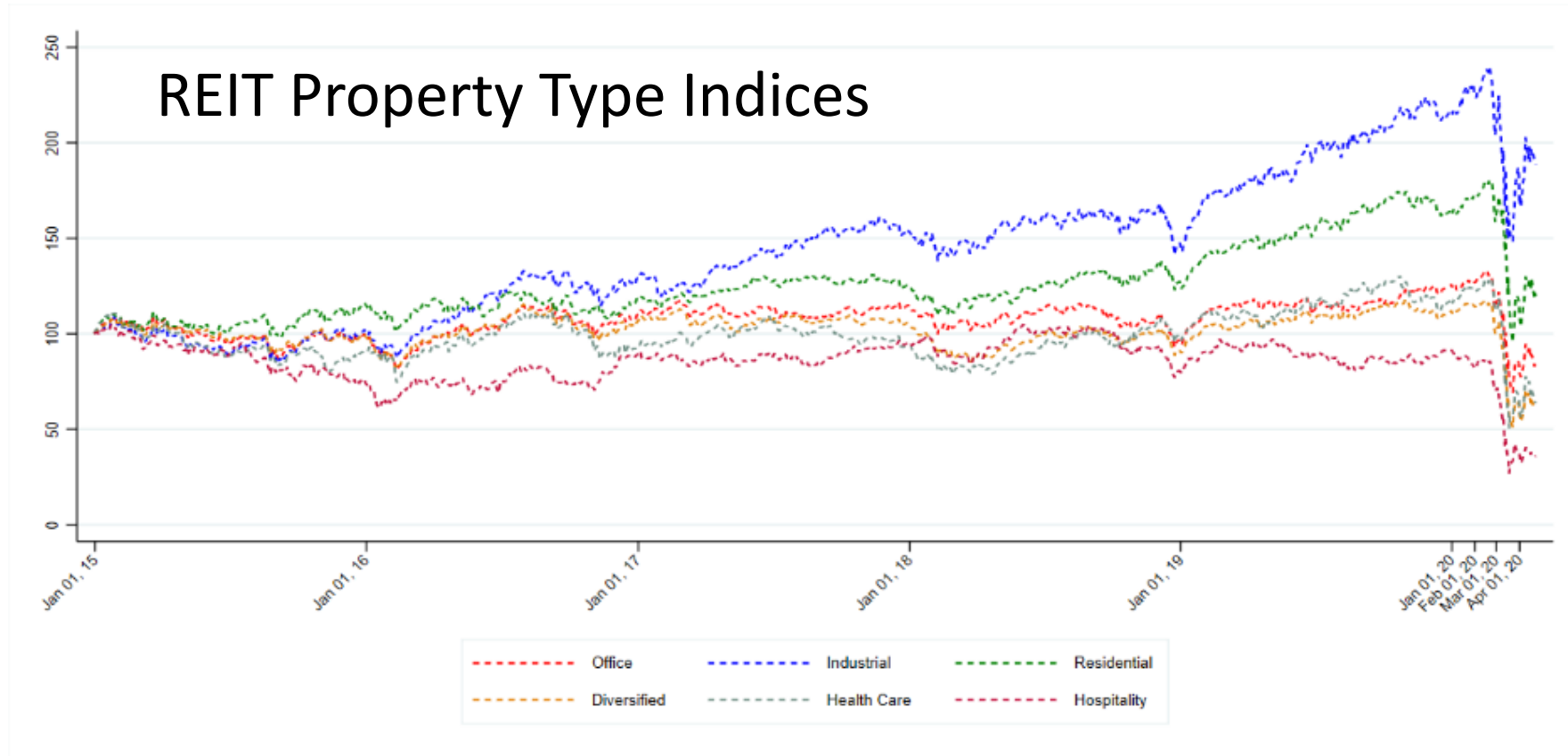
- Ours is the first academic paper to examine how COVID-19 pandemic has affected stock returns **through a firm's underlying assets**
- We focus on **asset-level** evidence using commercial real estate (CRE) assets owned by listed U.S. equity REITs
- The effects of COVID-19 we observe in liquid stock markets are indicative of effects occurring in private CRE markets

Summary

- We construct a **Geographically Weighted Case Growth** (*GeoCOVID*)
- We find the key drivers are the:
 - Property type focus of the REIT
 - REIT's geographic exposure of assets to the pandemic (i.e., *GeoCOVID*)
- Local non-pharmaceutical interventions (NPIs) helped moderate the negative return impact of *GeoCOVID*
- Reopenings have limited effects on the performance of CRE markets

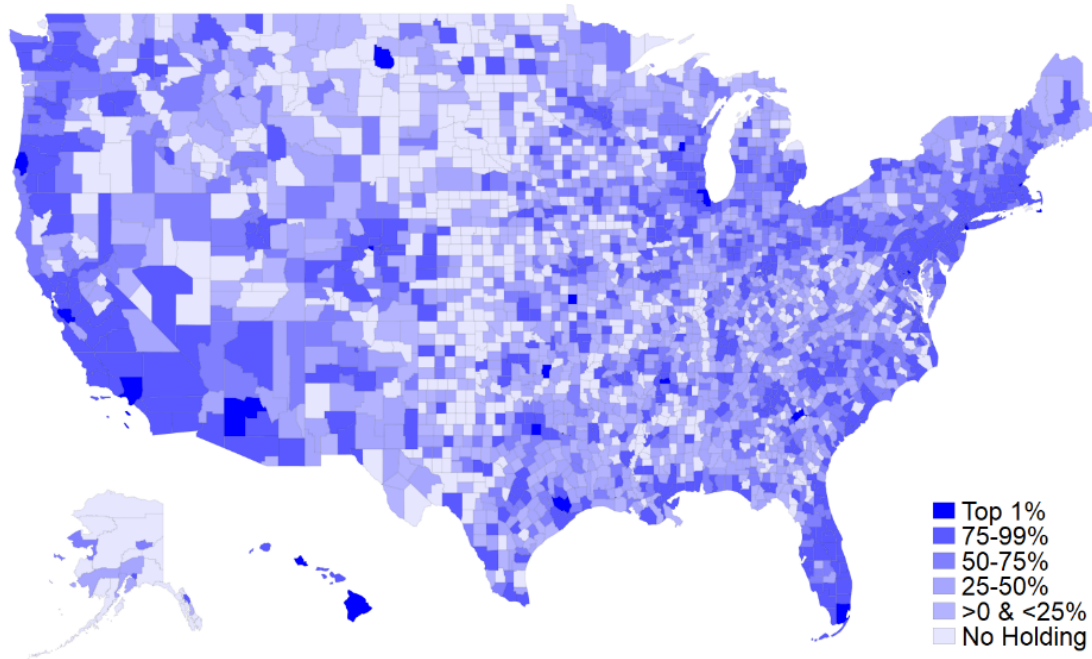


- March of 2020: total return index on S&P 500, equity REITs, and Russell 2000 declined 16%, 23%, & 26%, respectively
- Decline in REIT share prices far exceeds reduction that can be explained by a temporary loss in rental income

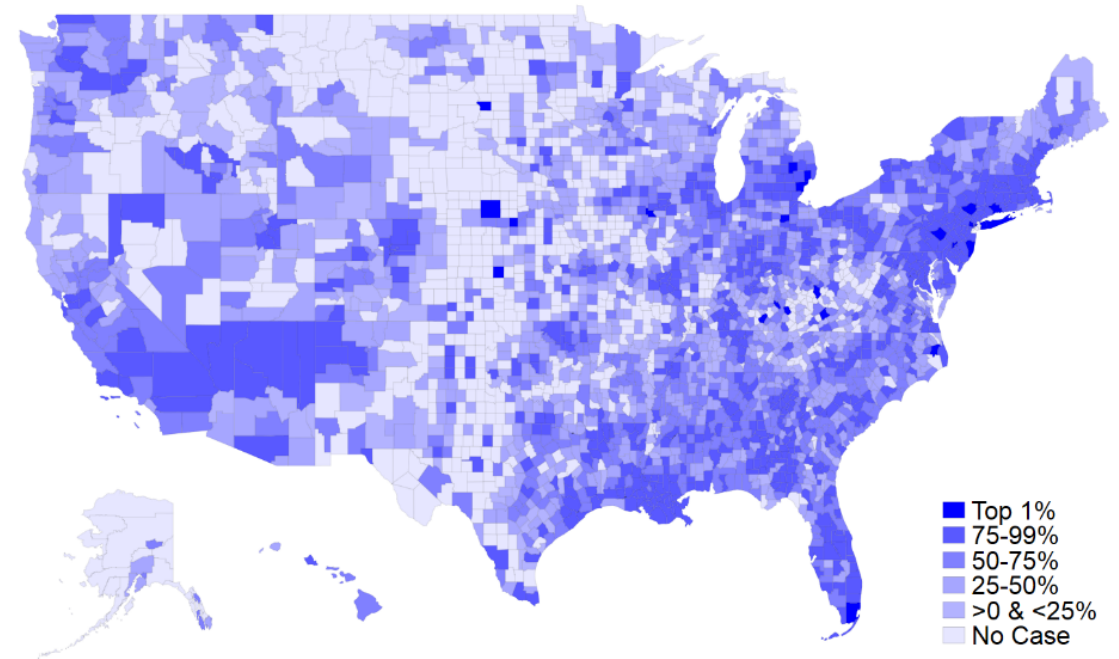


- March of 2020: cumulative total return index for retail REITs declined **49%**, followed by: hospitality REITs (**-44%**); health care REITs (**-41%**); office REITs (**-25%**); residential REITs (**-26%**); industrial REITs (**-10%**)

COVID-19 Growth

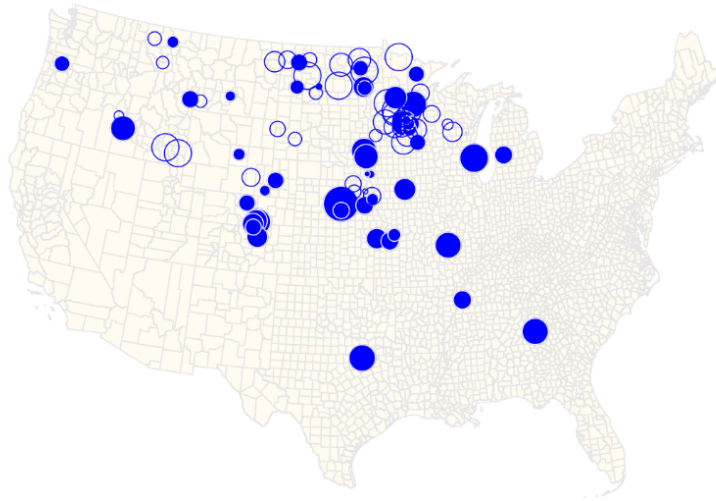


REIT Asset Allocations

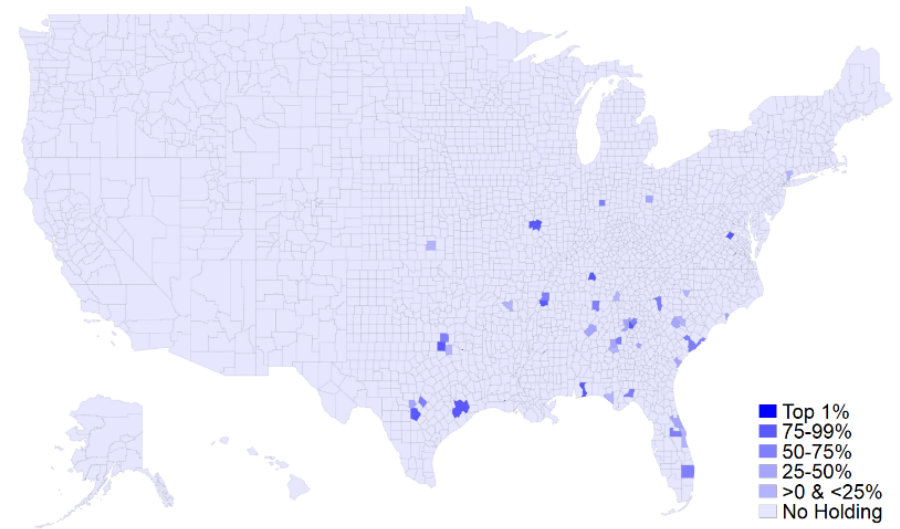
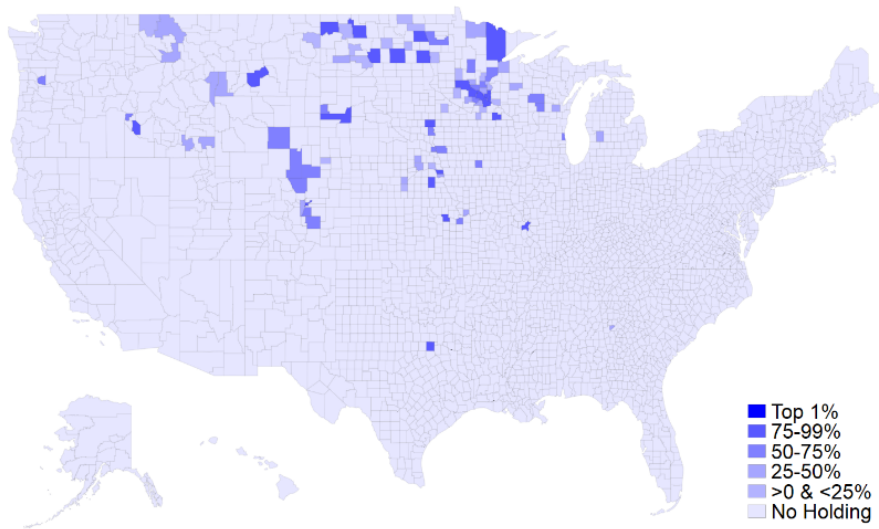
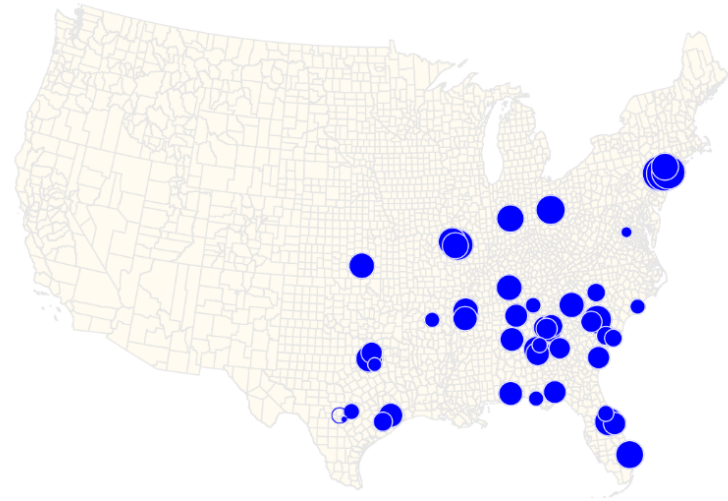


- But...# of reported COVID-19 cases varies substantially by county/regions
- Thus, property type indices mask significant variation across firms in the exposure of CRE portfolios to the pandemic

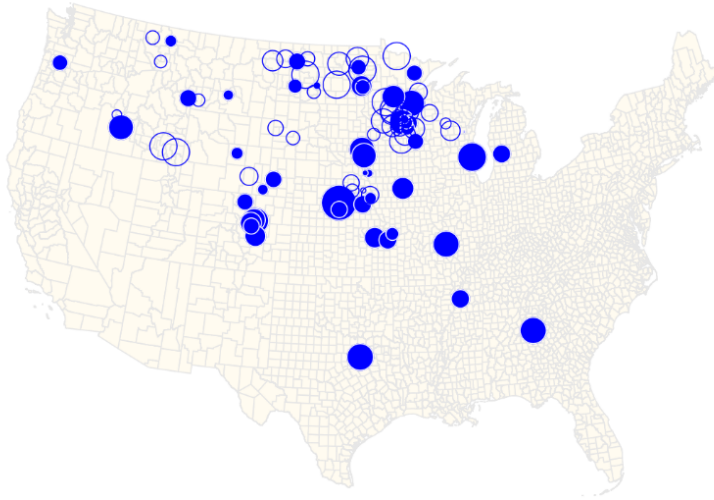
Investors Real Estate Trust



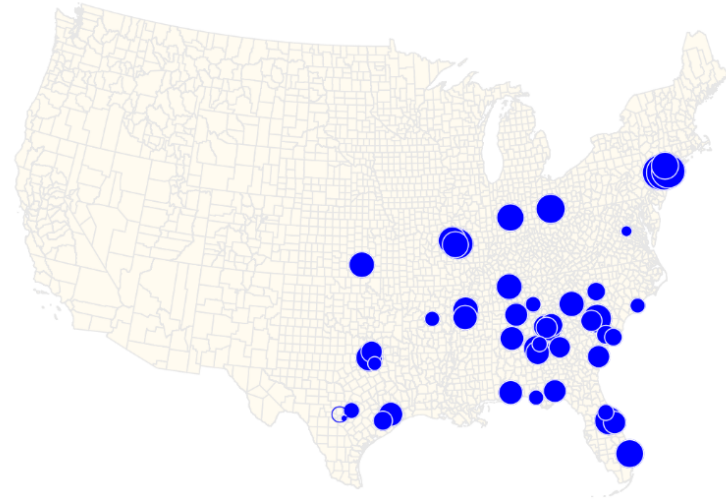
BRT Apartments Corp.



Investors Real Estate Trust



BRT Apartments Corp.



1-day, 2-day, and 3-day risk-adjusted returns

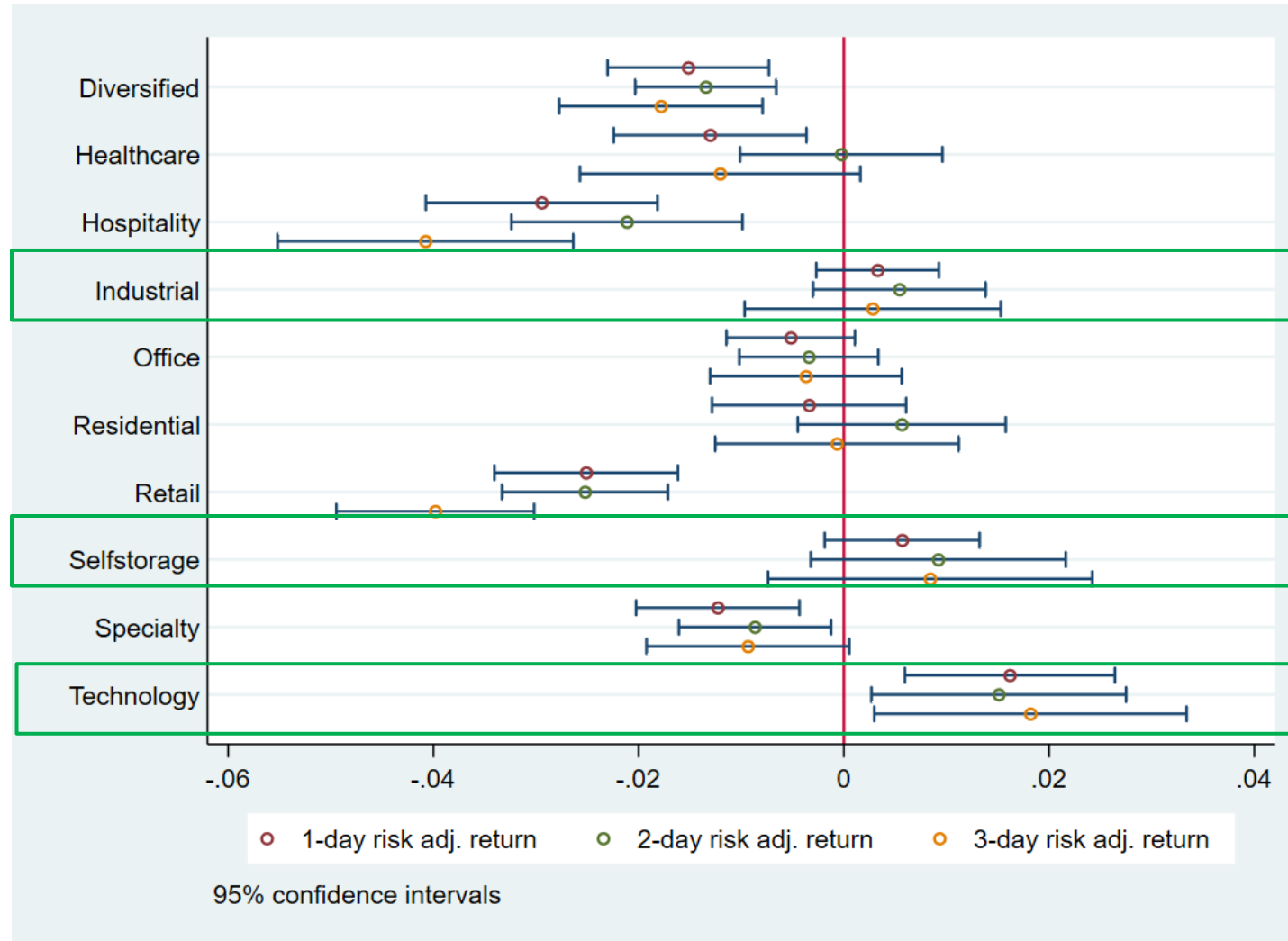
+0.03% to +0.6%

-0.05% to -1%

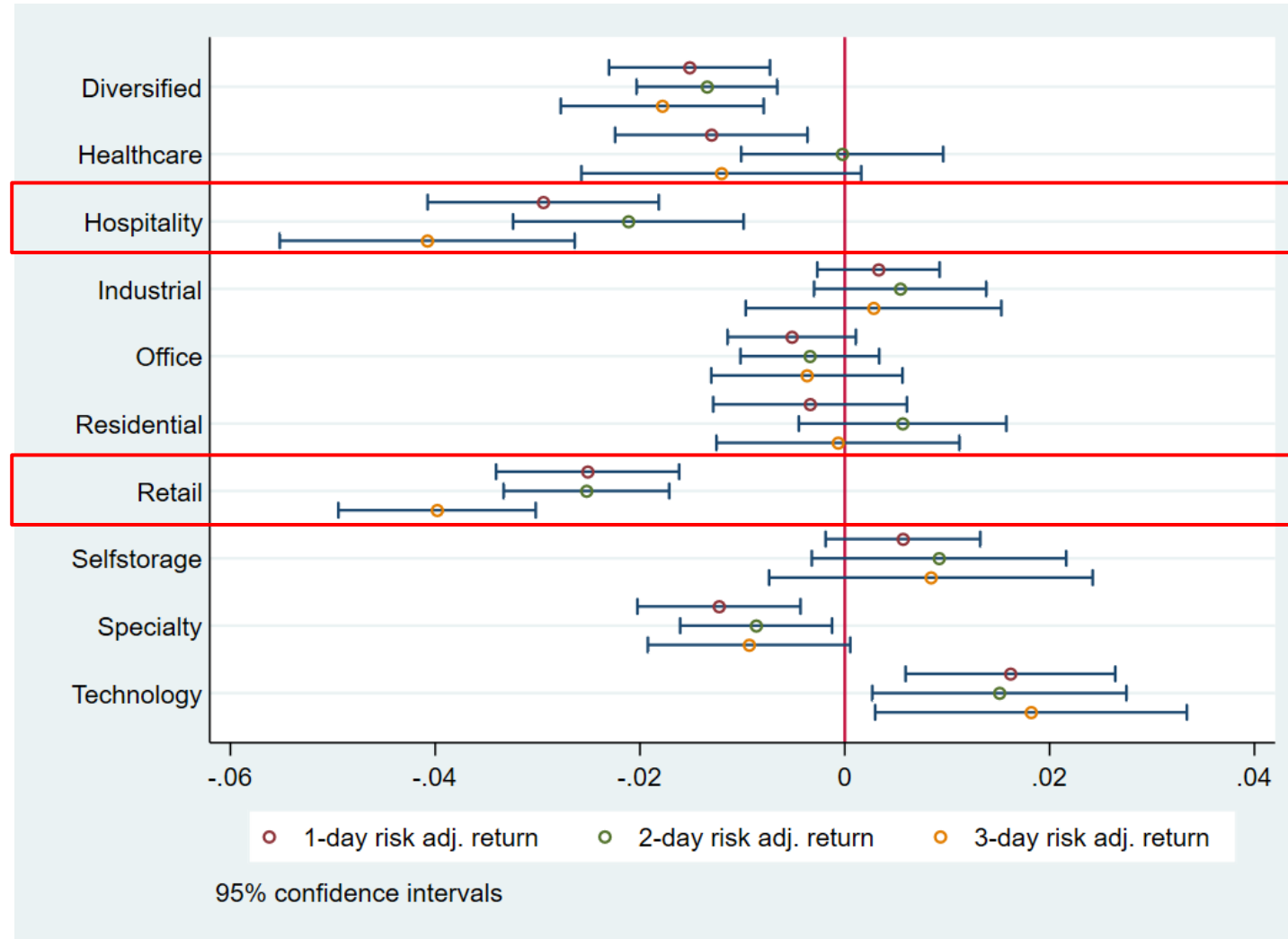
Research Design

- How do we measure COVID-19-induced shocks to a firms' asset-level productivity? Two steps to construct **GeoCOVID**:
 1. Quantify magnitude of local productivity shocks
 - log of daily change in reported cases by county
 - COVID-19 Global Cases database at Johns Hopkins University
 2. Measure a firm's geographic exposure to these daily changes in case growth
- Firm-Level Stock Performance (daily abnormal returns)
 - Estimate betas using daily return data: Jan 1, 2019 to Jan 20, 2020
 - Based on either S&P 500 Index or NAREIT Equity Index
 - Estimate daily abnormal returns: Jan 21, 2020 through Apr 15, 2020
 - Also construct non-overlapping cumulative abnormal returns over 2-day & 3-day windows
- Sample of 11,210 firm-day observations for 198 equity REITs

Daily Abnormal Returns by Property Type (based on S&P 500)



Daily Abnormal Returns by Property Type (based on S&P 500)



Multivariate Analysis

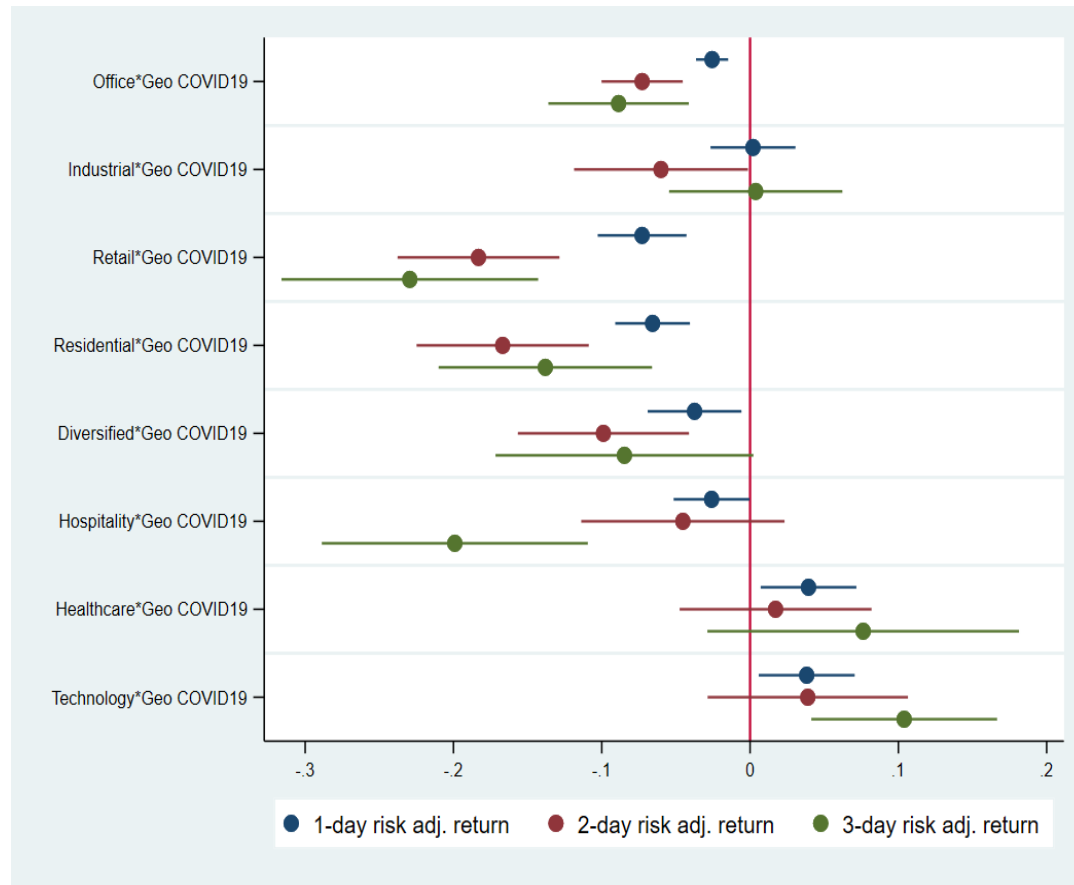
- Regress 1-day, 2-day, & 3-day abnormal returns (ARs) on each REIT's *GeoCOVID* on day $t-1$
- Include # number of days since first reported case in any county in which the REIT owns properties (Wheaton & Thompson, 2020)
- Construct a geographically-weighted *population density* variable based on each property held by a REIT
- Include asset-specific controls: extent to which portfolio is concentrated by (county) location or by property type
- Include a large set of other firm characteristics as controls
 - Leverage, cash, size, Tobin's Q, lagged returns, institutional ownership, investment, EBITDA/TA

Baseline Results

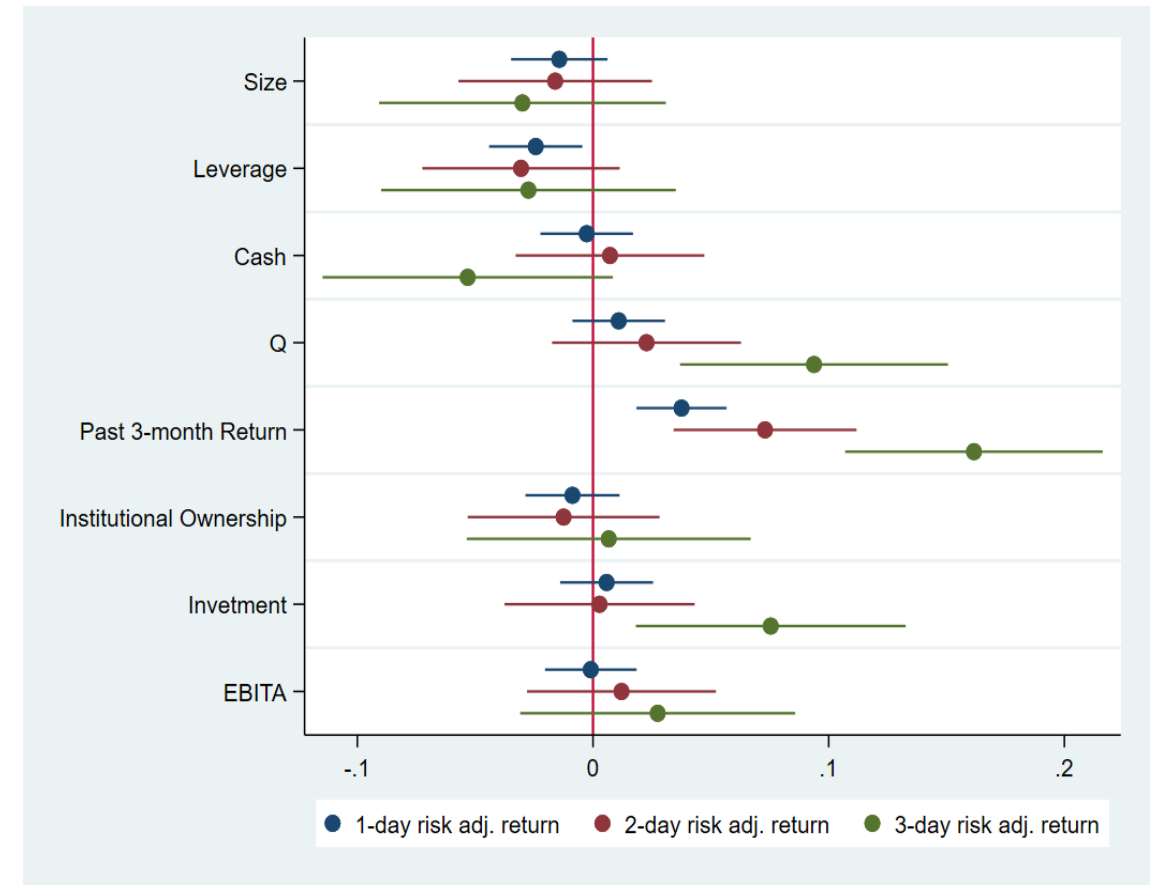
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|-----------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|
| | <i>Ret (1-day)</i> | <i>Ret (1-day)</i> | <i>Ret (1-day)</i> | <i>Ret (2-day)</i> | <i>Ret (2-day)</i> | <i>Ret (2-day)</i> | <i>Ret (3-day)</i> | <i>Ret (3-day)</i> | <i>Ret (3-day)</i> |
| <i>GeoCOVID</i> | -0.024*** (-4.70) | -0.026*** (-3.82) | -0.022*** (-3.01) | -0.070*** (-6.72) | -0.086*** (-5.98) | -0.080*** (-5.13) | -0.089*** (-5.91) | -0.099*** (-4.72) | -0.088*** (-3.89) |
| <i>Days since outbreak</i> | | -0.000*** (-7.01) | -0.000*** (-6.72) | | -0.000*** (-6.39) | -0.000*** (-5.89) | | -0.001*** (-6.53) | -0.001*** (-6.23) |
| <i>Days since outbreak</i> ² | | 0.000*** (8.73) | 0.000*** (8.24) | | 0.000*** (9.00) | 0.000*** (8.42) | | 0.000*** (8.51) | 0.000*** (8.06) |
| <i>ln(GeoDensity)</i> | | 0.001*** (5.17) | | | 0.001*** (6.08) | | | 0.002*** (5.73) | |
| Constant | -0.005*** (-12.18) | -0.001 (-0.70) | -0.004*** (-8.99) | -0.008*** (-10.00) | -0.003 (-0.73) | -0.008*** (-8.46) | -0.013*** (-10.86) | -0.002 (-0.43) | -0.011*** (-8.97) |
| FE | Prop type | Prop type | Firm | Prop type | Prop type | Firm | Prop type | Prop type | Firm |
| R Squared | 0.005 | 0.012 | 0.013 | 0.016 | 0.034 | 0.037 | 0.018 | 0.041 | 0.044 |
| Observations | 11,210 | 11,210 | 11,210 | 5,510 | 5,510 | 5,510 | 3,800 | 3,800 | 3,800 |

- Property type fixed effects, or firm fixed effects, are included; results for control variables are suppressed
- SD increase in *GeoCOVID* on day $t-1$ is associated with:
 - a 0.24 percentage point decrease in ARs on day t , equivalent to 40% of sample mean (-0.6%) of ARs
 - a 0.80 PP decrease in ARs during days t & $t+1$ (2-day window)
 - a 0.93 PP decrease in ARs during days $t-1$, day t , & day $t+1$ (3-day window)
- Strong negative association between *GeoCOVID* & abnormal returns is **not** driven solely by the national trend in reported cases

Property Type

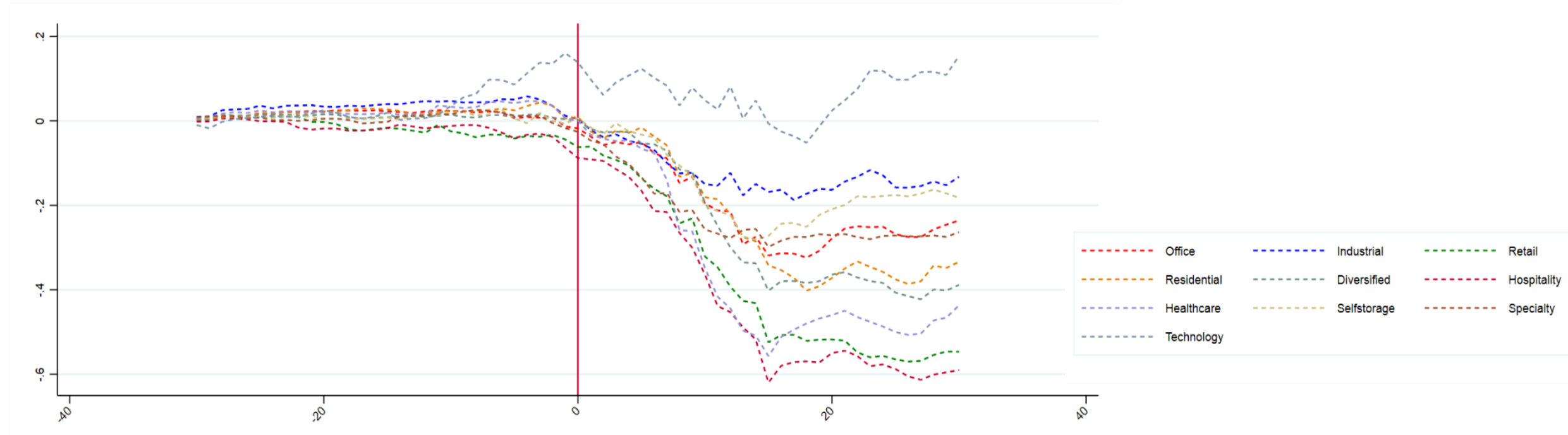


Firm Characteristics



The Effects of Non-pharmaceutical interventions (NPIs)

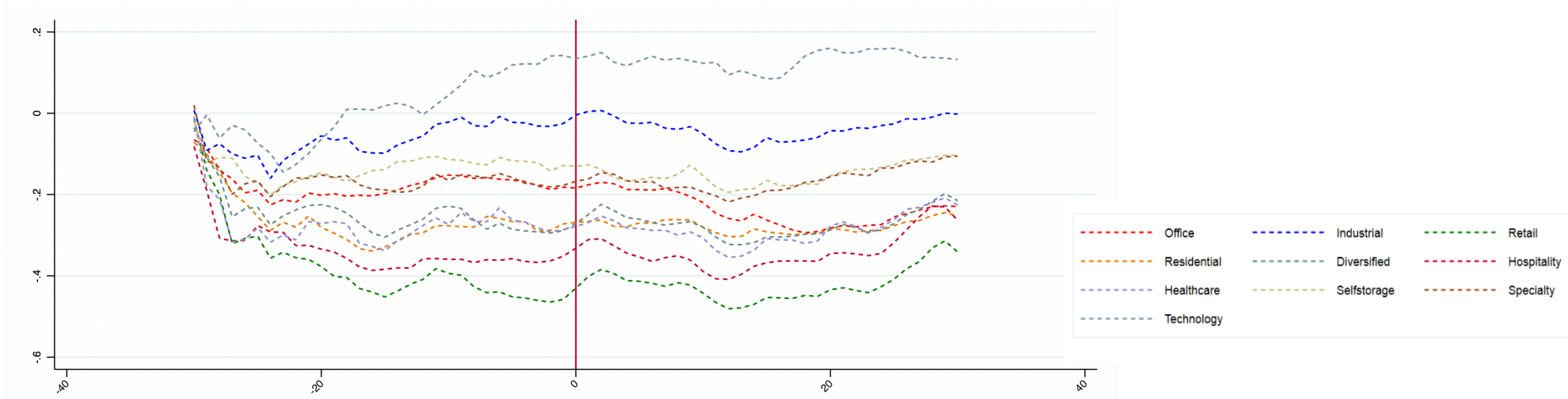
Market Reactions to State-of-Emergency (SOE) Declaration



- Examine “top 3” SOEs, “top 3” SIPOs, & SOE announcements in HQ state
- Identify NPIs: Jataware, a machine learning company that automates collection of news articles, detects whether an article mentions a COVID-19 NPI, verify our NPI event dates using Google searches
- Again...there is substantial variation across property types

The Effects of Reopenings

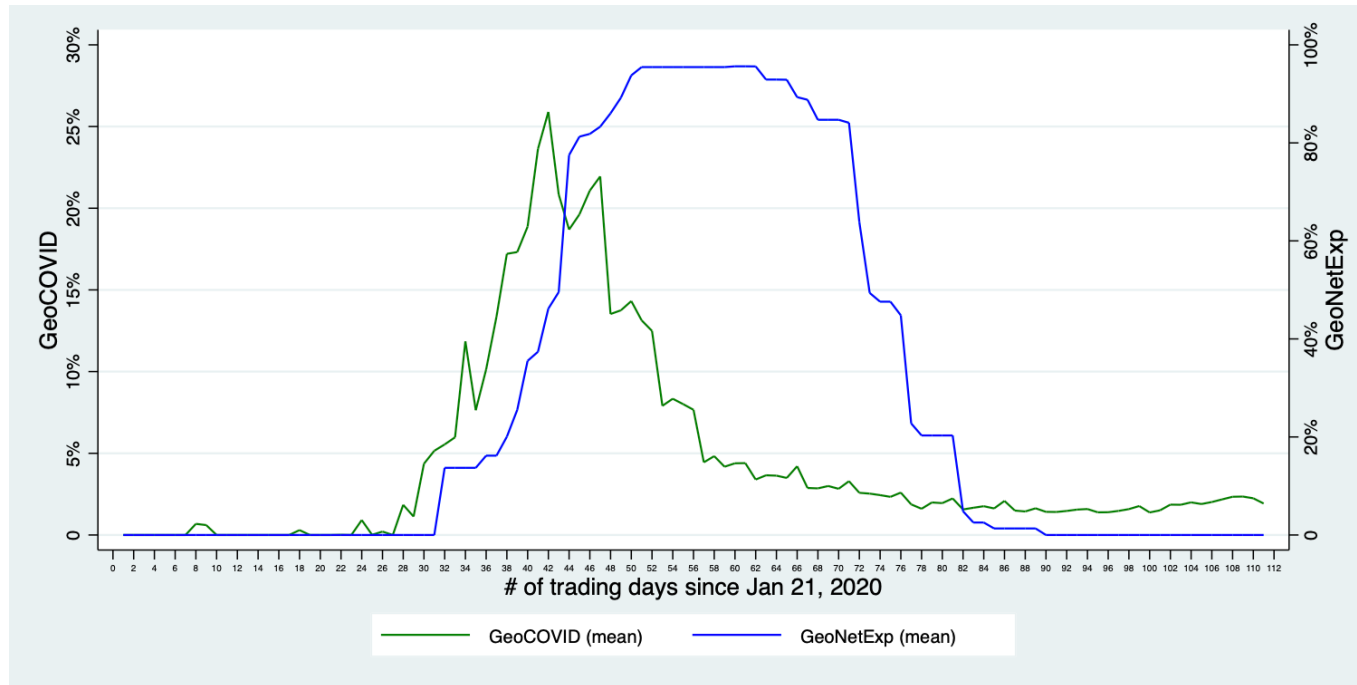
Market Reactions to State-of-Emergency (SOE) Declaration



- Examine “top 3” reopenings using data through June 30
- Identify reopenings: the date the state government allowed the first set of businesses to reopen (Chetty et al., 2020; Nguyen et al., 2020)
- We find no discernable pattern of market reactions to reopening announcements
- Firms and businesses may choose not to open, or fully open, even after restrictions are lifted...

GeoCOVID & Policy Interventions

$\text{GeoNetExp} = \% \text{ exposed to NPIs} - \% \text{ exposed to reopenings}$



- Both proportions are measured at the **state level**
- Reopenings are intended to nullify NPIs
- The inverse-U shape corresponds to an increase in average NPI exposures until April 3, followed by a decline after April 20 as reopenings began to occur

GeoCOVID & Policy Interventions

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---------------------------------|----------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|
| <i>Ret (1-day)</i> | <i>Post NPI</i> | <i>GeoNPI</i> | <i>GeoReopen</i> | <i>GeoNetExp</i> | <i>GeoNetExp</i> | <i>GeoNetExp</i> |
| | | | After Apr 15 | | Before Apr 15 | After Apr 15 |
| <i>GeoCOVID</i> × <i>Policy</i> | 0.067*** (3.85) | 0.150*** (4.29) | -0.050 (0.67) | 0.003** (2.55) | 0.009*** (3.10) | -0.003 (-1.37) |
| <i>GeoCOVID</i> | -0.078*** (-9.49) | -0.035*** (-4.30) | -0.186*** (-3.20) | -0.096*** (-10.84) | -0.080*** (-9.69) | -0.171*** (-3.87) |
| <i>Policy</i> | 0.011*** (3.27) | 0.029*** (5.84) | -0.001 (-0.29) | 0.138*** (8.04) | 0.116*** (5.53) | 0.043 (0.63) |
| FE | Prop type | Prop type | Prop type | Prop type | Prop type | Prop type |
| R Squared | 0.033 | 0.032 | 0.004 | 0.021 | 0.032 | 0.004 |
| Observations | 11,210 | 11,210 | 10,194 | 21,404 | 11,210 | 10,194 |

- Property type fixed effects, or firm fixed effects, are included; results for control variables are suppressed
- SD increase in *GeoCOVID* on day $t-1$ is associated with:
 - a 0.10 percentage point decrease in ARs on day t in the post-NPI period
 - Compared to pre-NPI level of 0.73
- Compared to a firm with no exposure to NPIs ($GeoNPI = 0$), firm with 10% NPI exposure ($GeoNPI = 10$) experiences a decline in 1-day abnormal returns that is **57% less than mean**.

GeoCOVID & Reopenings

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- Property type fixed effects, or firm fixed effects, are included; results for control variables are suppressed
- There is no evidence that reopenings boosted the expected performance of CRE markets

Conclusion

- Ours is first paper to examine how COVID-19 pandemic has affected stock returns through a firm's underlying assets
 - Specifically, the location of those assets
- First to examine how outbreak of the COVID-19 pandemic affects the CRE market
- Researchers have found that existing models may no longer be adequate (Barro et al., 2020; Alfaro et al., 2020)...
- ...And are exploring ways to better capture firm-level exposures to diseases (e.g., Hassan et al., 2020)
- Our findings suggest models need to control for cross-sectional variation in firms' geographic exposure to pandemics
 - geography of assets & extent to which "*local*" information about productivity of a firm's assets is capitalized into stock prices

Thank You!

- Latest version:
 - https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3593101