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The Role of Market Size and Type in the Commercial Real Estate Prices

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The Role of Market Size and Type in the Commercial Real Estate Prices

Abstract
Are commercial real estate prices after the Great Recession recovering differently in primary markets as compared to smaller markets after controlling for relevant differences between properties? The question tested a long-time theory in the commercial real estate market (CRE) by examining the price recovery of properties in primary and secondary markets, controlling for other differences in property and market characteristics. The research dealt specifically with the recent Great Recession, which offered the unique opportunity to observe a protracted price recovery after a steep fall in commercial real estate prices. The research focuses on early 2010 to the end of 2012, which featured two years of a steady price recovery. After testing the relationship between market type and price recovery, explanations can be offered for why market type is or is not important. The study casts light on investor bias and suggests opportunities to capitalize on it. If anecdotal evidence holds true, it stands to reaffirm the case to invest in secondary and tertiary markets.

Disciplines
Business | Real Estate

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Wharton Research Scholars Final Paper:

The Role of Market Size and Type in the Commercial Real Estate Prices

By Worth Newman with guidance from Professor Sameer Chandan

May 13, 2013

Question:

Are commercial real estate prices after the Great Recession recovering differently in primary markets as compared to smaller markets after controlling for relevant differences between properties?

The question tested a long-time theory in the commercial real estate market (CRE) by examining the price recovery of properties in primary and secondary markets, controlling for other differences in property and market characteristics. The research dealt specifically with the recent Great Recession, which offered the unique opportunity to observe a protracted price recovery after a steep fall in commercial real estate prices. The research focuses on early 2010 to the end of 2012, which featured two years of a steady price recovery. After testing the relationship between market type and price recovery, explanations can be offered for why market type is or is not important. The study casts light on investor bias and suggests opportunities to capitalize on it. If anecdotal evidence holds true, it stands to reaffirm the case to invest in secondary and tertiary markets.

Introduction:

In 2007, the Great Recession began to ravage the global economy. The crisis featured the slowing of real GDP growth rates, plummeting liquidity, a sharp drop in consumer confidence, and an abrupt decline in trade. As credit became scarce in the United States, the crisis burst a real estate bubble, which sharply sent down prices nationwide. American real estate assets continued to suffer from falling prices through

2009. Throughout the subsequent recovery, residential and commercial real estate behaved quite differently.

Commercial real estate, which is revenue producing, experienced a steady recovery. However, residential single-family homes have seen a much more uneven recovery despite significant government intervention. The protracted recovery crept into CRE markets in 2010 and has continued into early 2013. The price recovery of CRE presents the opportunity to gain insight into the interworking of the United States' CRE markets and suggests possible investment opportunities.

Background:

In the real estate industry's narrative there is a subjective distinction between primary, secondary, and tertiary markets. This label serves as a guide for investors to find the most liquid metropolitan suburban area (MSA) markets. The convention is understood between many industry professionals though never formally defined. This poorly defined convention helps guide many investment decisions. Often investors will limit their CRE exposure to primary markets due to a perception of liquidity. Anecdotal evidence suggests that as a result primary markets such as New York or Los Angeles often enjoy greater access to capital for a fixed number of real estate assets. If investors make decisions based on this perception of markets, it is possible for prices in primary CRE markets to be higher than secondary or tertiary ones after controlling for the differences between assets.

Dataset:

In commercial real estate (CRE), commercial mortgage-backed securities (CMBS) offer a rich dataset that describes the commercial real estate market. When CMBS are bought and sold, a large amount of disclosures are required. These disclosures include a wealth of financial information about the property, the characteristics of the loan, and geographic information about the property among other factors. Such a CMBS dataset is available from Bloomberg as well as other financial data sources.

More specifically this research is based on the on Bloomberg's Loan Lookup function (LLKU). Each time a commercial property receives a loan from a purchase or a refinance that is securitized, the bond information, property details and lease information are recorded in Bloomberg. As a result, the dataset offers a perspective on many commercial real estate transactions in the United States. It is important to note that the CMBS space is not perfectly representative of the American CRE market. There are also many loans issued that are never securitized. Life insurance companies purchase many large high-quality loans for their portfolios. Also banks tend to buy smaller loans to hold on their balances sheets. As a result, CMBS are a portion of the CRE market that may not be completely representative of the entire CRE space. However, this does not mean that conclusions cannot be drawn from the dataset. When generalizing the results, it should be considered that CRE in CMBS could slightly differ in scale or quality than the space as a whole.

One challenge with the dataset is the cyclicality of CMBS issuance. In a favorable economic environment when CRE properties are appreciating in value and banks are lending, there is a large number of data points because many properties are being

purchased and refinanced. However, during a downturn in the market, like the recession in 2008 and 2009, the credit freezes causes there to be extremely few CMBS issuances. Figure 1.1 illustrates the challenge of the paucity of data for 2010 to 2012. In 2008 and 2009 there were only 82 total office CMBS issued. In 2010 there were 71. Then in 2011 and 2012 there were 218 and 335 loans issued, respectively. As a result of this large disruption, we cannot consider data from during the recession, but there are sufficient data points to generalize about trends in office properties for 2010 to 2012. Despite this challenge, careful econometric work can still draw significant conclusion about the data.

Property types:

The universe of CMBS and the Bloomberg loan database includes many different types of commercial real estate including residential, office, apartment, industrial, and retail. However, many of these are problematic when building an econometric model. In order to draw conclusions across markets, years and loan types the underlying commercial properties must be comparable between each other. For example, it would not be meaningful to compare the cap rate of an urban retail space in New York City with a suburban strip mall in North Carolina. As a result, the analysis uses office CRE data. The office CRE asset class tends to be relatively homogenous between different property types. Other core asset classes, such as retail, have too much variation within each class to build a viable model. Industrial data also tends to be comparable across properties; however, a smaller and more incomplete dataset for industrial properties caused the analysis to focus on office properties. For that reason, the dataset analyzed was office property.

Data cleaning:

With the large CMBS office property dataset, it was important to clean the data in order to have valid results. At times, the information entered into the Bloomberg dataset could be mistyped, erroneous, or an outlier. Based on industry standards and histograms of the analyzed variables some observations were excluded.

Because much of the analysis compares primary to other markets, it is important to ensure that the CMBS data correctly codes the MSAs for each observation. To check or recalculate the MSAs, a database was built of all of the observed MSAs in the Bloomberg data. Using zip code and city, the database then used existing observations to deduce the correct MSAs for each zip code and city-state pairing. From that database, the MSAs were recoded to help correct roughly 10% of the observations that were mislabeled and an additional 10% that did not have an MSA assigned. Some loans and properties remained without an MSA. These were primarily properties in rural areas that would not be considered primary markets. As a result, they were still included in the analysis categorized as non-primary markets.

With the MSAs correctly labeled the data was separated into primary and other markets. For the primary markets Boston, Chicago, Los Angeles, New York, San Francisco and Washington were selected because those are the markets typically associated with the highest CRE transaction volume according to industry professionals and the Bloomberg data. With that distinction, the econometric model then sought to statistically examine the differences between primary and other markets.

Dependent variable:

As a proxy for CRE prices, the study examines capitalization rate (cap rate). The cap rate is the annual net operating income divided by the value of the property. Cap rate offers an inverse of the more typical price-earnings ratio because cap rate considers the earning potential of the property and its valuation. This commonly used industry measure for prices allows observations to be compared across cities and properties in cities or properties with higher land prices and rents though the property may be more expensive the rents are higher. Cap rate takes into account those differences and allows more generalizable conclusions to be drawn. The annual net operating income is readily available on Bloomberg as a part of CMBS disclosures, but the property value is more subjective.

CMBS can be issued to finance acquisitions of commercial properties and also refinance existing ones. For an acquired property there is a purchase price and an appraised value. However, in the case of a refinance, there is only an appraised value. In order to be able compare across acquisitions and refinances, cap rates will be calculated with the appraised value. However, this comes with issues of appraisal bias that are difficult to control. Because of CRE lender requirements, there is a tendency towards downward price pressure on appraised values in order to allow for properties to conform to lending standards when refinancing. However, for the purposes of this study these price pressures should be similar across markets and do not materially affect the results of the study.

Once the cap rate was calculated, the study examined the cap rate's spread over the 10-year Treasury bond in order to adjust the cap rate for the market conditions at the

time of sale. To calculate this, the month of origination's 10-year treasury yield was subtracted from the cap rate discussed above. This cap rate spread (CPS) over the 10-year Treasury was the dependent variable for this study.

Independent variables:

Primary: Primary labeled primary CRE markets with a "1." For the purposes of this study, Boston, Chicago, Los Angeles, New York, San Francisco and Washington were used as the primary markets based on industry consensus.

DSCR: Debt service coverage ratio represents the amount of cash to the periodic loan payments. A higher DSCR ratio suggests a lower likelihood of missing loan payments. However, usually lenders force lower quality properties to have higher debt services coverage ratios to reduce the likelihood of default.

Current Occupancy: Current occupancy (CurrOcc) is the occupancy rate of the CRE asset at the time the CMBS was issued. Buildings with higher occupancy are likely to sell at higher prices and enjoy more favorable terms for their loans.

Value Bucket: Value bucket (valBucket) is a method to categorize each property based on its size. The buckets divide the properties according to their most recent valuation. The value buckets used in the model are below:

Value Bucket	Minimum	Maximum
5	$0	$ 5 million
10	$ 5 million	$ 10 million
25	$10 million	$25 million
26	$25 million	-

These independent variables were selected among many possibilities because they contributed the most to explain the variation in cap rate spread from 2010 to 2012. Other

independent variables that were considered include: office property subtype, bond coupon, loan-to-value ratio, current occupancy, loan purpose (acquisition or refinance), property age, located in New York City, and more broad conceptions of prime markets. All of these variables failed to significantly explain the variation in cap rate spread, so they were not included. Some variables like loan-to-value ratio were excluded despite being significant because they interacted with the cap rate spread because they both include the property's accessed value in the ratio. Figures 1.8 includes many regressions including these variables that were not considered in the final analysis. Throughout all of these regressions, primary vs. non-primary markets remained a significant variable. The independent variables in the model, attempted to control for differences in finances and property characteristics in order to draw inferences about market type.

Analysis:

Upon running various regressions in Stata, the results began to show statistical significance. (See figure 1.7 for illustration). The model in the figure has an r-squared value of 29%, explaining 29% of the variance in the cap rate spread between 2010 and 2012. For DSCR its positive coefficient suggests a higher ratio and higher cap rate spread, which means lower prices. This is intuitive because a lower quality property will likely be required to hold more cash to cover their loan obligations. Inversely, buildings with higher occupancy experienced lower cap rates and higher prices. The categorical variable, value bucket, also contributed to explaining the variance in cap rate spread. Value buckets control for the differences in size between the properties in the analysis helping compare properties of different sizes. All three of these key explanatory variables

are significant with 95% confidence, which suggests that help control for the effects of property characteristics on market type when examining cap rate spreads.

Figures 1.2 to 1.6 show LTV, DSCR, coupon, current occupancy and compare them in primary and non-primary markets. These figures compare the annual mean of each statistic between each market. It is important to pay little attention to the data points from 2008 and 2009 because of the limited CMBS transaction volume in those years, the averages were often based off of extremely few data points, allowing a small number of anomalous loans greatly affect the means. As a result, there are some dramatic movements in the charts between the years 2008 and 2010, which are most likely not indicative of the trends in the frozen real estate market at the time. However, it is clear that according to these figures across the last decade, CMBS in primary markets to tend be of higher quality according to these measures but also enjoy higher prices. These figures show a clear difference between primary and non-primary markets before controlling considering these variables in the econometric model.

The remaining significant explanatory variable is the one that is most important to this study: primary. After controlling for the differences property characteristics and various financial measures, a statistically significant differences remains in the cap rate spreads between primary and other markets. This suggests that primary markets tend to have on average 96 basis points lower cap rate spread than CRE office properties outside of primary markets from 2010 to 2012.

Implications:

During the recovery of CRE markets it seems that investors have paid a premium for properties in primary markets after controlling for many financial and property-based differences. There are many possible sources of the higher prices in primary markets. It could be the result of investors wanting to be involved in what they perceive liquid markets. The bias could also be associated with higher competition from a larger number of real estate buyers located in primary markets. Regardless of the reason, econometric analysis suggests that buyers are willing to pay higher prices for primary markets.
In light of this bias, it could suggest that CRE investors should consider office space in non-primary markets because they tend to offer lower prices after controlling for differences in financial quality and property.

Recommendations for future research:

This area study still requires more research to see if this trend extends to other CRE assets classes. Over time, more data will became available as more CMBS are issued which could allow for the incorporation of more statistically significant explanatory variables. Also, with the acquisition of CRE data from banks and life insurance companies could further validate the results and allow the results become more generalizable. It is likely that this trends observed with CRE CMBS office data persists across asset classes and is not limited to recent years. In the future, studies with other datasets and property types could continue to validate this result. Despite the remaining uncertainty, it is possible to tentatively conclude that CRE office investors should carefully consider properties in non-primary markets in the pursuit of higher returns.

Figure 1.1: CMBS issuances

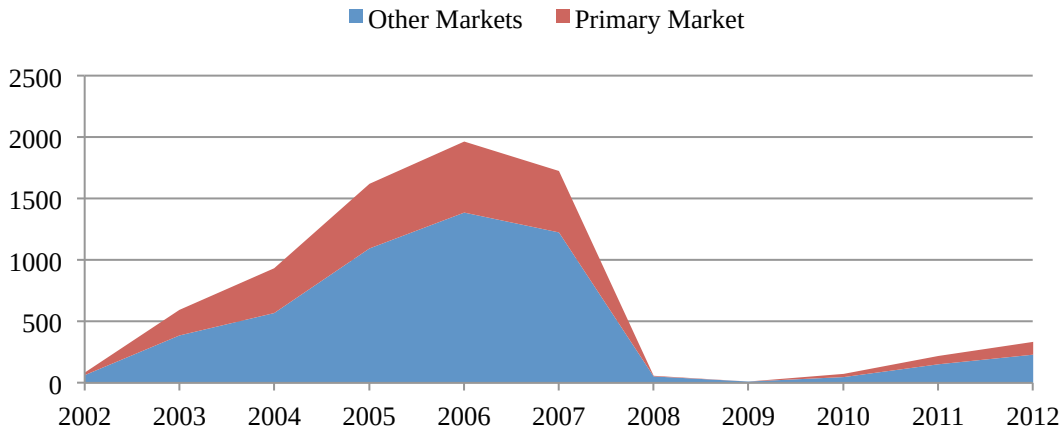

Figure 1.2: CMBS coupon rates

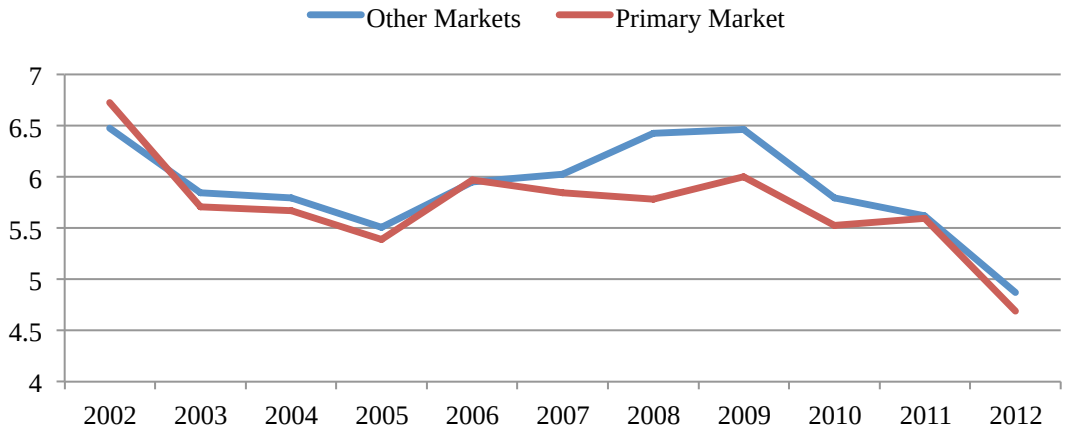

Figure 1.3: CMBS loan-to-value ratios

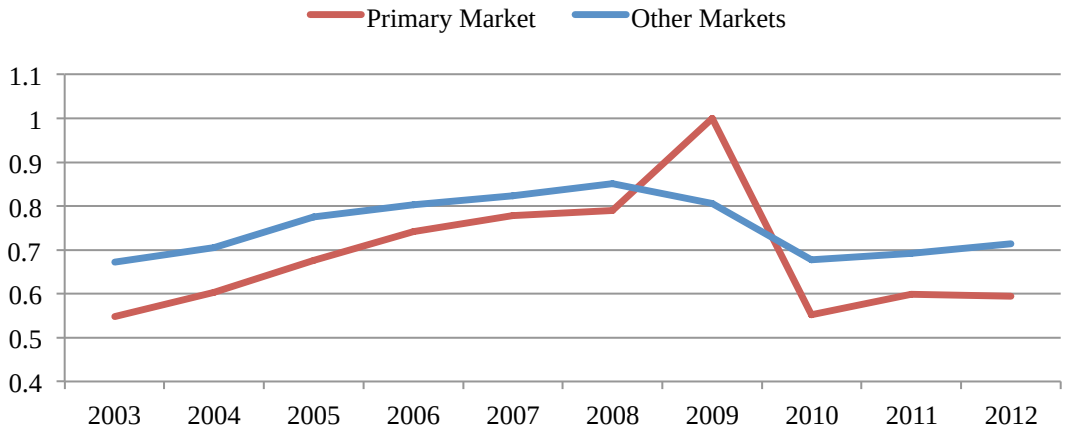

Figure 1.4: CMBS debt service coverage ratio

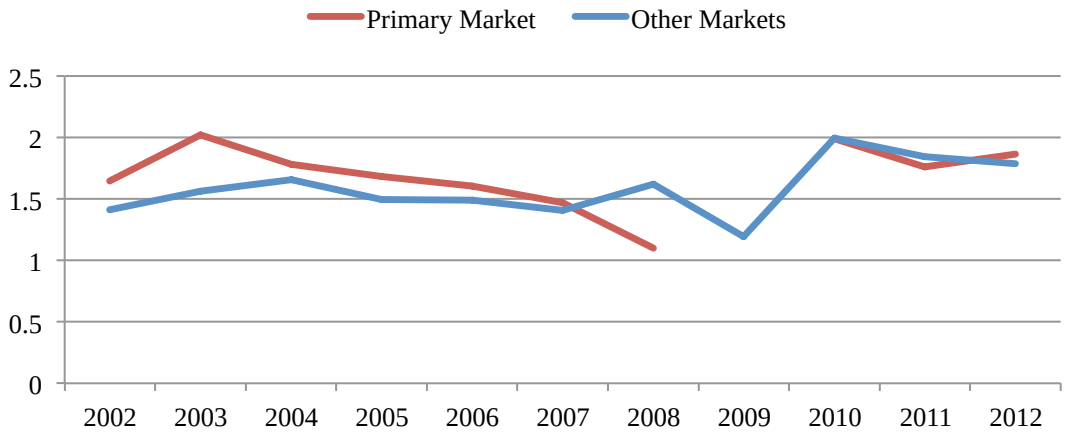

Figure 1.5: Property occupancy rate

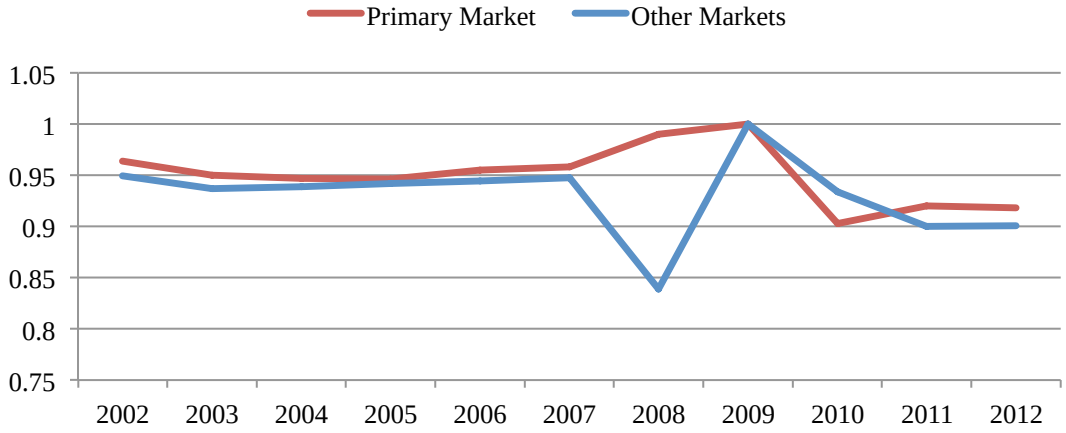

Figure 1.6: Capitalization rate

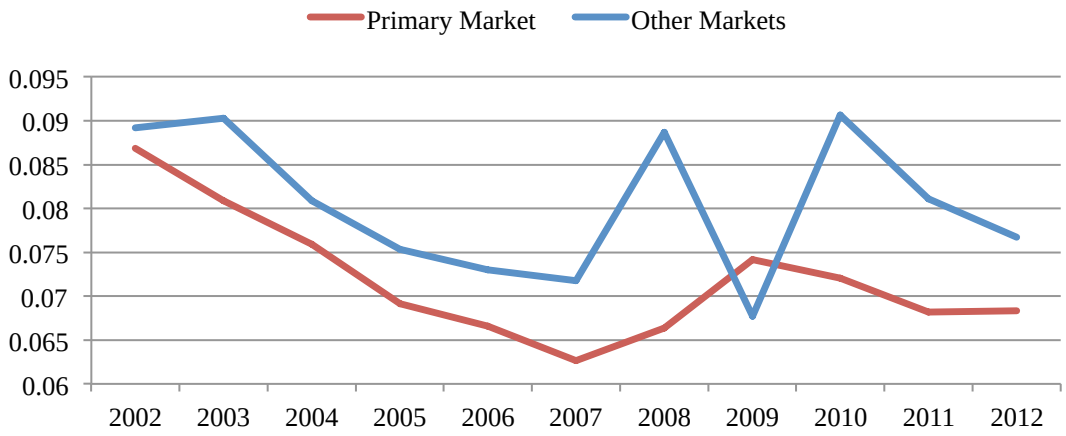

Figure 1.7: Multiple regression model *(2010 to 2012 office data for all figures in 1.7 and 1.8)*

```
. mvreg CPS = Primary DSCR CurrOcc i.valBucket

Equation          Obs  Parms        RMSE    "R-sq"          F        P
------------------------------------------------------------------------
CPS               279      7    1.101535    0.2942    18.89891   0.0000

------------------------------------------------------------------------------
         CPS |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Primary |  -.9661941   .1475024    -6.55   0.000    -1.256586   -.6758026
        DSCR |   .3863089    .121247     3.19   0.002      .147607    .6250108
     CurrOcc |  -1.621901   .8164852    -1.99   0.048    -3.229335   -.0144675
             |
  valBucket  |
          10 |  -.9924529   .8114961    -1.22   0.222    -2.590065    .6051588
          25 |  -1.263138   .7901003    -1.60   0.111    -2.818628     .292351
          26 |  -1.882344   .7885359    -2.39   0.018    -3.434753   -.3299341
             |
       _cons |   7.445517   1.126653     6.61   0.000     5.227449    9.663585
------------------------------------------------------------------------------
```

Figures 1.8: Additional information

Model excluding current occupancy

```
. mvreg CPS = Primary DSCR i.valBucket

Equation          Obs  Parms        RMSE    "R-sq"          F        P
------------------------------------------------------------------------
CPS               490      6    1.172125    0.2268    28.39841   0.0000

------------------------------------------------------------------------------
         CPS |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Primary |  -.7962653   .1123707    -7.09   0.000    -1.01706   -.5754705
        DSCR |   .3417436   .1010758     3.38   0.001      .143142    .5403451
             |
  valBucket  |
          10 |  -.7726127   .4595475    -1.68   0.093    -1.675567    .1303418
          25 |  -.9904416    .424468    -2.33   0.020    -1.824469    -.156414
          26 |  -1.684384    .422039    -3.99   0.000    -2.513639    -.855129
             |
       _cons |   6.039023   .4565636    13.23   0.000     5.141932    6.936115
------------------------------------------------------------------------------
```

Model including all considered valuables (including suburban office bond coupon, suburban office property, property age buckets, purchase or refinance, in New York market)

```
. . mvreg CPS = Primary DSCR CpnC CurrOcc SubOffice Refinance NYC i.valBucket Age50 Age25 Age10 Ag
> e5

Equation          Obs  Parms        RMSE    "R-sq"          F        P
------------------------------------------------------------------------------
CPS               279     15    1.099308    0.3178   8.782642   0.0000

------------------------------------------------------------------------------
         CPS |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Primary |  -.9303599   .1678683    -5.54   0.000    -1.260891   -.5998288
        DSCR |   .3289134   .1294173     2.54   0.012     .0740921    .5837348
        CpnC |  -.1716128   .1078238    -1.59   0.113    -.3839168    .0406912
     CurrOcc |    -1.2256   .8681183    -1.41   0.159    -2.934917    .4837164
   SubOffice |   .1165499    .155158     0.75   0.453    -.1889547    .4220546
  Refinance  |   .1983957    .151547     1.31   0.192    -.0999989    .4967902
         NYC |  -.4181069   .2598547    -1.61   0.109    -.9297583    .0935446
             |
   valBucket |
          10 |  -.9562149   .8272409    -1.16   0.249    -2.585044    .6726146
          25 |  -1.289483    .805271    -1.60   0.111    -2.875054    .2960883
          26 |  -1.829643   .8062052    -2.27   0.024    -3.417053   -.2422323
             |
       Age50 |   .4138325   .2867913     1.44   0.150    -.1508568    .9785218
       Age25 |   .3170859   .2425616     1.31   0.192    -.1605155    .7946873
       Age10 |   .0778351   .2765116     0.28   0.779    -.4666136    .6222838
        Age5 |   .1877259   .3629478     0.52   0.605    -.5269148    .9023667
       _cons |    7.65941   1.349194     5.68   0.000      5.00286    10.31596
------------------------------------------------------------------------------
```

Model 1.7 with property age buckets

```
. mvreg CPS = Primary DSCR CurrOcc i.valBucket Age50 Age25 Age10 Age5

Equation          Obs  Parms        RMSE    "R-sq"          F        P
------------------------------------------------------------------------------
CPS               279     11    1.105056    0.3002   11.49418   0.0000

------------------------------------------------------------------------------
         CPS |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Primary |   -.989972   .1541663    -6.42   0.000    -1.293503   -.6864408
        DSCR |   .3864155   .1219533     3.17   0.002     .1463071    .6265238
     CurrOcc |  -1.382801   .8509686    -1.62   0.105    -3.058235    .2926331
             |
   valBucket |
          10 |  -.9431934   .8287456    -1.14   0.256    -2.574873    .6884866
          25 |  -1.234692   .8045136    -1.53   0.126    -2.818662    .3492792
          26 |  -1.859091   .8025351    -2.32   0.021    -3.439167   -.2790161
             |
       Age50 |   .2550356   .2768757     0.92   0.358    -.2900926    .8001638
       Age25 |   .2432962   .2407039     1.01   0.313    -.2306149    .7172073
       Age10 |   .0197732   .2756866     0.07   0.943    -.5230137    .5625601
        Age5 |   .1231369   .3628679     0.34   0.735    -.5912973    .8375712
       _cons |   7.026595   1.210812     5.80   0.000      4.64268    9.410509
------------------------------------------------------------------------------
```

Model 1.7 with property age as a continuous variable

```
. . mvreg CPS = Primary DSCR CurrOcc Age i.valBucket

Equation          Obs  Parms        RMSE    "R-sq"          F        P
------------------------------------------------------------------------
CPS               278      8    1.104789    0.2930    15.98595   0.0000

------------------------------------------------------------------------------
         CPS |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     Primary |  -.9823964    .151979    -6.46   0.000    -1.281611    -.683182
        DSCR |   .3834493   .1216905     3.15   0.002     .1438664    .6230322
     CurrOcc |  -1.570922   .8232871    -1.91   0.057    -3.191801    .0499566
         Age |   .0014015   .0027845     0.50   0.615    -.0040805    .0068835
             |
  valBucket  |
          10 |  -1.006026   .8143723    -1.24   0.218    -2.609354    .5973009
          25 |  -1.280727   .7929527    -1.62   0.107    -2.841884    .2804291
          26 |  -1.899917   .7916475    -2.40   0.017    -3.458504   -.3413305
             |
       _cons |   7.377324   1.136453     6.49   0.000     5.139888     9.61476
------------------------------------------------------------------------------
```

Model 1.7 with a broader conception of primary markets including Houston and Dallas

```
. mvreg CPS = PrimaryX DSCR i.valBucket

Equation          Obs  Parms        RMSE    "R-sq"          F        P
------------------------------------------------------------------------
CPS               490      6     1.20741    0.1796    21.18796   0.0000

------------------------------------------------------------------------------
         CPS |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    PrimaryX |  -.4857913   .1101635    -4.41   0.000     -.702249   -.2693336
        DSCR |     .32822   .1041972     3.15   0.002     .1234853    .5329547
             |
  valBucket  |
          10 |  -.7626604   .4734072    -1.61   0.108    -1.692847    .1675266
          25 |  -1.113876   .4368316    -2.55   0.011    -1.972197   -.2555557
          26 |  -1.887499   .4332765    -4.36   0.000    -2.738834   -1.036164
             |
       _cons |   6.147218   .4725985    13.01   0.000      5.21862    7.075816
------------------------------------------------------------------------------
```

Model 1.7 with a broader conception of primary markets including Houston and Dallas including more variables

```
. mvreg CPS = PrimaryX DSCR CpnC CurrOcc i.valBucket
```

Equation	Obs	Parms	RMSE	"R-sq"	F	P
CPS	279	8	1.158163	0.2227	11.08965	0.0000

CPS	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
PrimaryX	-.5309242	.1425867	-3.72	0.000	-.8116426	-.2502057
DSCR	.3145385	.1341807	2.34	0.020	.0503693	.5787077
CpnC	-.0298316	.1086472	-0.27	0.784	-.2437314	.1840683
CurrOcc	-1.656255	.8641263	-1.92	0.056	-3.357509	.0449994
valBucket						
10	-1.164789	.8554123	-1.36	0.174	-2.848888	.5193091
25	-1.537823	.8343749	-1.84	0.066	-3.180504	.1048576
26	-2.366174	.8313489	-2.85	0.005	-4.002898	-.7294509
_cons	8.059705	1.368766	5.89	0.000	5.364939	10.75447

Breakdown of value buckets

```
. tab valBucket
```

valBucket	Freq.	Percent	Cum.
5	8	1.15	1.15
10	40	5.76	6.91
25	217	31.22	38.13
26	430	61.87	100.00
Total	695	100.00	

Breakdown of loan issued within primary versus secondary markets

```
. tab Primary
```

Primary	Freq.	Percent	Cum.
0	499	71.80	71.80
1	196	28.20	100.00
Total	695	100.00	

Breakdown of loans issued within primary markets

```
. tab MSAOveride if Primary == 1
```

MSA Overide	Freq.	Percent	Cum.
Boston-Cambridge-Quincy, MA-NH	3	1.53	1.53
Chicago-Naperville-Joliet, IL-IN-WI	28	14.29	15.82
Los Angeles-Long Beach-Santa Ana, CA	46	23.47	39.29
New York-Northern New Jersey-Long Islan	63	32.14	71.43
San Francisco-Oakland-Fremont, CA	22	11.22	82.65
Washington-Arlington-Alexandria, DC-VA-	34	17.35	100.00
Total	196	100.00	