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DO QUALITATIVE VARIABLES MATTER IN COMMERCIAL REAL ESTATE VALUATIONS?

John McGee

DO QUALITATIVE VARIABLES MATTER IN COMMERCIAL REAL ESTATE VALUATIONS?

by

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ABSTRACT

DO QUALITATIVE VARIABLES MATTER
IN COMMERCIAL REAL ESTATE
VALUATIONS?

John Michael McGee, B.B.A. in Real Estate

The University of Texas at Arlington, 2017

Faculty Mentor: Sriram Villupuram

The purpose of this research paper is to validate the claims made by Jim Clayton, David C. Ling and Andy Naranjo in their paper *Commercial Real Estate Valuation: Fundamentals Versus Investor Sentiment,* which examines the effect of investor sentiment on the valuation of commercial real estate, for example how two different investors can underwrite the same commercial real estate asset but arrive at different results based their individual sentiments regarding the expectation of the investor for that given asset or the risk that the investor has towards a given asset class or property type. To validate the claim that investor sentiment does affect the value of commercial real estate, I conducted a regression analysis of local capitalization rates (used to represent quantitative variables) and the University of Michigan: Consumer Sentiment© Index value (used to describe qualitative variables) to see how much each variable affected or predicted market rents

within the specific submarket, and property class in the DFW area that I chose. This project used the specific submarket of DFW Airport/Grapevine, and the property class of warehouse/industrial within the Dallas-Fort Worth Metroplex. I concluded based on regression analysis of the consumer sentiment index and local capitalization rates that investor sentiment should be taken into account when evaluating commercial real estate. The regression analysis provided a P-value of .094 for the sentiment variable and a .97 P-value for the capitalization variable showing that the sentiment variable was more significant regarding P-values, demonstrating that there is a relationship between investor sentiment and property valueations. Additionally, this indicates that investor sentiment should be taken into account when valuing commercial real estate, as it can influence the value of the asset or property.

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CHAPTER 1

INTRODUCTION

1.1 Background Information

Jim Clayton, David C. Ling and Andy Naranjo's (CLN) paper, *Commercial Real Estate Valuation: Fundamentals Versus Investor Sentiment,* postulates that quantitative variables such as capitalization rates are not the only variables that should be considered when valuing commercial real estate. CLN showed that qualitative variables such as investor sentiment could, in fact, impact the value of commercial properties as well. The fact that investor sentiment can impact property values is important because in real estate markets assets are traded in illiquid, highly segmented and informationally inefficient markets. Additionally, there is an inability to short sell private real estate, which restricts the ability of sophisticated traders to enter the market and eliminate mispricing that may occur. The above factors are the reason the commercial real estate markets are highly susceptible to sentiment-induced mispricing (Jim Clayton). Yet the traditional finance theory says that prices of assets traded in relatively frictionless markets reflect rationally estimated risk adjusted discount rates and future income streams; therefore, investor sentiment should not affect the evaluation of assets prices. The theory also suggests that if mispricing does occur, it is quickly eliminated by the actions of informed arbitrageurs who compete to capture the abnormal returns. However, this argument lacked the ability to explain dynamic run-ups and subsequent crashes in asset prices. This fact and other price

anomalies have led to the development of the "behavioral" finance approach to asset valuation in this method. Behavior models show that investor sentiment can have a role in determining an asset's price independent of the fundamentals and that asset's market (Jim Clayton).

The behavioral approach explicitly recognizes that some investors are not rational and that systemic biases in these investors' beliefs induce them to trade on non-fundamental information or sentiments that each investor may have. CLN's research in their paper, originally published in 2007 and republished in 2008, has laid the foundation for this Honors project (Jim Clayton).

1.2 Primary Purpose of Senior Project

The goal of this Project is to validate the claims made in the article C*ommercial Real Estate Valuation: Fundamentals Versus Investor Sentiment* by Jim Clayton, David C. Ling, and Andy Naranjo. Specifically, I am conducting a local study to see if I can come to the same conclusion as CLN's national study. CLN's conclusion is that investor sentiment does matter in commercial real estate valuations. I will apply the principles and skills learned throughout my time in the Real Estate Department at the University of Texas at Arlington College of Business, as well as in my independent studies class, with my honors advisor Dr. Sriram Villupuram. I will use all that I have learned in my time at UTA to conduct a regression analysis comparing investor sentiment values to capitalization rate values to show that sentiment values affect the overall property value more than capitalization rate values or quantitative values do. From my regression analysis, I will use data from a local submarket and particular property class to show that the findings made in 2007 national study hold true even when focusing on this particular region and property

class. The long-term goal of this paper is to develop an efficient and easy-to-use tool to evaluate commercial real estate properties, taking into account quantitative, qualitative data and property cycles.

CHAPTER 2

LITERATURE REVIEW

2.1 Fundamentals Versus Investor Sentiment

CLN's paper from 2007 found evidence that investor sentiment significantly impacts commercial real estate pricing (Jim Clayton). CLN based their paper off of: behavioral economic research, numerous sentiment studies in the different asset markets, capital flows in the commercial real estate industry, long-running/short-run capitalization rate dynamics studies, and required rates of return based both on risk-free and risk-adjusted rates. (Jim Clayton) CLN used data from four different industry sources. First, they used the Real Estate Research Corporation (RERC) to obtain a data set based off of their published quarterly reports. RERC's quarterly reports are based on a direct survey of investor sentiment conducted by RERC through there affiliates. The RERC asks respondents to rank current investment conditions for each of the nine property types on a scale of 1 to 10, with 1 indicating poor investment conditions and 10 indicating excellent conditions for investing (Jim Clayton). The RERC reports are used throughout the finance industry by investors, developers, appraisers and many financial institutions to monitor changing market conditions and to forecast financial performance (Jim Clayton). In addition to RERC, CLN employed survey data from Korpacz Price Waterhouse Coopers as a robustness check on the investor sentiment survey data obtained from RECE. Additionally CLN also wanted to address potential concerns that might arise from the survey-based nature of RERC and Korpacz Price Waterhouse Coopers's data, so they also

used the National Council of Real Estate Investment Fiduciaries or NCREIF and Real Capital Analytics or RCA as primary sources data.

Additionaly, CLN created their own index value for investor sentiment based on common variations in five different proxies for sentiments: (1) commercial mortgage flows as a percentage of GDP; (2) the percentage of properties sold by the NCREIF property index (NPI); (3) the ratio of transaction-based (TBI) and constant liquidity versions of the NPI value index; (4) the NPI total return over the past four quarters; and (5) the most recent quarterly TBI total return. After extensive modeling of data from the sources above using techniques such as regression analysis with both the primary and secondary data sets, CLN stated in their paper that the characteristics of the private real estate markets seem to render the markets themselves highly susceptible to sentiment-induced mispricing. Which matched the widespread belief among many real estate experts that the real estate markets are subject to fads and are highly susceptible to sentiment-induced mispricing. CLN results show that sentiment and fundamentals play a role in asset pricing over their study period from 1996 to 2007 (Jim Clayton).

CHAPTER 3

METHODOLOGY

To test CLN's claims that investor sentiment has an effect on property values, I came up with the process by which I could compare my thesis to their article, all the while establishing a correlation between the two studies. After seeking my Honors advisor's advice, I concluded that the best way to accomplish this was to use Microsoft Excel. I would use Excel's regression analytic tools to run a regression analysis of two variables; one would represent investor sentiment, and the other variable would represent the traditional evaluation method. To ultimately show which variable had the greatest impact on a properties market value allowing me to compare my local submarket study to CLN's national studygn which completed in a simaler way. The data that was necessary to run the regression analysis in Excel came from two independent sources.

The first source that I used was CoStar, a national data collection agency that specializes in commercial real estate analytics and data collection. CoStar also provides local market and submarket data in addition to the national data which is made available on a subscription basses. The data I sourced from CoStar was the historical quarterly data from 2003 to 2016, specifically, the industrial/warehouse property class within the DFW International Airport and Grapevine area submarket of Dallas and Fort Worth. data The data CoStar provided was sufficient in providing historic quarterly market rents, variable in the form of historical average rents for the property class in the submarket, as well as the qualitative variable for this experiment historical, quarterly capitalization rates for the

same property location and type. Still lacking an investor sentiment data which was not available through CoStar. I turned to my honors advisor for his advice and settled on the University of Michigan: Consumer Sentiment© Index a monthly investor sentiment index value from the University of Michigan. The University of Michigan: Consumer Sentiment© Index is a monthly historical index value which needed to be converted into a quarterly historical index value for use within the regression analysis. After collecting the data that needed for the regression analysis, extensive modeling and calculations were needed to make all three sets of data uniform so that Excel's regression analytic tools could run the regression analysis correctly. I did this by calculating a Delta value from the quarterly costar data all the way from 2003 to 2016 by taking the percent change from quarter to quarter. I then had to convert the index data from monthly to quarterly data so that I could obtain a comparable Delta value to use within the regression analysis. To do this I converted the monthly index data from The University of Michigan: Consumer Sentiment© Index into quarterly data which allowed me to calculate the Delta value for the same date range as the quarterly CoStar data. Once the Delta values for each variable were calculated I ended up with fifty-three quarterly data points across all three variables in my regression model (as some had to be dropped due to lacking data values either within the costar data or the investor sentiment index values). The regression model I ran analyzed which of the variables capitalization rates, or investor sentiment had the greatest effect on property values or market rent.

3.1 Modeling the Regression Analysis

Upon the completion of all three variables, Delta values, I was able to run a regression analysis in Microsoft Excel. See table 3.1 for the summery outputs as well as

Appendix A, B, and C which provide print-outs of the regression analysis, and the data series of Delta variables used to complete the regression model.

Table 3.1: Regression Summary Outputs

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.23327434
R Square	0.054416918
Adjusted R Square	0.018048338
Standard Error	0.076513113
Observations	55

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	0.017519001	0.0087595	1.496261814	0.233449008
Residual	52	0.304421338	0.005854256		
Total	54	0.321940339			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.019694539	0.07697764	0.255847523	0.799077966	-0.134772397	0.174161474	-0.1347724	0.174161474
Sentiment	-0.220552133	0.129467624	-1.703531174	0.09443886	-0.480347927	0.03924366	-0.48034793	0.03924366
Capitalization Rate	-0.11130931	0.951546021	-0.116977327	0.907328661	-2.020726093	1.798107474	-2.02072609	1.798107474

The regression analysis allowed me to test capitalization rate and investor sentiment variables, one at a time against property rents or market value variables, to see which variable affected the property value or market rent the most. The regression analysis was run at a 95% confidence level, and that level provided a P-value investor sentiment equal to .094439 versus a P-value generated from the capitalization rate data of .907329 as shown in the table above. When walking through these results with my Honors advisor, he explained to me that P-value less than .1 is representative of light significance, a P-value less than .05 is significant and lastly that a P-value less than .01 is super significant. He continued to tell me that you want the smallest P-value possible, and that the closer it is to 1 the less significant it is. I use this information to interpret that the P-value of .094439, which the investor sentiment variables generated showed that there was significance

compared to the P-value produced by the capitalization rate variables with a P value of .907329. This led me to my conclusion that investor sentiment should be taken into account when evaluating commercial real estate properties.

3.2 Strengths, Weaknesses, and Limitations

A major strength of this study is the length of time over which the data values came from a total of 13 years, which is three years longer than the CLN study. A minor strength of this study is the relatability to the CLN study in terms of how it was completed. Just as in the CLN study, this local study was completed using Microsoft Excel's regression analytic tools to test qualitative and quantitative variables to see their effect on property valuations. It goes without saying that there were some limitations and weaknesses presented within this study.

One limitation is the inability to complete a robustness check of the data provided by CoStar, as they are currently the only one to provide historical data on the submarket level for any length of time greater than three years. Another major limitation of this study was access to data itself, as the RERC, Korpacz Price Waterhouse Coppers, and NCREIF data sources were only available to full-time academics. Which neither my professor nor I had access to. The last weakness of this study was access to a free, local, and complete data set for the investor sentiment value. These limitations come together to form the weaknesses of this study which include lack of robustness checks, small data set size used within the regression, and its inability to use data sourced from the sources used within the CLN study. The small data set size limits the validity of the findings due to the weak R-squared value of .05, which should be closer to 1 to represent a strong fit within the data series to the findings or the output variables studied specifically the P values in this study.

CHAPTER 4

CONCLUSION

This project shows that the principles established Jim Clayton, David C. Ling and Andy Naranjo in their paper *Commercial Real Estate Valuation: Fundamentals Versus Investor Sentiment* holds true, not only on a national basis but also in regard to a particular location and industry. I was able to show the correlation between CLN's national study and my local submarket study through the use of Excel's regression analytics tools to run a regression analysis of qualitative and quantitative variables, finally drawing a conclusion through the interpretation of the regression's results. Based on the regression results, I concluded that there was a correlation between property valuations and investor sentiment. My conclusion stems from CLN's resurch and the findings in this project's regression analysis of capitalization rates the quantitative variable and University of Michigan: Consumer Sentiment© Index the qualitative variable to showed that investor sentiment is important in the valuation of commercial real estate made evident by figure 4.1 and 4.2.

Figure 4.1: Investor Sentiment Versus Return Plot

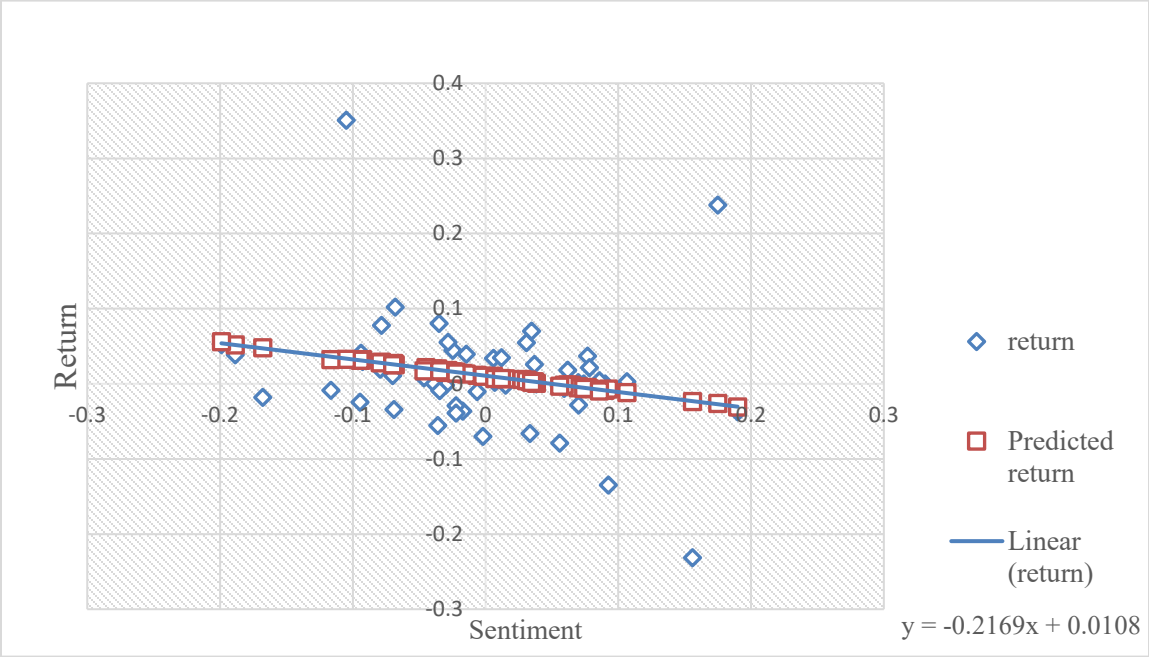
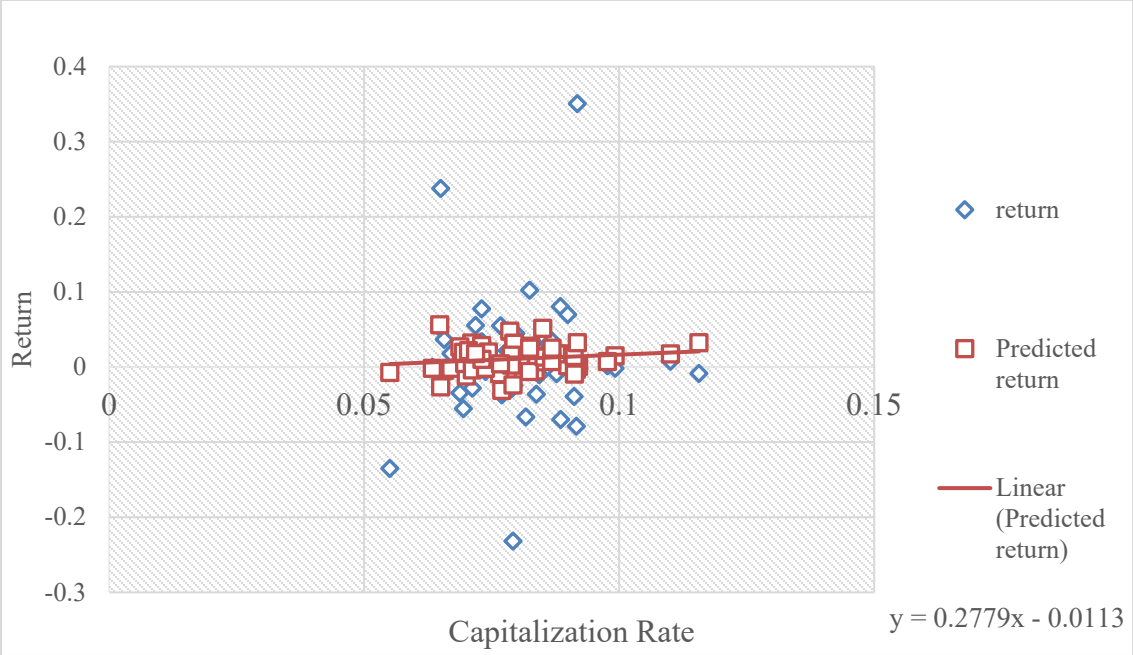


Figure 4.2: Capitalization Rate Versus Return Plot



The above graphs show based on the predicted return trendiness that the capitalization rates have very little effect on the market rents for an area and in fact there P-value of .907329. In contrast the investor sentiment value has a negative relationship

based on the predicted return trendiness to market value and is reinforced by its P-value of .094439, which is slightly significant, meaning that sentiment impacts the market value. As a result of these findings and the results of Jim Clayton, David C. Ling, and Andy Naranjo, investor sentiment does affect property values, both nationally and when evaluating a particular property class and sub-market. Yet due to the limitations in the weaknesses of the study, further research in this field is called for.

APPENDIX A

REGRESSION SUMMARY OUTPUT

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Regression Statistics	
Multiple R	0.23327434
R Square	0.054416918
Adjusted R Square	0.018048338
Standard Error	0.076513113
Observations	55

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
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Residual	52	0.304421338	0.005854256		
Total	54	0.321940339			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
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Capitalization Rate	-0.11130931	0.951546021	-0.116977327	0.907328661	-2.020726093	1.798107474	-2.02072609	1.798107474

APPENDIX B

DATA TABLES FROM REGRESSION

RESIDUAL OUTPUT				PROBABILITY OUTPUT	
Observation	*Predicted return*	*Residuals*	*Standard Residuals*	*Percentile*	*Return*
1	-0.004545708	0.041582745	0.553824916	0.909090909	-0.231343284
2	0.016243441	0.0286482	0.381554581	2.727272727	-0.134751773
3	0.005949506	-0.001283876	-0.017099465	4.545454545	-0.078787879
4	0.014183567	-0.050165576	-0.668136402	6.363636364	-0.069672131
5	-0.00142123	0.019741841	0.262934141	8.181818182	-0.066079295
6	0.03220811	-0.002333896	-0.031084287	10	-0.055363322
7	0.003252828	-0.069332123	-0.923408428	11.81818182	-0.038834951
8	0.011727247	-0.021901666	-0.291700032	13.63636364	-0.036900369
9	-0.011558568	0.01447402	0.192774023	15.45454545	-0.035982009
10	0.005045872	-0.003473545	-0.046262831	17.27272727	-0.034090909
11	0.015338406	-0.016908264	-0.225194804	19.09090909	-0.028813559
12	-0.0015834	0.0015834	0.021088708	20.90909091	-0.027960526
13	0.02887745	0.04895673	0.652036238	22.72727273	-0.02443281
14	-0.003659269	-0.024301257	-0.323659288	24.54545455	-0.017821782
15	-0.006232405	0.028081144	0.374002179	26.36363636	-0.010174419
16	0.027253718	-0.061344627	-0.817025973	28.18181818	-0.008830022
17	-0.00496056	0.006586577	0.087724134	30	-0.008474576
18	0.020107412	-0.018478747	-0.246111472	31.81818182	-0.005905512
19	-0.008698713	0.008698713	0.11585488	33.63636364	-0.001821494
20	-0.026087145	0.263990371	3.515988298	35.45454545	-0.001569859
21	0.047970497	-0.065792279	-0.876262578	37.27272727	0
22	-0.001584279	-0.004321233	-0.057552871	39.09090909	0
23	0.031587557	0.009396049	0.125142442	40.90909091	0
24	-0.006801058	-0.127950715	-1.704127377	42.72727273	0
25	0.00702051	-0.008842004	-0.117763318	44.54545455	0.001572327
26	0.001043196	-0.001043196	-0.01389393	46.36363636	0.001626016
27	0.051804944	-0.013208453	-0.17591841	48.18181818	0.001628664
28	0.028027711	-0.008349715	-0.111206708	50	0.002020202
29	0.031755629	-0.056188439	-0.748352647	51.81818182	0.002915452
30	0.015829231	-0.044642791	-0.594580511	53.63636364	0.004273504
31	0.017583524	0.063002556	0.839107312	55.45454545	0.00466563
32	0.019902075	-0.075265397	-1.00243147	57.27272727	0.008032129
33	-0.005739585	0.005739585	0.076443375	59.09090909	0.011086475
34	0.010263483	0.023725783	0.315994772	60.90909091	0.014519056
35	0.021779742	-0.007260686	-0.096702345	62.72727273	0.018320611
36	0.017971873	0.037583682	0.500562905	64.54545455	0.019677996
37	-0.030745925	-0.006154444	-0.081968723	66.36363636	0.021848739
38	0.05636238	-0.003935196	-0.052411388	68.18181818	0.025896414
39	0.002821628	0.023074786	0.307324384	70	0.029874214
40	0.017671777	-0.009639649	-0.128386848	71.81818182	0.033989267
41	0.004367293	0.050717453	0.675486647	73.63636364	0.035087719
42	0.013435263	0.026212314	0.349111939	75.45454545	0.037037037
43	0.01030689	-0.079979021	-1.065210456	77.27272727	0.038596491
44	0.00206616	0.068109279	0.907121828	79.09090909	0.039647577
45	-0.002821189	-0.07596669	-1.011771722	80.90909091	0.040983607
46	0.014466245	-0.053301197	-0.70989856	82.72727273	0.044891641
47	-0.02350581	-0.207837474	-2.768109014	84.54545455	0.052427184
48	0.032632835	0.318173617	4.237634535	86.36363636	0.055084746
49	0.007290091	-0.005269889	-0.070187665	88.18181818	0.055555556
50	0.025556587	0.076893302	1.024112923	90	0.070175439
51	0.017537958	-0.02636798	-0.351185194	91.81818182	0.077834179
52	-0.009330525	0.013604029	0.18118694	93.63636364	0.080586081
53	0.032550325	-0.041024902	-0.546395209	95.45454545	0.102449889
54	0.00738701	0.02770071	0.368935318	97.27272727	0.237903226
55	0.025498436	-0.014411962	-0.191947491	99.09090909	0.350806452

APPENDIX C

DATA TABLE USED FOR REGRESSION

Sentiment	Capitalization Rate	Returns
0.076754386	0.06568995	0.037037037
-0.02459893	0.079745747	0.044891641
0.027472527	0.06905	0.00466563
-0.01727862	0.083746885	-0.035982009
0.061926606	0.067	0.018320611
-0.09261186	0.071082753	0.029874214
0.033333333	0.081664084	-0.066079295
-0.00641026	0.08427945	-0.010174419
0.106382979	0.069986186	0.002915452
0.03125	0.069683415	0.001572327
-0.03030303	0.099178864	-0.001569859
0.064516129	0.063325958	0
-0.078478	0.073	0.077834179
0.069974555	0.07116	-0.027960526
0.0781893	0.078	0.021848739
-0.06896552	0.0687392	-0.034090909
0.069672131	0.08345	0.001626016
-0.03937008	0.0743	0.001628664
0.090128755	0.0765	0
0.174789916	0.064966667	0.237903226
-0.16783217	0.078518	-0.017821782
0.059259259	0.07375	-0.005905512
-0.09395973	0.0793285	0.040983607
0.092375367	0.055	-0.134751773
0.015172414	0.0838	-0.001821494
0.038135593	0.092	0
-0.18848921	0.085	0.038596491
-0.0794702	0.0826	0.019677996
-0.09472422	0.079333333	-0.02443281
-0.02227433	0.078860944	-0.028813559
-0.03506787	0.08845	0.080586081
-0.03598691	0.069441216	-0.055363322
0.073770492	0.082328105	0
0.005889282	0.073059135	0.033989267
-0.04499438	0.07042	0.014519056
-0.0284153	0.071779444	0.055555556
0.189856957	0.076966667	-0.036900369
-0.19895833	0.0648	0.052427184
0.036717063	0.078833333	0.025896414
-0.04634398	0.11	0.008032129
0.030785563	0.0767	0.055084746
-0.01464435	0.08525	0.039647577
-0.00208768	0.088475	-0.069672131
0.034557235	0.0899	0.070175439
0.055872292	0.091573422	-0.078787879
-0.02229654	0.09115	-0.038834951
0.155927835	0.07915	-0.231343284
-0.10495963	0.091733333	0.350806452
0.006968641	0.097633333	0.002020202
-0.06818182	0.082433333	0.102449889
-0.03448276	0.0877	-0.008830022
0.085574572	0.0912	0.004273504
-0.11663067	0.1156	-0.008474576
0.012021858	0.08675	0.035087719
-0.07012195	0.0868	0.011086475

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BIOGRAPHICAL INFORMATION

John Michael McGee is married to Hannah McGee, and they have two children: Adalyn and Samson. John started his academic career at the Tarrant County Community College District (TCCCD). While attending he was inducted as a member of the Phi Thata Kapa National Honor Society, The National Honor Society of Leadership and Success, and was on the Dean's list every semester. He obtained two Associate in Arts degrees and two certificates during his time at TCCCD. After attending TCCCD, John continued his education by pursuing an Honors Bachelor of Business Administration with a focus in Commercial Real Estate and Finance at the University of Texas at Arlington (UTA). John is a member of the Goolsby Leadership Academy within the College of Business, the Golden Key International Honor Society, Beta Gamma Sigma National Honor Society, and the Honors College at UTA. He is still a member of The National Honor Society of Leadership and Success and remained on the Dean's list every semester. During college, John worked as a commercial real estate broker for McGee and Associates, a local commercial and investment real estate firm. John is a member of approximately ten professional boards related to commercial real estate. John plans to continue his education at UTA through the fast-track program to a Master of Science in Commercial Real Estate. Upon completion of the master's program, he will take his exam to become a CCIM (Certified Commercial Investment Member). John plans to continue the research done in this thesis throughout his career in commercial real estate, focusing on the evaluation of commercial investment properties.