

Do Markets Yearn for the Dog Days of Summer? COVID, Climate, and Consternation

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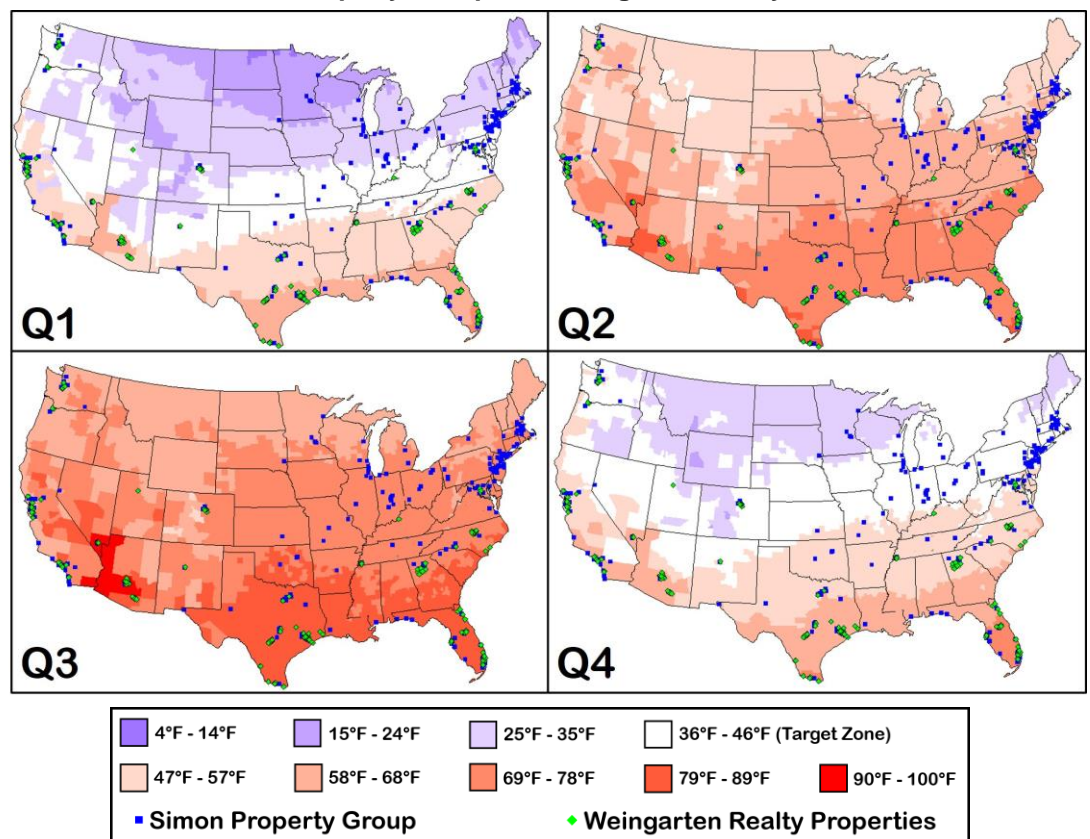
Acknowledgements

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Stakeholders are turning to untraditional data sources to quantify the impact of the COVID-19 shutdown. While no single variable can forecast which locations will be most susceptible to the virus, mounting scientific literature suggests that there is a correlation between temperature and viral propagation.¹ If correct, regions in the temperature ‘target zone’ may need to implement more stringent lockdown policies for a longer period to achieve comparable mitigation.

Investors can combine weather data with property data, to expose one dimension² of risk for Real Estate Investment Trusts (REITs) of prolonged closures, as well as areas that may see a resurgence of the virus later this year. Figure 1 exemplifies this by showing the higher concentration of properties in locations favorable to COVID-19 propagation in the portfolio of Simon Property Group compared to Weingarten Realty Properties.

Figure 1. COVID-19 Optimal Survival Temperatures Overlaid with Property Holdings for Simon Property Group and Weingarten Realty Investors.



Note: The average hourly temperature was calculated at the Federal Information Processing Standard (FIPS) code level for each calendar quarter from 12:00am UTC January 1, 2016 – 12:00am UTC January 1, 2020.

Source: S&P Global Market Intelligence Quantamental Research. Data as of April 10, 2020.

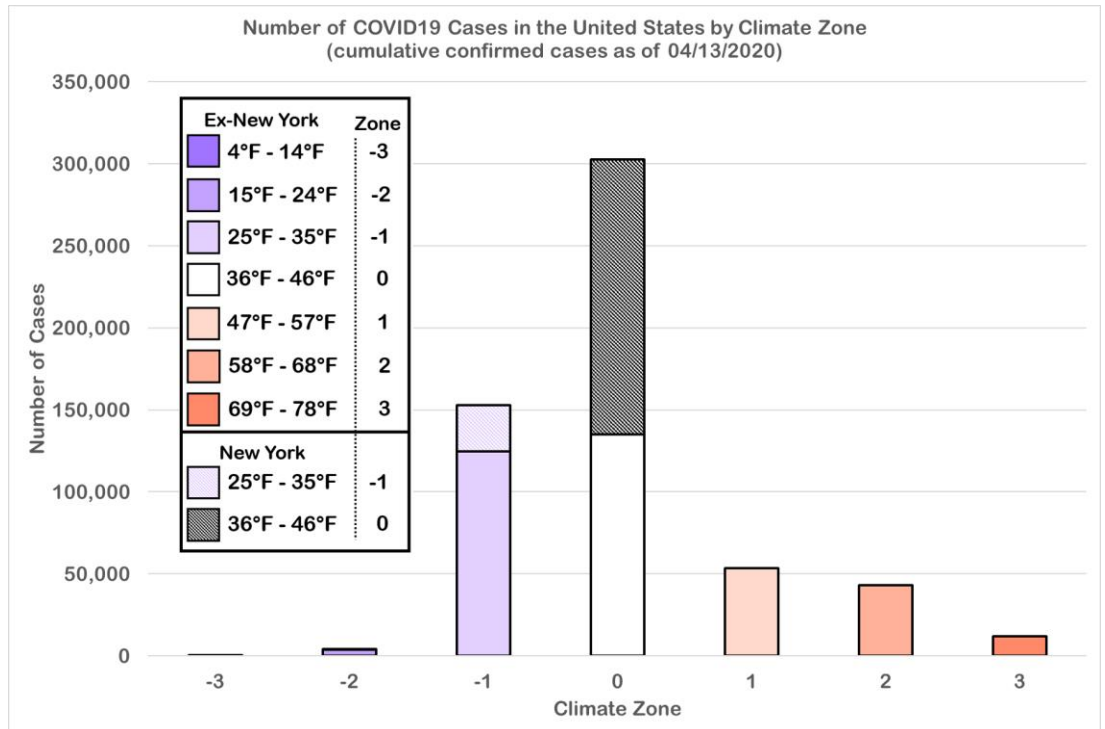
¹ See Fineberg and Relman 2020 for a literature review as of April 7, 2020. The References section includes a selection of leading papers on the subject of COVID-19 and climate.

² Temperature is one of several variables used in epidemiological models. Models may influence policy. Readers should see section 3 for expanded discussion.

1. Temperature correlation to COVID-19 Cases

The scientific community has worked diligently to provide rapid, preliminary insights into the novel coronavirus, SARS-CoV-2.³ More than a dozen studies suggest that the virus' rate of propagation, also known as the reproduction number⁴, is sensitive to ambient temperature. The number of cases in the United States, as of our April 14 analysis, is largest in the target temperature region cited in the literature (approximately 36°F-46°F) and declines at higher and lower temperatures (figure 2).

Figure 2. Number of COVID-19 Cases in the United States by Climate Zone.



Note: The number of confirmed COVID-19 cases was aggregated by temperature⁵ zone.

Source: S&P Global Market Intelligence Quantamental Research. Data as of April 14, 2020.

Zone 0 (target zone) continues to lead the case count, even after removing New York, the current epicenter of the viral outbreak in the United States. Note that on a per capita basis, zone 0 leads with $28.2 \frac{\text{cases}}{10,000 \text{ people}}$, though zone 3 is also in contention with $24.9 \frac{\text{cases}}{10,000 \text{ people}}$ and zone -1 takes a distant third at $16.5 \frac{\text{cases}}{10,000 \text{ people}}$.

³ The References section includes a selection of leading papers on the subject of COVID-19 and climate.

⁴ Readers seeking a layman's summary of epidemiological models are referred to Rogers, A., Molteni, M., 2020. "The Mathematics of Predicting the Course of the Coronavirus." Available at: <https://www.wired.com/story/the-mathematics-of-predicting-the-course-of-the-coronavirus/>

⁵ Weather data was provided by Weather Source.

2. Impact of COVID-19 on Real Estate

In Figure 1, two real estate investment trusts (REITs) are contrasted to show their exposure to climates that are reportedly favorable for COVID-19 transmission. Simon Property Group (SPG) is the largest shopping mall operator in the U.S., at the time of this publication, with a large concentration of properties in the lower Northeast and Great Lakes states. Weingarten Realty (WRI) is primarily invested in shopping centers with grocery stores as anchor stores, located in the southern United States. Weather data could be used in combination with other information^{6,7} to form a REIT investment strategy.

To provide a single score for each REIT, a weighted average of the temperature zones for the REIT's property portfolio was calculated. The zone in which a particular property is located can change seasonally, as temperatures change across the nation. For each quarter, the property's zone was assigned based on the quarterly average temperature. Property zones were aggregated to form a REIT average exposure by taking into account the REIT's proportional ownership and size of each property. Specifically, the metric was calculated as,

$$TE_{iQ} = \frac{\sum |Z_{nQ}| O_{in} S_n}{\sum O_{in} S_n} \quad \text{Eq. 1}$$

where TE_{iQ} is the temperature zone exposure for REIT i in quarter Q ; $|Z_{nQ}|$ is the absolute value of the zone of property n in calendar quarter Q ; O_{in} is REIT i 's ownership percentage of property n ; and S_n is the size of property n .⁸ The summation runs over all n properties and the output is a score matrix of size $i \times Q$.

**Table 1: Select REIT Property Holdings by Temperature Zone
(Russell 3000 REITs, as of 04/17/2020)**

Company Name	Property Count	Number of Properties by Bin in Quarter 4					Score Per Quarter			
		-1	0	1	2	3	Q1	Q2	Q3	Q4
Urstadt Biddle Properties Inc.	71	0	70	1	0	0	0.4824	1.9784	3.0000	0.0228
UMH Properties, Inc.	123	0	113	10	0	0	0.6748	1.9756	2.9593	0.0813
Urban Edge Properties	87	0	49	36	2	0	0.1155	1.9665	3.0000	0.3564
Simon Property Group, Inc.	208	6	80	56	44	22	1.0078	2.3532	3.2830	1.0531
...
Weingarten Realty Investors	196	0	10	54	95	37	1.5309	3.0108	3.6885	1.7754
Bluerock Residential Growth REIT, Inc.	42		3	14	14	11	1.4715	2.9852	3.7568	1.8460
Whitestone REIT	66		1	7	58		1.7108	3.2976	4.2976	1.8830
NexPoint Residential Trust, Inc.	38			10	20	8	1.4512	3.1328	3.8141	1.8831

Source: S&P Global Market Intelligence Quantamental Research. Data as of April 14, 2020.

Using the SNL REIT dataset, 36,182 properties for 165 REITs⁹ were mapped to time-varying temperature regions, averaged quarterly. Table 1 shows a subset of the results of the analysis,

⁶ In a [recent publication, analysis of the Panjiva Supply Chain Intelligence Data](#) showed food imports (e.g. grocers) had increased 30% in the first quarter of 2020, compared to 2019; whereas retail imports declined by more than 40%. Food importers have also maintained guidance whereas more than a third of retailers have withdrawn their guidance.

⁷ SPG is among the REITs with the largest foot traffic decline (89%) versus Weingarten Realty (55%), based on analysis of the AirSage Foot Traffic dataset. A forthcoming publication will use the dataset to examine the foot traffic decline in REIT properties.

⁸ Not all REITs report the property size. In the absence of a database value for size, the property is assumed to have the average size of the other properties in the REIT's portfolio. If no sizes are available, then ownership alone is used as the weighting scheme.

⁹ Analysis includes only the properties reported by REITs in the Russell 3000 on April 17, 2020 and included in the SNL Real Estate Property Data. See Appendix for full results table.

mapped to their historical temperature zones by quarter, along with the scores calculated using equation 1. Note that properties may be located in a different temperature zone over time due to historical climate differences during different times of the year. Real time weather monitoring, using the Weather Source dataset, may provide more accurate information.

Using the information in table 1, an investor may look to the historic property exposure score (defined in eq. 1) for the fourth quarter of the calendar year. REIT's with lower (higher) scores have higher (lower) exposure to the climate that has been scientifically associated with the propagation of the virus and may be less (more) attractive to investors. We find, for example, that Simon Property Group has a greater exposure to these locations (with a score of 1.0531) than Weingarten Realty Investors (with a score of 1.7754).

3. Conclusions and Caveats

This report showcases data from Weather Source, a marquee name in the weather data space. By joining the Weather Source content to the Johns Hopkin's University COVID-19 database¹⁰, we establish a relationship between temperature and case count. This relationship is consistent with over a dozen scientific studies, recently made available via preprint¹¹. By combining the Weather Source content with the SNL REIT data, we calculate an exposure score for REITs in the Russell 3000 to climates that are more conducive to viral spread. All data manipulation was performed using the Snowflake cloud platform and Xpressfeed™.

We emphasize that readers should not interpret this work as a forecast of any kind, particularly of the spread of COVID-19. Accurate epidemiological modeling requires a number of additional inputs, including population density, access and quality of public health systems, per capita income, public health policy, behavioral patterns, and others. Furthermore, the literature referenced in this work come with caveats such as limited data, suboptimal data quality, and short observational time windows. The information provided is intended to be used as an example of how such analysis might be performed, the result of which would then be used as one part of a wider investment analysis.

¹⁰ Johns Hopkin's University Center for System Science and Engineering (JHU CSSE) was provided by Star Schema and distributed on the Snowflake Cloud computing platform. Details can be found at <https://github.com/starschema/COVID-19-data>

¹¹ See Fineberg and Relman 2020 for a literature review as of April 7, 2020. The References section includes a selection of leading papers on the subject of COVID-19 and climate.

4. Appendix. Full table of REIT Properties by Temperature Zone

**Table A1: REIT Property Holdings by Temperature Zone
(Russell 3000 REITs, as of 04/17/2020)**

Company Name	Property Count	Number of Properties by Bin in Quarter 4					Score Per Quarter			
		-1	0	1	2	3	Q1	Q2	Q3	Q4
Urstadt Biddle Properties Inc.	71	0	70	1	0	0	0.4824	1.9784	3.0000	0.0228
UMH Properties, Inc.	123	0	113	10	0	0	0.6748	1.9756	2.9593	0.0813
Urban Edge Properties	87	0	49	36	2	0	0.1155	1.9665	3.0000	0.3564
Cedar Realty Trust, Inc.	59	0	34	25	0	0	0.3152	1.9517	2.9558	0.3642
Farmland Partners Inc.	149	0	104	35	10	0	0.9597	2.2886	3.1275	0.3691
Acadia Realty Trust	110	0	64	43	3	0	0.5612	1.8679	2.9144	0.3874
Chatham Lodging Trust	134	1	50	41	33	9	0.3439	0.8194	1.1360	0.3972
Getty Realty Corp.	189	1	122	56	10	0	0.5926	1.9259	3.0106	0.4074
Pennsylvania Real Estate Investment Trust	29	0	17	12	0	0	0.2367	2.0582	3.0307	0.4466
Innovative Industrial Properties, Inc.	28	1	20	3	3	1	0.8476	2.1227	3.0439	0.4756
Kennedy-Wilson Holdings, Inc.	108	3	67	21	17	0	0.3918	1.7103	2.4973	0.5318
Global Net Lease, Inc.	171	18	79	45	27	2	0.9528	2.1441	3.0592	0.5374
STAG Industrial, Inc.	222	9	122	73	15	3	0.7558	2.1547	3.0380	0.5496
Mack-Cali Realty Corporation	91	0	49	42	0	0	0.0477	1.9647	3.0000	0.5979
iStar Inc.	59	2	30	20	5	2	0.6004	2.0322	3.0661	0.6174
Industrial Logistics Properties Trust	71	4	43	17	4	3	0.6463	2.3183	3.1060	0.6398
MTR Gaming Group, Inc., Asset Management Arm	22	2	13	2	3	2	0.8253	1.9649	3.0605	0.6707
Boston Properties, Inc.	153	0	74	71	8	0	0.5747	1.8619	2.8421	0.6817
Retail Value Inc.	15	2	7	3	2	1	1.1802	1.9972	3.1857	0.6869
Brookdale Senior Living Inc.	20	0	9	9	1	1	0.6500	2.0500	2.8500	0.7000
STORE Capital Corporation	565	55	251	181	61	17	0.8814	2.1699	3.0690	0.7239
Investors Real Estate Trust	78	58	20	0	0	0	1.6645	1.4536	2.5601	0.7411
Americold Realty Trust	155	12	58	57	26	2	0.7842	2.2438	3.1126	0.7435
Gladstone Commercial Corporation	116	5	47	42	16	6	0.8963	2.2664	3.1379	0.7626
Empire State Realty Trust, Inc.	31	0	8	22	1	0	0.0000	2.0000	3.0000	0.7860
One Liberty Properties, Inc.	125	5	47	57	12	4	0.6362	2.4340	3.1588	0.7881
RPT Realty	57	2	28	10	3	14	1.0479	2.2642	3.2320	0.7990
W. P. Carey Inc.	184	7	84	48	38	7	0.9001	2.3521	3.2712	0.8178
Ventas, Inc.	1120	29	479	354	219	39	0.8448	2.2240	3.1551	0.8223
Community Healthcare Trust Incorporated	118	0	56	33	18	11	0.8839	2.3113	3.2644	0.8279
Essential Properties Realty Trust, Inc.	375	28	123	170	49	5	0.8480	2.3013	3.1387	0.8293
Sabra Health Care REIT, Inc.	429	19	174	136	95	5	0.8205	2.1119	3.0979	0.8392
Gaming and Leisure Properties, Inc.	44	2	20	11	11	0	0.5914	2.2061	3.2126	0.8438
Office Properties Income Trust	137	1	43	69	21	3	0.6083	2.3049	3.1302	0.8472
Agree Realty Corporation	442	22	185	128	82	25	0.9387	2.2681	3.2021	0.8494
Physicians Realty Trust	259	32	103	65	50	9	0.9537	2.2873	3.2310	0.8540
National Storage Affiliates Trust	15	0	6	5	3	1	0.5714	2.3571	3.2143	0.8571
Vornado Realty Trust	101	0	6	94	0	1	0.1522	1.8524	2.9649	0.8616
Service Properties Trust	506	8	200	173	111	14	0.8715	2.3715	3.2312	0.8794
American Finance Trust, Inc.	631	41	236	237	83	34	0.8603	2.3626	3.2076	0.8814
Easterly Government Properties, Inc.	75	1	23	26	25	0	0.7960	2.2364	3.2022	0.8832
Lexington Realty Trust	153	1	48	65	33	6	0.8493	2.5990	3.2293	0.8840
Four Corners Property Trust, Inc.	640	24	261	208	105	42	0.9413	2.3870	3.2946	0.8861
LTC Properties, Inc.	102	0	40	37	21	4	0.7431	2.4120	3.3483	0.8907
Federal Realty Investment Trust	123	0	35	70	14	4	0.5733	2.0444	3.0026	0.8957
QTS Realty Trust, Inc.	30	0	8	17	4	1	0.5413	2.4012	3.2801	0.8979
National Health Investors, Inc.	201	5	81	70	31	14	0.8650	2.3356	3.1935	0.8981
AvalonBay Communities, Inc.	297	0	101	123	67	6	0.6822	1.9108	2.8612	0.9056
Welltower Inc.	1453	33	597	447	284	92	0.8327	2.2501	3.1741	0.9093
New Senior Investment Group Inc.	103	2	41	32	23	5	0.8039	2.2549	3.1765	0.9118
Washington Prime Group Inc.	104	4	50	21	18	11	0.9831	2.3285	3.2873	0.9167
VEREIT, Inc.	3400	139	1257	1138	674	192	0.9162	2.3760	3.2888	0.9177
Franklin Street Properties Corp.	35	3	9	15	7	1	0.7742	2.4991	3.3450	0.9232
Diversified Healthcare Trust	416	16	127	174	71	28	0.8086	2.3447	3.2130	0.9236
Iron Mountain Incorporated	146	0	60	41	41	4	0.9510	2.3005	3.2425	0.9249
Brandywine Realty Trust	172	0	53	94	24	1	0.3223	2.1706	3.1692	0.9296
Monmouth Real Estate Investment Corporation	114	1	52	31	18	12	0.8416	2.4903	3.3407	0.9480
SL Green Realty Corp.	60	0	2	58	0	0	0.0000	2.0000	3.0000	0.9548
CareTrust REIT, Inc.	212	9	88	42	67	6	0.8632	2.2453	3.2170	0.9575
Washington Real Estate Investment Trust	47	0	2	45	0	0	0.0000	2.0000	3.0000	0.9629
Spirit Realty Capital, Inc.	1430	54	450	547	293	86	0.9011	2.3891	3.2567	0.9697
Brixmor Property Group Inc.	404	9	155	106	94	40	0.9517	2.3345	3.2571	0.9803
EPR Properties	321	9	107	97	92	16	0.9590	2.4100	3.2706	0.9819
Digital Realty Trust, Inc.	124	1	27	66	28	2	0.7493	2.2893	3.1097	0.9964
Clipper Realty Inc.	18	0	0	18	0	0	0.0000	2.0000	3.0000	1.0000
JBG SMITH Properties	79	0	0	79	0	0	0.0000	2.0000	3.0000	1.0000
Brookfield Property REIT Inc.	120	6	37	41	30	6	0.9432	2.3425	3.2665	1.0007
VICI Properties Inc.	33	0	12	12	9	0	0.6519	2.5886	3.5299	1.0014
Apartment Investment and Management Company	128	1	35	58	27	7	0.8360	2.0502	3.0082	1.0018
CBL & Associates Properties, Inc.	105	3	29	47	22	4	0.8585	2.5363	3.2555	1.0063
National Retail Properties, Inc.	2725	87	932	964	539	203	0.9243	2.4584	3.3165	1.0071
Armada Hoffer Properties, Inc.	67	0	5	56	5	1	0.7692	2.7302	3.0796	1.0126
Retail Properties of America, Inc.	117	0	30	48	38	1	0.7554	2.3650	3.3042	1.0158
Hyatt Hotels Corporation	40	0	10	15	12	3	0.9077	1.8892	2.6415	1.0179
Medical Properties Trust, Inc.	144	5	61	25	49	4	1.1049	2.4443	3.4484	1.0214
Tanger Factory Outlet Centers, Inc.	36	0	12	12	11	1	0.7613	2.5161	3.4099	1.0218

Source: S&P Global Market Intelligence Quantamental Research. Data as of April 14, 2020.

**Table A1 (cont.): REIT Property Holdings by Temperature Zone
(Russell 3000 REITs, as of 04/17/2020)**

Company Name	Property Count	Number of Properties by Bin in Quarter 4					Score Per Quarter			
		-1	0	1	2	3	Q1	Q2	Q3	Q4
Stratus Properties Inc.	26	0	0	1	25	0	1.9156	3.0000	4.0000	2.0000
Douglas Emmett, Inc.	77	0	0	0	77	0	1.5839	2.0000	3.0000	2.0000
Rexford Industrial Realty, Inc.	224	0	0	0	224	0	1.5947	2.0000	2.9768	2.0000
Ryman Hospitality Properties, Inc.	20	0	2	14	2	2	0.8824	2.8137	3.2245	1.1766
Churchill Downs Incorporated	18	1	7	5	3	2	0.9673	2.3444	3.2867	1.0506
Sunstone Hotel Investors, Inc.	19	0	6	5	6	2	1.1316	2.0263	3.0658	1.1842
CoreSite Realty Corporation	31	0	7	16	6	2	0.7796	2.0205	2.8002	1.0471
Equinix, Inc. (REIT)	43	0	5	27	9	2	0.6977	2.2558	3.1163	1.1860
BRT Apartments Corp.	41	0	1	22	16	2	0.7351	2.0805	2.6121	1.0703
Transcontinental Realty Investors, Inc.	75	0	2	26	45	2	1.2613	2.9443	3.8833	1.6952
American Realty Investors, Inc.	80	0	3	26	49	2	1.1840	2.9229	3.8255	1.6222
Braemar Hotels & Resorts, Inc.	14	1	3	5	2	3	1.0536	1.8571	2.7500	1.3036
DiamondRock Hospitality Company	30	1	9	12	5	3	1.0000	2.1000	3.0333	1.0667
PS Business Parks, Inc.	99	0	3	56	37	3	1.1108	2.3785	3.0641	1.5250
Safehold Inc.	43	1	6	21	11	4	0.9349	2.3971	3.2040	1.1764
Pebblebrook Hotel Trust	54	0	8	24	18	4	1.1667	1.8518	2.7037	1.3333
The GEO Group, Inc.	93	1	30	30	28	4	0.9783	2.4106	3.3441	1.0703
Cousins Properties Incorporated	61	0	0	28	29	4	1.4730	3.0622	3.8173	1.6163
Universal Health Realty Income Trust	70	1	17	17	31	4	1.2381	2.8757	3.7817	1.6283
Independence Realty Trust, Inc.	58	0	10	34	9	5	0.7931	2.6897	3.4310	1.1552
Xenia Hotels & Resorts, Inc.	40	0	7	13	15	5	1.1250	2.5750	3.3000	1.4500
Global Medical REIT Inc.	62	2	25	15	15	5	0.9497	2.5245	3.4989	1.0469
Saul Centers, Inc.	63	0	6	52	0	5	0.1888	2.1536	3.1005	1.0273
Taubman Centers, Inc.	20	0	8	4	2	6	1.1421	2.4387	3.2826	1.0732
Hersha Hospitality Trust	49	0	9	30	4	6	0.7759	2.2038	3.0196	1.1920
Summit Hotel Properties, Inc.	73	6	18	24	19	6	0.9871	2.3232	3.1182	1.1445
Piedmont Office Realty Trust, Inc.	65	6	14	21	17	7	0.9498	2.5459	3.3273	1.2714
Healthcare Realty Trust Incorporated	203	5	56	78	57	7	0.9242	2.4327	3.2320	1.0728
Jernigan Capital, Inc.	28	0	3	14	3	8	1.5284	2.9577	3.5142	1.6759
Park Hotels & Resorts Inc.	60	0	18	20	14	8	0.9820	1.9440	2.7060	1.0365
NexPoint Residential Trust, Inc.	38	0	0	10	20	8	1.4512	3.1328	3.8141	1.8831
American Campus Communities, Inc.	154	3	43	48	52	8	1.1145	2.5147	3.3549	1.1839
City Office REIT, Inc.	30	0	8	1	12	9	1.1905	2.7130	3.6570	1.7515
Consolidated-Tomoka Land Co.	38	1	1	8	19	9	1.1233	2.7929	3.4899	1.5244
Bluerock Residential Growth REIT, Inc.	42	0	3	14	14	11	1.4715	2.9852	3.7568	1.8460
National HealthCare Corporation	121	0	2	88	20	11	0.7849	2.7726	3.3181	1.3490
Ashford Hospitality Trust, Inc.	116	4	29	45	27	11	0.9284	2.4862	3.2767	1.1724
Host Hotels & Resorts, Inc.	76	1	11	31	21	12	1.1802	2.3061	3.1608	1.4053
RLJ Lodging Trust	103	1	29	32	29	12	1.1674	2.3875	3.2109	1.2305
Apple Hospitality REIT, Inc.	230	3	53	75	87	12	1.0565	2.5696	3.4261	1.2522
Gladstone Land Corporation	64	1	17	23	10	13	1.1250	2.4219	3.1719	1.2969
Terreno Realty Corporation	142	0	38	61	25	18	0.8111	2.0702	2.8071	1.1128
UDR, Inc.	166	0	23	82	41	20	0.8447	2.2152	3.0041	1.3763
Seritage Growth Properties	205	6	75	50	54	20	1.1224	2.3379	3.2754	1.0659
First Industrial Realty Trust, Inc.	432	21	190	44	157	20	1.0294	2.3106	3.2848	1.0915
Simon Property Group, Inc.	208	6	80	56	44	22	1.0078	2.3532	3.2830	1.0531
Preferred Apartment Communities, Inc.	110	0	2	64	21	23	1.2766	2.9439	3.4710	1.5781
Kite Realty Group Trust	96	0	33	20	16	27	1.0616	2.6717	3.5258	1.2817
Healthcare Trust of America, Inc.	232	2	84	55	64	27	1.0535	2.5147	3.4472	1.0510
Camden Property Trust	176	0	10	62	77	27	1.3733	2.8420	3.6415	1.7010
SITE Centers Corp.	148	0	45	52	21	30	0.9655	2.4734	3.2592	1.0290
Mid-America Apartment Communities, Inc.	314	0	8	152	124	30	1.1806	2.9328	3.6075	1.5802
Weingarten Realty Investors	196	0	10	54	95	37	1.5309	3.0108	3.6885	1.7754
Highwoods Properties, Inc.	251	0	9	204	0	38	0.8322	2.7636	3.2249	1.3162
CorePoint Lodging Inc.	265	3	73	62	88	39	1.2243	2.5741	3.4943	1.3536
Extended Stay America, Inc.	555	12	175	201	122	45	0.9766	2.3892	3.2144	1.0667
Kimco Realty Corporation	429	3	127	158	89	52	0.9827	2.4155	3.2656	1.2557
CubeSmart	389	1	127	120	86	55	1.0567	2.4539	3.3979	1.2434
Healthpeak Properties, Inc.	692	3	150	264	218	57	0.9611	2.3143	3.1760	1.2700
Life Storage, Inc.	521	0	153	121	186	61	1.2249	2.5299	3.4921	1.3077
Regency Centers Corporation	419	5	101	143	96	74	1.2511	2.4081	3.2184	1.4035
Omega Healthcare Investors, Inc.	910	13	334	265	207	91	0.9593	2.4067	3.3209	1.0600
Duke Realty Corporation	491	26	131	143	96	95	1.1037	2.4406	3.2951	1.2002
EastGroup Properties, Inc.	354	0	7	45	207	95	1.6877	2.9960	3.8454	2.0539
Prologis, Inc.	719	24	189	244	164	98	1.1056	2.3926	3.1834	1.2493
Sun Communities, Inc.	419	6	170	51	86	106	1.3080	2.3363	3.3521	1.3102
Extra Space Storage Inc.	1157	6	318	419	299	115	1.0058	2.4472	3.3090	1.2146
Equity LifeStyle Properties, Inc.	403	10	95	83	82	133	1.3204	2.5212	3.4688	1.6222
Columbia Property Trust, Inc.	24	0	1	20	3	0	0.2731	1.7936	2.7618	1.0607
Paramount Group, Inc.	16	0	0	11	5	0	0.3192	1.6808	2.6808	1.2080
PMC Commercial Trust, Asset Management Arm	11	0	0	5	6	0	1.4536	2.1048	2.6690	1.4536
Corporate Office Properties Trust	198	0	0	190	8	0	0.3229	2.2529	3.0700	1.0700
The St. Joe Company	13	0	0	0	13	0	2.0000	3.0000	4.0000	2.0000
MGM Resorts International	20	0	2	4	14	0	1.0235	3.2370	4.2606	1.5340
Harrahs Entertainment, Inc., Asset Management Arm	34	0	10	9	15	0	0.8180	2.8855	3.7965	1.2213
Boyd Gaming Corporation	27	2	5	2	18	0	1.1923	3.0385	4.0769	1.5000
American Assets Trust, Inc.	30	0	0	11	19	0	0.9552	1.9276	2.6349	1.6102
Red Rock Resorts, Inc.	30	0	2	4	24	0	0.9138	3.0345	4.2241	1.6207
The Macerich Company	64	1	14	22	27	0	0.9977	2.4986	3.3994	1.1743
Hudson Pacific Properties, Inc.	59	0	1	31	27	0	1.2750	1.8722	2.5590	1.4024
CyrusOne Inc.	71	0	25	17	29	0	0.9369	2.5855	3.5113	1.0894
CoreCivic, Inc.	102	2	25	45	30	0	0.8960	2.6842	3.4918	1.1649
Retail Opportunity Investments Corp.	89	0	16	35	38	0	0.7509	1.8200	2.5524	1.2854
Alexandria Real Estate Equities, Inc.	152	0	30	82	40	0	0.7663	1.8721	2.6210	1.0485
The Howard Hughes Corporation	78	0	1	33	44	0	1.1598	2.6610	3.6610	1.4593
Whitestone REIT	66	0	1	7	58	0	1.7108	3.2976	4.2976	1.8830
Kilroy Realty Corporation	113	0	0	39	74	0	1.0784	1.7679	2.3923	1.6259
Equity Residential	304	0	47	160	97	0	0.7390	1.9024	2.7483	1.1737
Essex Property Trust, Inc.	258	0	35	108	115	0	1.0323	1.8352	2.5370	1.3080

Source: S&P Global Market Intelligence Quantamental Research. Data as of April 14, 2020.

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Our Recent Research

April 2020: [Cold Turkey – Navigating Guidance Withdrawal with Supply Chain Data](#)

April 2020: [Data North Star – Navigating Through Information Darkness](#)

March 2020: [Long Road to Recovery: Coronavirus Lessons from Supply Chain and Financial Data](#)

COVID-19 continues to disrupt global supply chains in unprecedented ways. Leveraging maritime shipping data from Panjiva, this report includes a review of trade and financial data to analyze the impact of the SARS-CoV-2 / COVID-19 coronavirus outbreak.

This report takes two approaches to analyzing the fallout from the SARS-CoV-2 / COVID-19 coronavirus outbreak on global trade and corporate supply chains. The first part of the report identifies 11 themes emerging on an event-driven basis from over 50 Panjiva Research reports. The second section considers the impact of exposures to Asia in firms' U.S. supply chains on sector-neutral stock returns since the start of 2020.

Findings include:

- Second-order supply chain effects are also emerging with the apparel industry now seeing a shortage of materials globally due to earlier outages in China.
- Retailers including Costco and Target are gaining from increased sales of health- and personal care products. Yet, supply shortages are rapidly emerging in part due to medical supply export restrictions in several countries.
- There is a notable, but not statistically significant, relationship with firms with higher exposure to Asia having seen a weaker sector neutral stock price performance.

February 2020: [Ship to Shore: Mapping the Global Supply Chain with Panjiva Shipping Data in Xpressfeed™](#)

World merchandise trade accounted for an estimated \$19.7 trillion in 2018, about 90% of which is by sea. While financial data tells us “how a company has done in the past,” shipping data provides a closer-to-real time indicator of “what a company is doing now.” Panjiva’s shipping data allows investors to track trends, identify anomalies, and assess risks for companies engaged in international trade. This paper illustrates how to find investment insights in Panjiva’s US seaborne and Mexican datasets using the US auto parts industry as a case study.

Findings include:

- Shipment trends often lead fundamentals: Rising shipments amid flat or declining fundamentals may signal future financial trend reversal
- Growth in the number of a company's suppliers and in the types of products it imports may signal strengthening demand and/or product line diversification.
- Tracking industry-level product-line trends can help identify companies with significant exposure to rising or declining product lines.

January 2020: Natural Language Processing – Part III: Feature Engineering Applying NLP Using Domain Knowledge to Capture Alpha from Transcripts

Unstructured data is largely underexplored in equity investing due to its higher costs. As a result, the information content remains largely untapped and offers an investment edge for investors. One particularly valuable unstructured data set is S&P Global Market Intelligence's machine readable earnings call transcripts. This newest publication, the third in the series (NLP I, NLP II), introduces new stock selection ideas in the areas of I) Topic identification, II) Call transparency and III) Call sentiment using more advanced NLP techniques.

- Topic Identification – Firms that referenced the most positive descriptors around their financials outperformed historically.
- Transparency – Firms that provided greater call transparency exhibited by executives' behaviors and decisions outperformed historically.
- Weighted Average Sentiment – Quantifying call sentiment using a weighted average construct led to better returns and less volatility historically.
- Additive Forecasting Power – The newly introduced signals demonstrated additive forecasting power above commonly used alpha and risk signals historically.

December 2019: The “Trucost” of Climate Investing: Managing Climate Risks in Equity Portfolios

Does sustainable investing come at a “cost”, and is the fear of investors around the performance concessions of “green” portfolios warranted? Our latest research suggests investors' fears are misplaced – carbon-sensitive portfolios have similar returns and significantly better climate characteristics than portfolios constructed without carbon emission considerations. Other findings include:

- Highly profitable firms are likely to be leaders in reducing their carbon emission levels.
- There is no degradation in fundamental characteristics for the carbon-sensitive portfolios compared to the baseline portfolio, even though the difference in constituents can be as high as 20%.
- Carbon-sensitive portfolios were observed as having significant reductions in water use, air pollutants released and waste generated.

October 2019: #ChangePays: There Were More Male CEOs Named John than Female CEOs

This report examines the performance of firms that have made female appointments to their CEO and CFO positions. Our research finds that firms with female CEOs and/or CFOs:

- Are more profitable and generated excess profits of \$1.8 trillion over the study horizon.
- Have produced superior stock price performance, compared to the market average.
- Have a demonstrated culture of Diversity and Inclusion, evinced by more females on the company's board of directors.

June 2019: Looking Beyond Dividend Yield: Finding Value in Cash Distribution Strategies

Examines the relationship between yield-oriented strategies (dividend yield, buyback yield, and combined shareholder yield) and future stock return, across multiple countries/regions. Also provides insights into two additional topics:

- Which company fundamental characteristics support and enhance future shareholder payouts?
- Under which interest rate environment should investors favor yield-oriented strategies?

June 2019: The Dating Game: Decrypting the Signals in Earnings Report Dates

The first part of this report focuses on companies that deviate from a historical reporting pattern, while the second part examines a related topic – the market’s reaction to companies that postpone a previously scheduled (announced) earnings release date.

- “Advancers” (companies that advance their earnings report date by at least 6 days) are likely to report improving year-year on sales, better earnings surprises, and more positive conference call sentiment readings than their industry group peers and “delayers” (companies that delay their earnings report date by at least 6 days).
- Advancers outperform delayers by over 7% on an annualized basis (Russell 3000). This return rises to 8.80% (Russell 2000) and falls to 2.21% (Russell 1000).
- The annualized return to stocks identified as buy candidates and tagged as advancers is 10.77%, compared to 6.29% for buy candidates tagged as delayers.
- Companies that postpone a previously announced earnings release date underperform the broad market by 2.44% in the 3 days surrounding the announcement. These companies are also likely to report deteriorating fundamentals.

May 2019: Bridges for Sale: Finding Value in Sell-Side Estimates, Recommendations, and Target Prices

February 2019: U.S Stock Selection Model Performance Review

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