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Flight to Quality?
An Investigation of the Attributes of Sold Properties in Hot and Cold Markets

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Prepared for Presentation at the 27th Annual Meeting of the American Real Estate Society in Seattle, WA, USA April 13-16

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Abstract

This paper uses sales transaction data in order to examine whether flight from risk phenomena took place in the US office property investment market during the financial crisis of 2007-2009. The effect of the crisis on the pricing of property quality attributes, mainly summarized by the class category of each building, is investigated. In addition, the paper examines how turnover levels were affected by the market downturn and whether there were significant variations between different real estate quality types. The results of the hedonic regression models suggest that the price spread between Class, A, B and C grew significantly during the downturn. We also find that property attributes such as size, height and age are priced significantly different in 'hot' and 'cold' markets.

Introduction

Associated with interlinked macro-economic and capital market episodic crises, in severe disruptions to credit markets there can be "flight to quality" and/or "flight to liquidity". Such episodes are associated with falls in asset values and widening risk spreads between different qualities of assets within and between the major asset classes. This paper investigates the extent to which, as market conditions change, differences in risk premia between different qualities of real estate asset will also lead to changes in price spreads. There has been considerable empirical research regarding the occurrence of flight-to quality or liquidity phenomena in stock and bond markets but there has been little, if any, research regarding this issue in the real estate market.

This paper investigates whether there is evidence to support the expectation that, during market downturns (cold markets), risk aversion to, and the inherent risk of, low quality properties increases more compared to high quality properties resulting in mainly two outcomes. Firstly, due to changes in investor demand, high quality properties become more liquid and increase their share of total transactions. Secondly, the price spread between different qualities of real estate asset increases in cold markets to reflect the divergence in the risk premium attached to these qualities. Within the context of hedonic price analysis, this would imply a significant change in the coefficients of the different quality attributes contributing to the total price of a particular property.

Given the two basic propositions of the paper, the analysis is structured in two stages. The first stage examines the shares of high quality properties in total transactions that occurred over the period 2000-2010 in order to assess whether there was an increase in the share of high quality properties during the crisis period (cold market) compared to the pre-crisis period (hot market). In the second stage, we test the hypothesis that the spread between the pricing of low quality and high quality characteristics increased during the crisis period compared to the pre-crisis period.

In commercial real estate markets, the flight-to-quality phenomenon may be important for performance measurement. This is because differences in the propensities of assets to be sold has the potential to bias both indices based on appraisals and/or transaction prices. Differences in performance over time in an appraisal-based index may be due to changes in the sample rather than changes in the market. In a 'cold' market associated with a flight to quality, if low risk assets are more likely to be to be sold out (or brought into) the index, a change in index performance can be caused by changes in the sample weighting towards assets with different risks. The extent of a ‘market’ decline estimated by the index may be due to the fact that there is a change in weighting towards lower quality assets which have been affected by a flight to quality. The recorded market return may be lower due to deteriorating market conditions and a change in the sample of properties. The typical and well-established practice in the literature regarding the construction of transaction price indices is to control for quality changes. However, it is important that significant changes in quality coefficients that may occur during crisis periods are taken into account.

The results of our analysis do not lend support to the hypothesis regarding the increase of the share of high-quality properties in total transactions, but do provide support to the hypothesis of the spread in the pricing of high quality attributes compared to the pricing of low quality attributes.

Related Literature

There is a longstanding body of research on credit spreads in bond markets investigating the drivers of changes in risk premia in market crises (see Vayanos, 2004 for a review). This literature identifies changes in a common component of the risk premium associated with 'general' risk aversion as one driver of yield spreads. In practice, changes in general risk aversion are not directly observable and it is only the asset class risk premium that is available. This is a function of a common component (the common price of risk) and the inherent riskiness of that asset class. Within the bond spread literature, the inherent riskiness of the asset class is decomposed into two other components. The first is associated with a change in the risk of the asset class itself produced by deteriorating economic and market conditions leading to an increase in default risk. In commercial real estate markets, weak market conditions can be associated with higher probabilities of tenant failure, lease terminations and voids. The second is related to changes in investors' risk preferences. In a flight from risk, certain clientele groups may be differentially affected. For instance, in periods of restricted credit, lower quality borrowers may be unable to borrow with consequent effects on the level of demand in their segment.

A third determinant of an increase in the yield spread is a change in liquidity. Changes in market conditions cause changes in investors' liquidity preferences and in the relative liquidity of different asset types. While it is difficult to compare the liquidity of actively traded, public bond markets and thinly traded, private real estate markets, for both there tends to be a positive association between asset liquidity and asset quality.

In general, there are two competing views regarding the co-variance of the higher-risk stocks and the lower-risk government bonds with changing market conditions. According to Durand, Junker and Szimayer (2007), a positive co-variance between these two asset classes can be justified theoretically on the basis of the argument that when interest rates are higher and bond returns are lower, stock returns should also be lower, as expected future cash flows are discounted using higher discount rates, which result in lower net present values. Furthermore, expected future cash flows are lower during periods of higher interest rates furthermore reducing net present value. On the other hand, the flight-to-quality phenomenon implies that in a high-risk environment, when investors liquidate their stock positions to purchase safer investments such as government bonds, stock and bond returns should be negatively correlated. The expectations for real estate markets are equally ambiguous. It is possible that, since they can be more easily sold, high quality real estate assets may be liquidated in a flight to high quality bonds. Alternatively, funds flows to high quality real estate assets may increase as a proportion of total flows to real estate funds.

Durand, Junker and Szimayer (2007), who analyzed quarterly returns from 1952 to 2003, found evidence that supports both of these competing views regarding investor behaviour. In particular, they verified that during non-dramatic economic conditions stock and bond returns were positively correlated. However, they also found evidence that in some "extreme" situations this relationship turned negative, thereby supporting the flight-to-quality hypothesis. In particular, their estimates point to a one-to-seven chance of the flight-to-quality phenomenon taking place during such extreme market conditions, with large negative stock returns being associated with large positive bond returns.

Hartmann, Straetmans and de Vries (2004), using data on stock and bond returns over the period 1987-1999, examined the flight-to-quality hypothesis, and specifically whether a crash in the stock market had a positive effect on the government bond market or whether both markets crashed at the same time. Their analysis suggests that the flight-to-quality phenomenon, that is flight of capital from the stock market to government bonds during crashes, is as common as both markets (stocks and bonds) co-crashing at the same time.

Piplack and Straetmans (2010) examined co-movements of four different asset classes (stocks, bonds, T-bills and gold) during periods of market stress. In their study, they particularly examine the presence of a "flight-to-quality", which they define as "the simultaneous event of a stock market crash with a boom in either bond or gold markets" and a "flight-to-liquidity" effect, which they define as the flow of capital from stocks to T-bills. Their analysis suggests that the flight-to quality phenomenon is less likely to take place during market stress, which in most cases leads to a simultaneous crash of both the stock and bond markets. However, they find some evidence of a safe-haven effect, reflected in a stronger likelihood for sharp rise in gold prices when other assets fall sharply.

Barrios *et al.*, examined intra-euro government bond spreads during the financial crisis. Their findings point to risk aversion and resulting flight-to-safety and flight-to-liquidity phenomena in capital markets as one of the three determinants of yield spreads. Their findings support the argument of a risk premium change during periods of crisis. In particular, their findings suggest that the additional interest rate premium of new bond issues increased during periods characterized by a high level of risk aversion. This relationship was reflected in a significant upward shift of the impact of deteriorated fiscal balance on bond spreads.

In the real estate literature, there have been no studies explicitly investigating the 'flight to quality' issue. A number of studies have examined whether there are systematic differences between sold and unsold properties. The first study related to this topic was carried out by Guilkey *et al* (1989). Using a relatively small sample of US institutional properties, they test four hypotheses concerning the impact of information asymmetries, liability matching, economies of scale associated with large lot sizes and geographical remoteness. Supporting agency and information asymmetry effects, they found that managers tended to sell assets that did not maximize manager compensation and properties located in markets with strong current demand but rapid recent increases in new supply that were not continuing. They also found that lease maturity, holding period, tenant quality, capitalization rate, income per square foot, age and a range of economic drivers had significant explanatory power.

In related work, Collett *et al* (2003) focused on the holding periods of commercial property assets in the UK. Using the IPD transaction data, they examined hypotheses concerning the effect of size, returns and market conditions in acquisition and sale period. Overall, they found that strong market performance was associated with higher turnover rates. Further, they identify a lot size effect with small lot sizes having a higher propensity to sell than large lots. In the US, research, Fisher *et al* (2003) examine the determinants of transaction frequency and the underlying factors that affect the probability of property sales occurring from period to period. They draw an important distinction between liquidity and transaction frequency. This is a potentially important issue since properties may not transact because they are difficult to sell or because the owner does not wish to sell. A decision not to sell may be associated either with negative or with positive asset attributes. For instance, the low transaction frequency identified by Collett *et al* (2003) for retail warehouses in the UK was almost certainly due to positive attributes rather than negative factors. Conversely, studies which find that small lots sizes are sold more commonly than larger lots sizes do not indicate differential liquidity. Rather they may imply differences in motivation to sell rather than ability to sell.

Fisher *et al*. (2004) have examined the probability of sale in the commercial real estate market under varying market conditions using the properties in the NCREIF database that were held between 1985:1 and 2001:4. *A priori*, Fisher *et al* (2004) hypothesized that a range of owner specific (gearing, fund type, historic performance, previous valuation) and property specific (holding period, voids, size and age) variables together with market factors (cost and flow of funds, employment, capital growth, and equity returns) affects sales activity. In line with Collett *et al* (2003), they point to a strong positive correlation between capital growth and market turnover. Overall, they find that their *a priori* expectations are confirmed and that the factors identified provide significant explanatory power of sale probability. The only property-quality proxy that was included in the analysis was age, which was found to be positively related with the probability of sale, indicating that older properties were transacted more frequently than newer properties. However, one can argue that age is an imperfect quality proxy, and does not accurately capture variations in asset quality as reflected in typical market categorizations of office space, such as class A, B and C. Johnson, Benefield, and Wiley (2007) in a cross-sectional study of the probability of sale that included both sold and non-sold residential properties, provide evidence that newly constructed properties, signifying higher quality, exhibited a higher probability of sale.

A related strand of the real estate literature which is relevant to the issues at hand is the research on capitalization rates as they reflect investor rent/value growth expectations and risk perceptions. However, the direct implication of the flight-to-quality hypothesis on cap rates is that during severe downturns the spread between the capitalization rate for low quality properties and the capitalization rate for high quality properties should increase. Although there is empirical work with results that are consistent with the hypothesis that capitalization rates fluctuate in response to changes in real estate market conditions or variations in building quality, there is no empirical research addressing the question of the divergence of the cap rate spread across property qualities during severe downturns.

In sum, the existing empirical literature has addressed the issue of the flight-to-quality argument in the stock and bond markets but not in the real estate market. The empirical findings of this strand of literature provide evidence that flight-to-quality phenomena have taken place in the stock and bond markets during market stress but not consistently. The literature on real estate markets provides evidence of variations in capitalization rates both with varying market conditions and qualitative property characteristics. However, the combined effect that varying market conditions and quality have on the composition of sales and risk pricing in the property market has not been addressed.

Investment Quality and the Marginal Investors in Commercial Real Estate Markets

In commercial real estate markets, asset class is often a function of a bundle of attributes which interact to form, a perhaps somewhat nebulous concept, investment quality. One of the most important determinants of investment quality is the credit risk of the income stream. This is largely driven by the financial strength of the tenants and the terms of the lease contracts (particularly period remaining on the lease). In addition, the physical attributes of the asset in terms of its suitably for business occupation (associated with specification, appearance, configuration, interior finishing etc) are crucial determinants of an asset's ability to attract occupiers with low credit risk and who accept lease terms that are relatively less risky for the owner. Further, locational differences within and between offices markets will also be an important determinant of investment quality. Albeit often intuitively, these attributes are implicitly weighted by market intermediaries and used to provide relatively simple metrics of investment quality that can often act as heuristic cues for investors.

In the idiom of the commercial real estate market, investment quality is often discussed in terms of whether assets can be classified as Class A, B or C. Similar segmentation is also often highlighted between investor types. Short-hand clientele investor categories such as institution/non-institutional and core/value/opportunistic reflect variations in risk preferences amongst investor groups. Indeed, assets are also classified in the same way. The result tends to be cross-sectional and time-varying variations in marginal investors for real estate assets with different investment qualities.

These concepts are presented graphically in Figures 1 and 2. To suppress complexity, we assume a single core and opportunistic investor with different risk indifference curves for two real estate assets of different investment qualities. In Figure 1, the market is 'overheated'. General risk aversion is low and the required risk premium above the risk free rate is small. The gap in inherent risk between the two assets is also relatively small. As a result, the yield spread between high quality and low quality investments is also relatively small. The key difference between core and opportunistic investors is that (it is assumed that) the unit of required return per unit of risk increases at different rates as the riskiness of the assets increases. Core investors have a convex utility function and their required return *per unit of risk* increases as assets becomes more risky. In contrast, opportunistic investors are characterized as risk seekers who have a concave risk function. Their required return *per unit of risk* decreases as the asset becomes more risky. As a result, the core investor has a lower risk premium for low risk investments than the opportunistic investor and is the marginal investor for the Class A investment. However, due to the different functions of the risk indifference curves, the opportunistic investor has a lower risk premium compared to the institutional investor for the Class B real estate asset and is the marginal investor for this asset.

In Figure 2, the market is assumed to be in crisis. General risk aversion is high and the required premium above the risk-free rate has increased significantly. As a result, while the underlying shape of the risk functions of core and opportunistic investors remain similar, both types of investor have increased the required risk premium. The risk of the real estate assets have also increased. However, the risk of the Class B asset has increased more than the risk of the Class A asset. While the core and opportunistic investors remain the marginal investors for the Class A and Class B assets respectively, the yield spread between the two assets has increased.

Figure 1

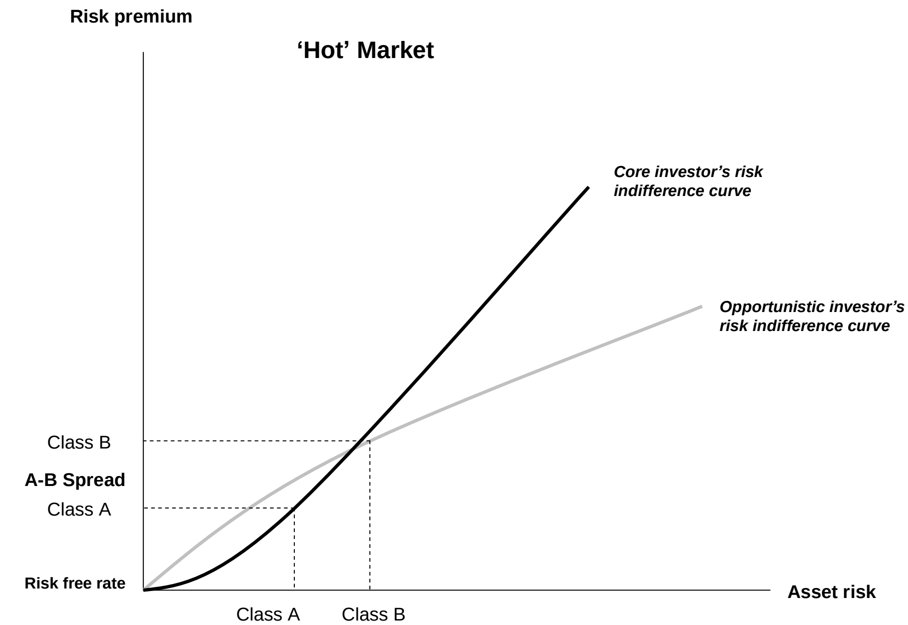
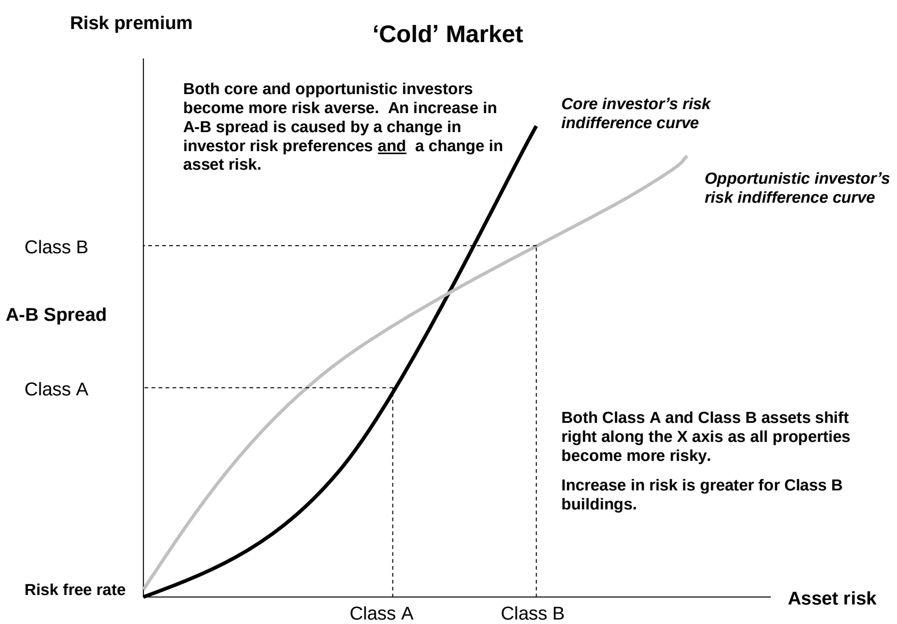


Figure 2



The 'flight to quality/liquidity' literature exhibits some of the fundamental problems as investigating the relationship between capital flows and returns. It has been pointed out that capital 'flights' do not subtract capital from the overall market since other investors are taking the other side of the transaction (Shiller, 1998). Indeed, Zheng (1998) argues that the existence of a seller for every buyer means that flow of funds analysis is simply a means of identifying which group or sector moves market prices. Another similarity is that there are conflicting expectations of the flow-return relationships in the capital flows literature. This study generates similar potentially conflicting expectations. In a market crisis, a flight to high quality *bonds* from the real estate sector may result in Class A properties being sold (because they can be?). However, a flight to bonds *from* real estate may be dominated by a flight to quality effect *within* the real estate asset class. Alternatively, investors may wish to retain high quality assets in their real estate portfolios and dispose of Class B or Class C assets. Similar to the capital flows literature, it is possible to make plausible inductive inferences and provide a rationale for almost any empirical relationship identified. Bearing this in mind, we present the empirical framework and results below.

Data and Empirical Model

The study draws on CoStar's comprehensive national commercial real estate database which includes approximately 43 billion square feet of commercial space in more than two million properties making it the largest available real estate database in the United States. In total, we have used 18,562 observations of transaction. While transaction prices are considered over a period of 11 years from 2000 through end of 2010.

There are a number of important data issues to acknowledge. CoStar was founded in 1987. Since this period, its coverage of the US commercial real estate sector has been increasing in terms of its scale and scope. It is expected that it would have initially prioritised higher quality buildings in the main urban centers. As a result, change in absolute numbers of transactions may not be a reliable indicator of the different turnover rates in different years. For instance, increased numbers of Class B sales in a given year may be due to growth in the coverage of CoStar as well as variations in turnover rates between different quality categories. Put simply, the proportion of sales of Class B and C buildings may have increased in the sample period because CoStar increased their coverage of this quality of asset. As a result, it is important to be cautious when interpreting changes in sale volumes.

Our econometric procedure is hedonic regression modeling. This is the standard methodology for examining price determinants in real estate research. We use this method in our study primarily to isolate the effect of quality classifications. The quintessential log-linear hedonic rent model takes the following form:

$$\ln SP_i = \alpha_i + \beta x_i + \phi Z_i + \varepsilon_i \qquad (1)$$

Where SP_i is the natural log of average sale price per square foot in a given building, x_i is a vector of the natural log of several explanatory locational and physical characteristics, β and φ are the respective vectors of parameters to be estimated. Z_i is a vector of time-related variables and ε is a random error and stochastic disturbance term that is expected to take the form of a normal distribution with a mean of zero and a variance of σ. The hedonic weights assigned to each variable are equivalent to this characteristic's overall contribution to the sale price (Rosen 1974).

To capture the effects of quality categories, we use dummy variables to indicate whether a building is categorized as A, B or C. The sign of the coefficient depends on which category is omitted. We omit Class C buildings and expect positive coefficients that would indicate that, on average, Class B and C buildings sell for more than Class C buildings. A summary specification of the log –linear model is as follows

$$LNPRICE_i = C_0 + \beta_1 \sum_{n=1}^{N} Age\ variables + \beta_2 \sum_{n=1}^{N} Quality\ variables +$$
$$\beta_3 \sum_{n=1}^{N} Physical\ variables + \beta_4 \sum_{n=1}^{N} Amenity\ variables_i + \beta_5 \sum_{n=1}^{N} Lease\ variables +$$
$$\beta_6 \sum_{n=1}^{N} Capitalmarket\ variables + \beta_7 \sum_{n=1}^{N} SUBMARKETS_i + \varepsilon_i$$

A full list of the independent variables is presented in Appendix 1.

The basic hedonic pricing model that was estimated has the log of the inflation-adjusted transaction price per square foot as the dependent variable and several groups of variables (depicted in Appendix 1) as independent variables. Our expectations are derived from *a priori* inferences and previous research. With age, while we expect a negative relation, we note that a quadratic relationship has frequently been observed between price and age (Ling and Petrova, 2008). The estimated coefficients for the various amenities (parking, bank, gym etc), size and number of stories are expected to be positive. We control for variations in market conditions at the time of sale by including a number of factors to model real estate capitalization rates and capital values. Submarket dummies are used to control for location effects.

Summary Statistics

Table 1 summarizes the data in our sample of properties sold by quality category for the three major classes and by phase in the market cycle. The latter categorization was undertaken based on the MIT transaction-based commercial real estate index. Thus, we have identified a 'hot' market associated with rising prices running for Q1 2005 until the market turning point in Q3 2007 (15 quarters). The 'cold' market associated with the global financial crisis of 2007-2008 runs until the end of 2009 (nine quarters). We then identify a brief recovery period associated with the index starting to rise again until the end of 2010 (four quarters). Figure 3 shows an index of our sample data based on nominal and real prices per sq. ft. compared to the MIT-TBI price index. While the general market trends are largely similar in both indices, our dataset appears to exhibit lower growth in the 2005 to 2007 period. However, these 'raw' averages are not comparable with the MIT-TBI since our dataset is not weighted by age or other characteristics which may account for part of the differential performance of the two indices.

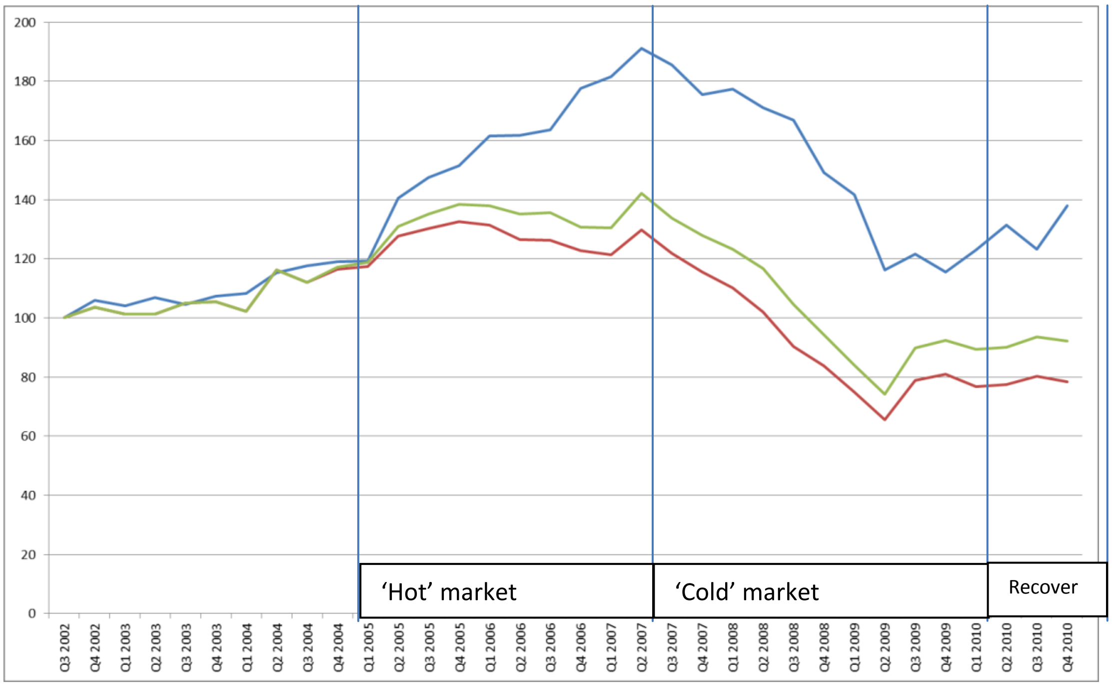


Figure 3: Comparison of sample data index with the TBI-MIT index (Q3 2002=100, sample data is an unweighted average)

Turning to the summary statistics in Table 1, it is notable that the 'raw' averages (i.e. without any constant-quality adjustments) suggest only a small price gap between Class B and Class C assets. For the whole sample, their mean sale prices are $145 and $141 per square foot. In the period since 2007, mean prices of Class C buildings have been slightly higher than Class B buildings. In contrast, the mean sale price of a Class A building has been $223 per square foot over the sample period. Class B and Class C buildings, compared to Class A buildings, also tend to be much more similar in terms of number of stories and occupancy rate. The main distinction between Class B and C buildings seems to be that the latter tend to be older and smaller than Class B. With an average height of over 10 stories (compared to 3-2 stories for Class B and C respectively), it seems reasonable to infer that Class A buildings are likely to be particularly concentrated in CBDs and in high value locations. Class A buildings also tend to considerably larger than Class B and C buildings. It is also important to note that, due to their typical size, Class B and C buildings have a much higher propensity to have a single occupier compared to Class A. This explains the higher occupancy rates for Class B and C buildings.

In terms of sales volume, in absolute terms the majority of transactions involved Class B and C buildings. Sales of Class A buildings accounted for approximately 14% of all sales. However, it is important to bear in mind that although almost four times as many Class B buildings were sold compared to Class A, more Class A *space* was sold than Class B. The change in market conditions in late 2007 was associated with a marked decrease in the amount of space traded. The summary statistics do not support the hypothesis of the increasing allocation to Class A properties during the crisis. In the 'hot' market period, around 284 million square feet of Class A space was sold (25.8 million square feet per quarter). This fell by over 60% after the market downturn and dropped to just over 92 million square feet in the 'cold' market period (10.2 million square feet per quarter). In the 'hot' market, 156 million square feet of Class B space was transacted (10.4 million square feet per quarter). Class B experienced a fall of similar magnitude to Class A falling to approximately 85.5 million square feet in the 'cold' market. However, this was less than Class A and represented a fall of approximately 33%. Barring a change in CoStar's market coverage of Class B sales over time, the financial crisis appears to have had a relatively smaller effect in this market segment in terms of quantity of space sold.

Although the number of transacted Class C properties increased the actual volume of space traded hardly changed as the average building size halved. While approximately 2.13 million square feet of space was transacted per quarter between 2005 and 2007, the figure for the period from late 2007 until end of 2009, is 2.01 million square feet per quarter.

Turning to price differences, in the 'hot' market period Class A buildings on average sold at a premium of 27% over Class B buildings. As noted above, the price variations between Class B and C are small. Following the market downturn, the summary statistics suggest that the Class B and C properties experienced much larger price falls compared to Class A space. The mean sale price for Class A space fell from $244 psf in between 2004 and late 2007 to $219 after the market downturn – a fall of just over 10% . Class B space fell from $192 psf to $137 psf – a fall of nearly 29%. The evidence supports a substantial increase in the A-B spread in the downturn. In the 'cold' market, the average Class A buildings on average sold at a premium of 60% over Class B buildings. This spread has not narrowed in the 'recovery' period.

To further investigate and illustrate the price differentials over time, Figure 4 plots the spreads on an annual basis. The bars represent the A/B spread as a percentage of the Class B average price per sq. ft. and the B/C spread as a percentage of the Class C price. At the beginning of the decade, Class B properties traded for around 60% above C properties whereas the spread is virtually zero or even negative

Table 1 Summary Statistics

Period	Variable	Class A	Class B	Class C
Whole sample	Mean Price psf ($)	223	145	141
Q1 2000 -	Mean No. of Stories	10.74	3.18	2.05
Q4 2010	Mean Age (yrs)	19.70	29.10	52.08
	Mean Size (sq ft)	242420	46646	14306
	Mean Occupancy Rate (%)	80.02	79.69	84.83
	Total space sold sq ft (000)	638,049	442,064	92,317
	Mean space sold per quarter sq ft	14,501,114	10,046,909	2,098,114
	Number of Observations	2632	9477	6453
'Hot' market	Mean Price psf ($)	244	192	181
Q1 2005 –	Mean No. of Stories	11.64	3.98	2.48
Q3 2007	Mean Age (yrs)	20.11	28.71	46.06
	Mean Size (sq ft)	260387	66649	22840
	Mean Occupancy Rate (%)	81.43	73.09	71.38
	Total space sold sq ft (000)	283,822	156,158	23,457
	Mean space sold per quarter sq ft	25,802	14,196	2,132
	Number of Observations	1090	2343	1027
'Cold' market	Mean Price psf ($)	219	137	147
Q4 2007 –	Mean No. of Stories	10.06	3.05	2.01
Q4 2009	Mean Age (yrs)	17.35	29.72	51.03
	Mean Size (sq ft)	220878	41443	13346
	Mean Occupancy Rate (%)	78.23	78.90	86.01
	Total space sold sq ft (000)	92,106	85,455	19,097
	Mean space sold per quarter sq ft	10,234	9,495	2,010
	Number of Observations	417	2062	1356
'Recovering' market	Mean Price psf ($)	208	127	132
Q1 2010 –	Mean No. of Stories	8.87	2.33	1.77
Q4 2010	Mean Age (yrs)	24.01	29.53	59.90
	Mean Size (sq ft)	205765	29464	9736
	Mean Occupancy Rate (%)	78.99	86.54	93.62
	Total space sold sq ft (000)	93,623	95,205	27,631
	Mean space sold per quarter sq ft	23,406	23,801	6,908
	Number of Observations	455	3231	2838

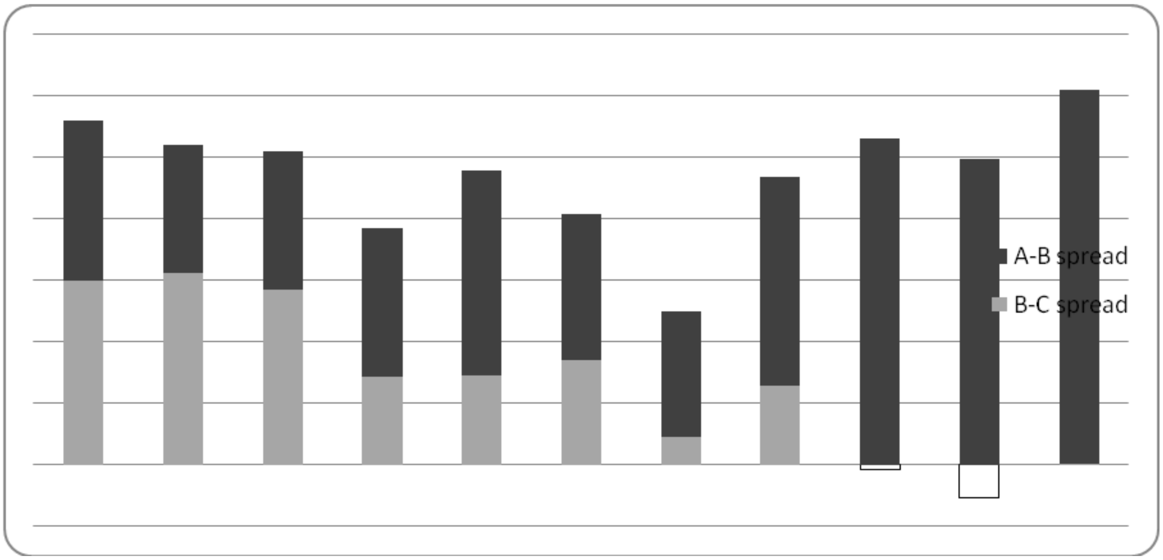


Figure 4: Average A/B and B/C spreads from 2000-2010 in %

towards the end of the decade. Conversely, the A/B spread appears to have increased during the same period. While it is intriguing to speculate about the underlying causes of these trends, only a valid analytical framework that accounts for within and across-group heterogeneity in the sampling period can reveal whether this trend is not simply due to changes in the quality of the properties transacted in each group. The next section presents the results of the hedonic regression model.

Results

The model specification above was applied for the whole sample period, for different market conditions and on annual samples. The results are summarized in Table 2 The results reveal that the estimated coefficients on the variables are of the predicted sign in most cases. Features associated with prestige properties such as banking facilities, a concierge, a fitness centre and a restaurant also tend to have a positive and significant effect on sale price. Finally, all else equal, the number of stories in an office building has a significantly positive effect on sale prices. With buildings aged 70 and over as the omitted variable, the relative sale price premium associated with younger buildings declines relatively smoothly and levels off after 30 years. Possibly due to higher vacancies at initial lease-up, brand new buildings tend to have a lower sale price premium than buildings three or four years

Table 2 **Selected Results from Hedonic Models**

	Model 1		***Model 2***		***Model 3***		***Model 4***		***Model 5***		***Model 6***		***Model 7***		***Model 8***		***Model 9***		***Model 10***	
Sample	**All**		**'Hot' only**		**'Cold' only**		**'Recovering' only**		**2005 Only**		**2006 only**		**2007 only**		**2008 only**		**2009 only**		**2010 only**	
	β		**β**		**β**		**β**		**B**		**β**		**β**		**β**		**β**		**β**	
Class A	0.55	***	0.41	***	0.55	***	0.72	***	0.48	***	0.42	***	0.33	***	0.61	***	0.66	***	0.72	***
Class B	0.12	***	0.10	***	0.14	***	0.13	***	0.14	***	0.12	***	0.04		0.21	***	0.17	***	0.13	***
Plot size	0.14	***	0.12	***	0.15	***	0.14	***	0.12	***	0.09	***	0.13	***	0.15	***	0.16	***	0.14	***
Occupancy	-0.0001	***	-0.001	***	0.0004		0.09	***	-0.001	**	-0.001		-0.001	*	-0.0001		0.00004		0.09	***
Size	-0.30	***	-0.27	***	-0.32	***	-0.33	***	-0.30	***	-0.23	***	-0.25	***	-0.31	***	-0.39	***	-0.33	***
Height	0.06	***	0.08	***	0.01		0.04	*	0.03		0.08	***	0.09	***	0.03		-0.07		0.04	*
'Hot'	0.07	***																		
'Cold'	-0.01																			
'Recovering'	-0.17	***																		

older. Similarly, the results indicate that recently renovated buildings do not sell at a significant premium. It is only after 4-5 years after a renovation that a significant price premium is obtained. These results are somewhat counterintuitive but might be explicable through increased re-positioning and re-leasing risk immediately following a major property refurbishment. In terms of the other independent variables in the model, we note the positive and statistically significant effect of land size and negative effect of rentable building area. As expected, the coefficient for occupancy rate is significantly negative for most of the model specifications.

Turning to the variables of interest, it should be kept in mind that these coefficients represent the pricing premium attached to each of these two quality categories compared to the reference quality which is class C. For the whole sample model, Class A and B indicator variables are highly statistically significant and have the anticipated positive sign. For the whole period, 55% and 12% premia are estimated for Class A and B respectively. The variable representing the 'hot market' has the expected positive sign and it is statistically significant. The variable representing the 'cold' market has the expected negative sign. However, the effect is minor and it is not statistically significant. Most likely, this can be explained by the fact that, during this period, many of the properties sold in a period of falling but still comparatively high (relative to 2000-2004) prices. In turn, the significant negative estimate for the 'recovering' market reflects the fact that values in this period were increasing from the bottom of the market.

When we estimate the model for samples sub-divided into the different market conditions. Since each year these premiums are estimated in relation to the same price base (that of class C) then changes in their spread should reflect changes in the risk attached to these qualities. Whilst the Class B premium relative to Class C remains relatively stable between 'hot and 'cold' markets, the premium for Class A drops substantially in the 'hot' market. We estimate a 41% Class A premium in the 'hot' market, a 55% premium in 'cold' market and a 72% Class A premium in the 'recovering' market. These inferences are broadly confirmed in the model estimations for the annual samples. The lowest Class A premium (33%) is estimated for 2007 – the year when the market peaked. In 2007, there is no significant Class B premium. The Class A premium increases dramatically in 2008 to over 60% and it continues to increase in 2009 and 2010.

To further investigate the differential impact of building classification on price in each phase of the market cycle, we re-estimate the base model with added interaction effects of building class and market phase. Appendix 2 shows full estimation results for this model. The results are largely consistent with our earlier findings. Class A main effects are significant at the 5 percent level, while Class B main effects are not. As expected, the main effects of all three market phases are significant (compared to the benchmark 2004 benchmark year). Interestingly, Class B appears to be insignificantly different from Class C 2004 or only marginally significant throughout the analyzed period. Interaction effects are negative in all cases which most likely reflects the choice of building class and time period benchmarks. Table 3 presents the full effects by building class and market phase against the reference category (Class C, 2004). The Class A premium appears to increase during the cold market before leveling off somewhat in the recovery period. In contrast, the Class B effect appears to decline over time. Hence, the Class A premium increases during the market downturn whereas the distinction between Classes B and C regarding constant-quality price levels erodes during the same period. Overall, it appears that Class B properties were affected more adversely by changing market conditions than their Class C counterparts.

Table 3: Combined Interaction Effects (reference categories: Class C, 2004)

	Hot	**Cold**	**Recovery**
Class A	*0.98*	*1.01*	*0.88*
Class B	*0.62*	*0.57*	*0.34*

Finally, we test our hypothesis of a flight to quality more formally using Wald tests for structural breaks in individual periods. Our a priori expectation is to detect a structural break in the coefficients of quality characteristics as the risk premium assigned to lower quality attributes and, therefore, their pricing, should change more than the risk premium and pricing of high quality characteristics.

This is consistent with our argument of a differential effect on the pricing of class A and class B buildings during the crisis due to the flight-to-quality phenomenon. The test for equality of the obtained coefficients across the three market phases reveals a significant structural break for Class A, confirming previous results of a significantly different Class A premium depending on market conditions. Again, no such structural break can be detected for Class B. Most other quality-related variables such as size, percent_leased, age (selected groups displayed) and height are priced differently in each phase of the market cycle.

Table 4: Wald test for structural breaks between three market phases

	Chi2	Prob	Sig
Class A	**26.52**	**0.0000**	***
Class B	2.43	0.2962	
Size	**10.95**	**0.0042**	***
Percent_leased	**17.30**	**0.0002**	***
Plot size	3.33	0.1892	
MIT TBI	4.35	0.1137	
Age 1 year	**10.12**	**0.0064**	***
Age 10 years	**26.51**	**0.0000**	***
Age 20 years	**4.70**	**0.0954**	*
Age 40-50 yrs	0.49	0.7838	
Stories	**8.46**	**0.0145**	**

Conclusions

This paper has used sales transaction data in order to examine whether flight from risk phenomena took place in the US office property market during the financial crisis of 2007-2009. Within this context, we examined the effect of the crisis on the pricing of property quality attributes, mainly summarized by the class category of each building. A review of the literature on flight from risk quality and capital flows produced no clear expectations about changes in turnover. A flight from risk can associated with a change in the marginal investor for an asset class manifested in this context in the substitution of bonds for real estate. Alternatively, within the real estate asset class, capital may be reallocated between different qualities of assets. It is a stylized fact in commercial real estate markets that overall market turnover tends to decrease in a falling market. It was our expectation that weaker credit conditions and an increase in risk aversion would have stronger negative effects on lower quality assets both in terms of prices and turnover

We conclude that the analysis of total transaction volumes over time is too problematic to yield any meaningful results beyond the mere observation of achieved transaction levels. Hence, this analysis does not account for the number of properties that *were available* for sale within each class and each year. We cannot assess whether the decreasing share of high quality properties during the crisis was the result of the disproportionate decrease in the number of Class A properties that were available for sale during that period. Put simply, this paper sheds no light on the extent to which falling sales volume of Class A assets was due to ‘couldn’t sell’ rather than ‘wouldn’t sell’ effects.

In terms of the effect of flight-to-quality phenomena on the pricing of property quality, the results are consistent with our hypothesis of an increased spread during the crisis between the price attached to class A quality and the price attached to class B quality. A model using interaction terms confirms that the Class A premium increases during the cold market compared to the lower tiers of the market. The tests for structural breaks confirms the hypothesis of differential pricing, not just for Class A but also for most other quality-related factors such as height, size and age.

However, decomposing the drivers of the change in price spread is beyond the scope of this paper. With the existing data, it is not possible to distinguish the extent to which the change in price spread was due to a change in increase in risk aversion of the marginal investor relative to a change in the inherent riskiness of the assets. Future research may seek to identify the factors driving the changes in spread.

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Appendix 1

		Description of variables
	Dependent variable	
log_pricesf_real		is the inflation-adjusted transaction price in $ per sq.ft. in 2009 prices
	Independent variables	
es_all	ES	is a binary variable set to indicate one if the property has an Energy Star label.
leed_all	LEED	is a binary variable set to indicate one if the property has a LEED label.
double_cert	Dual certified	is a binary variable set to indicate one has both an Energy Star and a LEED label.
agesale_0yr	Age	is a binary variable set to indicate one at a given age of property at the time of sale.
renos_ageX	Renovated	is a binary variable set to indicate one at a given number of years since major refurbishment and time of sale.
log_percent_leased	Occupancy rate	represents the percentage of the building that is leased
log_rba	Size	represents the natural logarithm of the rentable building area
log_s> tories	Stories	is the natural logarithm of the number of stories
log_landarea	Plot size	represents the natural logarithm of the area of the site on which building is situated
cl_a	Class A	is a binary variable set to indicate one if the property is categorized as Class A.
cl_b	Class B	is a binary variable set to indicate one if the property is categorized as Class B.
cl_C	Class C	is a binary variable set to indicate one if the property is categorized as Class C
amen_banking	Bank	is a binary variable set to indicate one if the property has a bank branch or ATM in the building
amen_fitnesscenter	Fitness center	is a binary variable set to indicate one if the property has a gym
amen_ac	Airconditioning	is a binary variable set to indicate one if the property is completely air-conditioned.
amen_onsitemanage	Onsite manager	is a binary variable set to indicate one if property manager's office
amen_bus	Bus stop	is a binary variable set to indicate one if the property is within walking distance of a bus stop.
amen_commuterrail	Commuter rail	is a binary variable set to indicate one if the property direct access to or, if in the suburbs, is within reasonable walking distance of a commuter rail stop
amen_conferencing	Conference	is a binary variable set to indicate one if the

	suite	property has conference facilities
amen_convenience	Convenience	is a binary variable set to indicate one if the property has a convenience store
amen_atrium	Atrium	is a binary variable set to indicate one if the property has a lobby with a high, vaulted ceiling or a grand, central court that separates two halves of a large building
amen_cornerlot	Corner lot	is a binary variable set to indicate one if the property is situated on corner lot
amen_drycleaner	Dry cleaner	is a binary variable set to indicate one if the property has dry cleaning facilities in the building.
amen_foodservice	Food services	is a binary variable set to indicate one if the property has a cafeteria facility
amen_signage	Signage	is a binary variable set to indicate one if the property has exterior signage.
amen_stparking	Street parking	is a binary variable set to indicate one if the property has on street parking facilities
amen_concierge	Concierge	is a binary variable set to indicate one if the property has a lobby attendant provided by the building owner to assist tenants of the building with special requests.
amen_subway	Subway	is a binary variable set to indicate one if the property is within an 800m radius of a rail terminus.
amen_restaurant	Restaurant	is a binary variable set to indicate one if the property has a restaurant in the building.
amen_247access	24/7 access	is a binary variable set to indicate one if the property has constant access.
emp_9909	Emp growth	represents the rate of MSA employment growth in service industries between 1999-2009
f_corp_bond_spread	Corp bond spread	represents the Baa corporate bond yield less the AAA corporate bond yield.
f_tbi_tr_off	MIT TBI TR index	represents the total return on office property for the MIT transaction-based real estate index.
	SUBMRKT	is a binary variable indicating in which of the *i* submarkets that the property is located in. Submarkets are divisions of the primary market that are generally recognizable to the real estate industry and the business community by the names given to the areas. For instance, the Manhattan market consists of 20 submarkets. In total, we use 545 submarkets.

Appendix 2: Transaction price w/ interaction terms (2004-2010 only)

Real price psf

		Coefficient	T stat
Constant		6.62	21.79
Class A main		1.25	3.79
Class B main		0.21	1.82
Hot		0.46	5.6
Cold		0.44	4.95
Recovery		0.23	2.8
*Class A * hot*		-0.73	-2.19
*Class A * cold*		-0.68	-2.05
*Class A * recover*		-0.60	-1.8
*Class B * hot*		-0.05	-0.41
*Class B * cold*		-0.08	-0.65
*Class B * recover*		-0.10	-0.91
Class C	OMITTED		
Age yrs)	<1	-0.19	-5.93
Age yrs)	1	-0.30	-9.07
Age yrs)	2	-0.20	-6.37
Age yrs)	3	-0.24	-7.29
Age yrs)	4	-0.29	-8.71
Age yrs)	5	0.09	2.72
Age yrs)	6	0.25	7.28
Age yrs)	7	0.17	4.81
Age yrs)	8	0.17	4.78
Age yrs)	9	0.19	4.61
Age yrs)	10	0.05	1.06
Age yrs)	11	0.14	3.07
Age yrs)	12	0.07	1.44
Age yrs)	13	0.04	0.68
Age yrs)	14	0.04	0.62
Age yrs)	15	0.11	2.17
Age yrs)	16	0.18	4.21
Age yrs)	17	0.07	1.65
Age yrs)	18	0.06	1.63
Age yrs)	19	0.05	1.55
Age yrs)	20	0.08	2.73
Age yrs)	21	0.03	1.23
Age yrs)	22	0.07	2.48
Age yrs)	23	0.03	1.06
Age yrs)	24	-0.04	-1.25
Age yrs)	25	0.06	2.3
Age yrs)	26	0.03	1.17
Age yrs)	27	0.05	1.65

		Coefficient	T stat
Occupancy rate		-0.00	-0.98
Size (log)		-0.31	-39.93
	0.14	0.05	
			4.33
Plot size (log)			25.81
Air conditioning		-0.06	-1.86
Atrium		0.00	-0.05
Banking		0.13	6.05
Bus		0.00	-0.16
Train		0.14	2.53
Concierge		0.11	3.54
Conference		0.08	3.67
Convenience		0.07	2.11
Corner lot		0.04	2.93
Drycleaner		-0.11	-2.77
Gym		0.10	4.25
Food service		0.09	4.39
Onsite manager		0.06	3.86
Subway		-0.02	-0.44
Restaurants		0.08	4.13
Signage		-0.03	-1.97
Parking		0.09	1.42
Green		0.31	14.26
Corporate bond spread		-0.25	-17.76
MIT TBI		0.01	9.8
Emp growth		-0.01	-0.07
SUBMKT dummies		INCLUDED (n=542)	
Adj. R-squared		0.66	
F Prob		0.00	
No of obs		10464	

Age yrs)	28	0.09	2.77
Age yrs)	29	-0.02	-0.47
Age yrs)	30-32	0.00	-0.13
Age yrs)	33-35	0.03	1.03
Age yrs)	36-38	-0.02	-0.61
Age yrs)	39-49	-0.03	-1.68
Age yrs)	50-59	0.00	0.18
Age yrs)	60-69	0.02	0.5
Age yrs)	70+		
Renovated yrs ago)	<1		
Renovated yrs ago)	2-3	0.02	0.57
Renovated yrs ago)	4-5	0.08	2.4
Renovated yrs ago)	6-10	0.09	3.85
Renovated yrs ago)	11-20	-0.02	-1.13