

Linkages between Housing and Municipal Bond Markets

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- The housing recession has multiple flow-through effects, among them a potential for negatively impacting the financial condition of some municipalities, and therefore parts of the municipal bond market.
- We explore linkages between housing and municipal bond markets at the county level using a unique data-set.
- To control for systematic or macro effects, we use yield spreads and isolate periods of rising and declining home prices. We further control for amount of debt outstanding and credit rating to refine our analysis.
- Our principal findings are:
 - The theoretical relationship between home prices and municipal bond spreads does exist empirically, but in an asymmetric fashion. That is, when home prices are stable or rising, there is little effect on spreads. But when home prices decline, there is a negative correlation with spreads.
 - Counties with greater home price declines have experienced higher yield spreads.
 - Ratings have discriminatory ability, with counties having lower rated debt being more sensitive to declining home prices.
- Counties with larger house price declines are those with greater indebtedness. Thus, they have had to incur higher than average increase in municipal funding costs. We believe that this creates a powerful negative feedback mechanism.

Introduction

Traditional literature on municipal bonds has focused its attention on impact of tax regimes. In this paper we investigate the relationship between municipal bond yields and home prices. There are several factors that affect yields on municipal bonds. We separate these factors into macro factors that affect all municipal bonds and micro factors that affect particular issuances. For example, all municipal bonds are heavily influenced by changes in the overall fixed income marketplace, such as movements in the interest rate yield curve. Also, due to their exemption from federal taxes, the yield on tax-exempt municipal bonds will be greatly affected by both current and expected future federal tax rates. These factors are systemic variables that influence returns across the entire municipal bond universe. On the other hand, yields on particular bonds, relative to the overall municipal bond universe, are determined by the perceived financial outlook of the issuing entity. To the extent that investors feel that a municipality might have trouble meeting its obligations, its bonds will tend to have higher than average yields as investors demand compensation for the additional risk.

We believe a key variable that would affect a municipality's financial outlook is local home prices. For most counties, a major portion of revenue is derived from property taxes. Since property taxes are directly related to local property values, we expect that yields on municipal bonds, which are dependent on the financial condition of the issuing city or county, would be affected by local property prices. As rising home prices would tend to improve the financial condition of the municipality and falling home prices would tend to worsen the financial condition, we expect home price changes to have an inverse relationship with municipal bond yields.

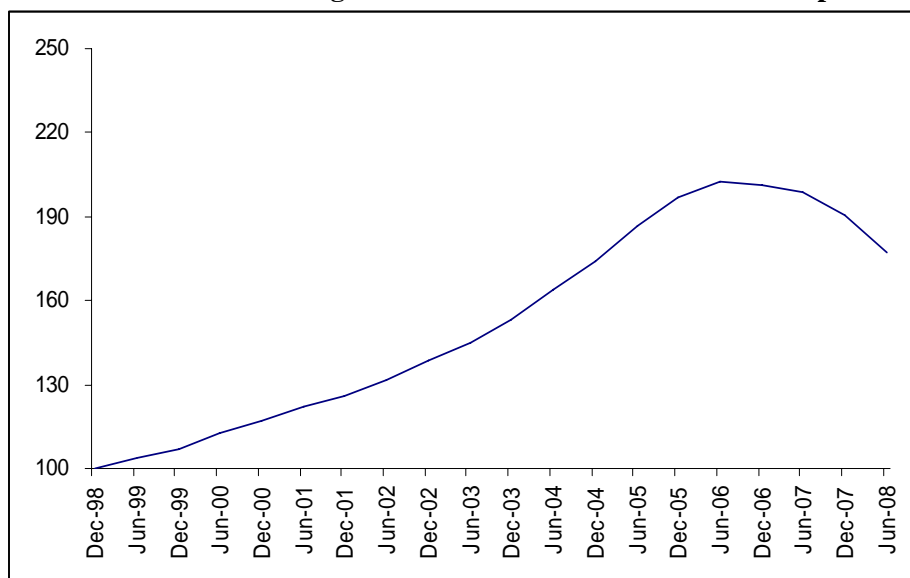
Data

House Price Data

For house price data, we use the Case-Shiller Home Price indices calculated by Fiserv, Inc. Fiserv, Inc. calculates indices based on the Case-Shiller methodology for thousands of different zip codes across the country as well as the S&P Case-Shiller Home Price indices which measure twenty metropolitan regions and two aggregate indices. The Case-Shiller indices use the repeat sales pricing technique to measure housing markets. With this methodology, only single-family properties that have been sold at least twice are included. Data are collected on transactions of all single-family residential properties for the time period in question and the level of the index is determined based on the price change between the last two sales of each home. For this paper we include only counties which have corresponding single-family home price indices are included. The county-level indices have varying amounts of history and are measured on a quarterly or semi-annual basis.

Exhibit 1 below shows an index of house prices for the counties used in our analysis. It is based on a simple weighted average of the semiannual percent change in each county's home price index. House prices increased from 1999 through the middle of 2006. Since that time house prices have decreased on average.

Exhibit 1: Average Home Price Index for Counties Sampled



Source: Standard & Poor's calculation based on Case-Shiller data from Fiserv.

Municipal Bond Data

For municipal bonds, we utilize InvestorTools Perform to analyze data from the Standard & Poor's InvestorTools Municipal Bond index, which includes bond level data and municipal yield curve data provided by Standard & Poor's Securities Evaluations, Inc. The index contains municipal bond data back to 1999. Approximately 535 counties are included in this data. Snapshots of each bond are taken on a monthly basis for amount outstanding, yield and ratings. Both insured and uninsured bonds are included. This study is unrelated to The S&P National Municipal Bond Index, an index containing a sample of the largest and most liquid municipal bonds. Ratings are from Standard & Poor's where available. If a particular county did not have a rating from Standard & Poor's on a given date Moody's ratings are used where available. Population data for each county is taken from the U.S. Census Bureau.

Our analysis includes only counties that are covered by the Case Shiller Home Price indices calculated by Fiserv, Inc. and that have outstanding municipal bonds, as per InvestorTools data, for the entire time period covered from June 1999 through June 2008. For consistency between counties we use only semiannual observations. A total of 101 counties are included in the analysis. The table below profiles the counties used in the sample by showing overall averages and averages for each quartile on the counties, their respective housing markets and their respective bond issues as of June 30, 2008.

Exhibit 2: Profile of Sampled Counties

Yield Spread (%)				
Quartile 1	Quartile 2	Quartile 3	Quartile 4	Average
0.464	0.295	0.195	0.068	0.253

Amount of Debt Outstanding (\$ Millions)				
Quartile 1	Quartile 2	Quartile 3	Quartile 4	Average
\$1,140.06	\$131.14	\$43.51	\$12.23	\$325.78

Population				
Quartile 1	Quartile 2	Quartile 3	Quartile 4	Average
2,181,318	809,968	488,596	189,106	903,222

House Price Decline Since June 2006 (%)				
Quartile 1	Quartile 2	Quartile 3	Quartile 4	Average
0.73	-6.72	-11.67	-29.68	-12.01

Source: US Census Bureau, Fiserv Case-Shiller indices, Standard & Poor's Securities Evaluations, Inc, InvestorTools. Data as of June 30, 2006.

Municipal Debt Outstanding and House Price Declines

We divide our county sample into two groups based on the amount of debt outstanding as of June 2006, the recent peak of house prices. Amount of debt outstanding for each county is based on all bonds of each county that are included in the Standard & Poor's InvestorTools Municipal Bond index. Intuitively, we expect that counties with higher levels of outstanding debt will exhibit a greater relationship between house price changes and spreads. However, correlations run for the two variables for the top and bottom halves of our sample do not support this conclusion. Nevertheless, though not reflected in yield spreads, we do find that counties with higher debt levels experienced greater house price declines than their less-indebted neighbors, as Exhibit 3 shows.

Exhibit 3: Relatively Indebted Counties Have Also Experienced the Greatest Decline in Housing Value

	Municipal Debt Outstanding	
	Top Half	Bottom Half
Avg Debt per Capita	\$ 354.81	\$ 85.59
Avg House Price Decline	-14.3%	-8.7%

Source: Standard & Poor's calculations based on previously noted data sources. Data as of June 2006.

While not necessarily a causal factor in either direction, the fact that counties with higher debt levels experienced greater average house price declines does not bode well for their future cash flows or balance sheets.

Relationship between Municipal Bond Yield Spreads and Housing Price Changes

As a main cause of changes in a bond's yield is often the change in the yield curve itself, we use yield spreads rather than actual yields to isolate unsystematic changes to market perceptions of each county's bond. This helps to isolate micro effects on the yield of a given bond from macro factors that may affect the entire municipal bond universe in a similar way. The spreads used are calculated by taking the option adjusted yield of each bond to the S&P/InvestorTools Non-callable AAA municipal bond curve. As municipalities will often have multiple issues outstanding at a given time, we calculate a composite spread for each county on each observation date. Composite spreads are calculated on a par-weighted basis. Thus the yield spread we used for a given county on a particular date is equal to the par-weighted yield of all bonds outstanding for that county outstanding at the time in question.

Municipal bond yield spreads would be expected to have a negative correlation to local house price changes, as municipalities with decreasing property values would be expected to have more difficulty meeting payments on debt, resulting in investors demanding a higher yield for their risk. Running a simple cross-sectional correlation of six-month house price changes to semi-annual yield spreads for each county over the entire sample period yields an insignificant result of 1.85%. We attribute a large portion of this to changes in the yield curve. While using yield spreads rather than actual yields mitigates the effect of yield curve changes somewhat, the yield curve and other macro factors still exhibit a strong influence over yield spreads. Yield spreads themselves vary considerably over time. An analysis of yield spread changes over time for particular municipalities will be influenced by changes in overall municipal bond yield spreads thus making it difficult to isolate the effects of micro level data such as local house price changes.

To reduce this influence we run separate correlations for each date being observed. Taking an average of the correlation for each date results in an average correlation of -4.16%, still not a meaningful result. However, correlations do begin to become negative starting at the end of 2006. This coincides with the trend in house price changes. Prior to this period house prices were on average increasing. In late 2006 this began to reverse with average house prices decreasing in each subsequent period. Exhibit 4 below shows the correlation between six-month house price changes and municipal bond spreads for the two year period ending in June 2006 where house prices were increasing and for the two year period beginning in June 2006 where house prices were decreasing.

Exhibit 4: Correlations between Home Price Change and Yield Spreads are Meaningful only in Decreasing Home Price Environments.

Increasing House Price Environment

Date	Correlation	Average House Price Change
12/31/2004	17.57%	6.24%
6/30/2005	2.64%	7.22%
12/30/2005	8.26%	5.65%
6/30/2006	7.57%	2.80%

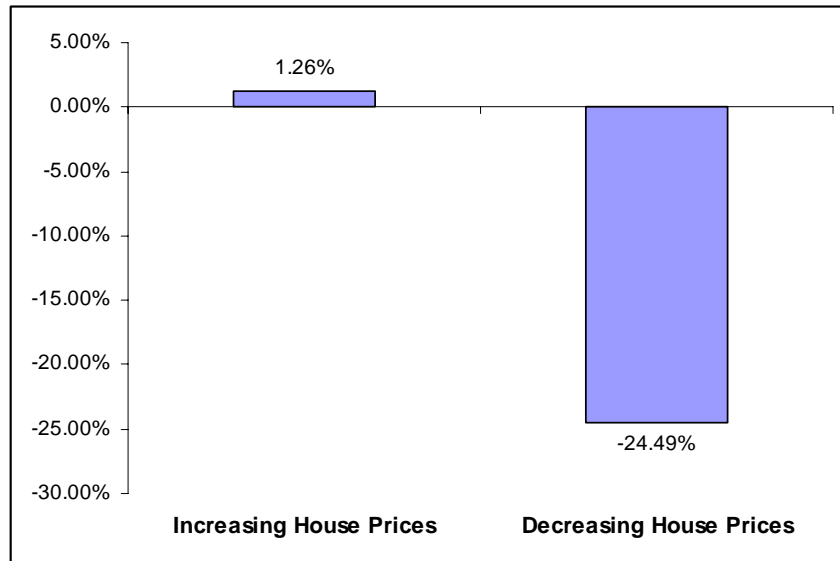
Decreasing House Price Environment

Date	Correlation	Average House Price Change
12/29/2006	0.73%	-0.57%
6/29/2007	-13.31%	-1.28%
12/31/2007	-45.52%	-4.28%
6/30/2008	-39.87%	-6.88%

Source: Standard & Poor's calculation based on Case-Shiller data of 101 counties from Fiserv and Standard & Poor's Evaluations, Inc. municipal bond data from InvestorTools.

During periods of increasing house prices correlations tend to be very small and actually positive, contrary our expectations. However, as home prices decrease correlations turn negative and become stronger. Exhibit 5 show the average correlations between home price changes and yield spreads for all periods since June 1999 where home prices are increasing and all periods where home prices are decreasing.

Exhibit 5: Correlations between Home Price Changes and Yield Spreads are Stronger during Periods of Decreasing Home Prices.



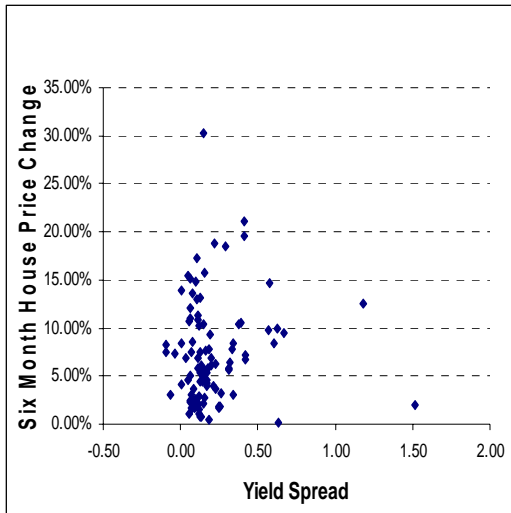
Source: Standard & Poor's calculation based on Case-Shiller data of 101 counties from Fiserv and Standard & Poor's Evaluations, Inc. municipal bond data from InvestorTools.

The average correlation during periods of increasing house prices is 1.26% while the average correlation during decreasing house prices is -24.49%. The data suggests that there may be a relationship between house price changes and municipal bond spreads but only during periods of falling house prices. We find this logical from a theoretical perspective. Most municipal bond issues are highly rated and are priced accordingly in the market, with yields implying a very strong likelihood of repayment. Therefore, positive news should not have much of an effect on yield spreads. However, negative information on a bond issuer that results in the market assuming a significantly greater chance of default than before should result in widening yield spreads.

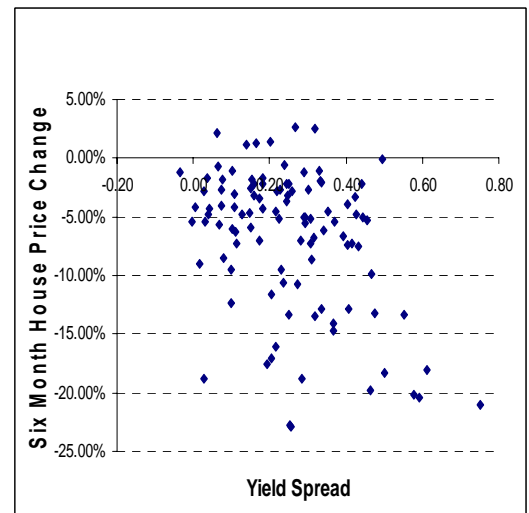
Exhibit 6 shows a scatter plot of house price change versus yield spreads for two different time periods – June 2004 and June 2008. In June 2004 there appears to be no relationship between the two factors. Most municipal bonds have slightly positive yield spreads save for a few outliers and the level of the yield spreads are unaffected by the corresponding house price change. On the other hand in June 2008 yield spreads are more varied and areas with greater decreases in house prices tend to also have higher yield spreads.

Exhibit 6: Relationship between House Price Changes and Municipal Yield Spreads

While there is no relationship when house prices are increasing...



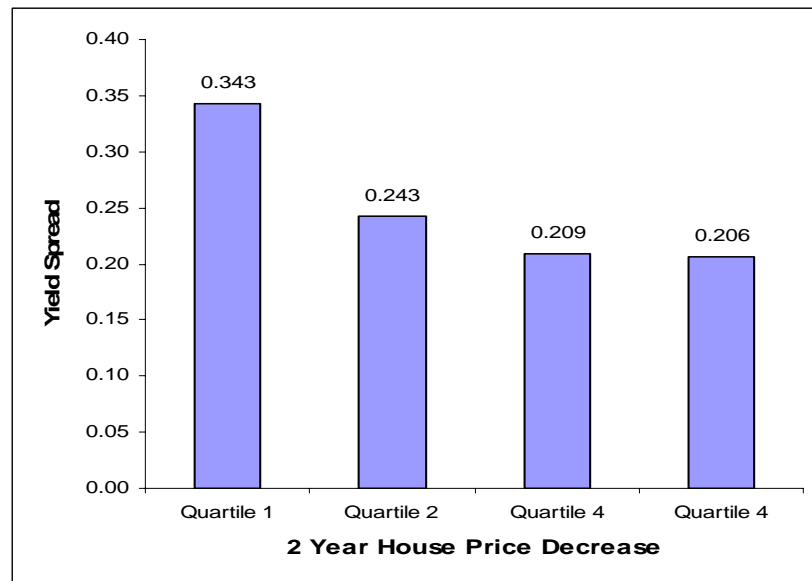
A relationship develops as home prices decrease.



Source: Case-Shiller data from Fiserv and Standard & Poor’s Evaluations, Inc. municipal bond data from InvestorTools. Chart on left as of June 30, 2004. Chart on right as of June 30, 2008.

Looking at the data over a longer period of time further provides further evidence. For example, over the two year period from June 2006, when house prices for these counties were on average at their peak, through June 2008, there was a clear relationship between the level of decrease in house prices and the resulting yield spread at the end of the period. The correlation between the two year house price changes and yield spreads for this period is -27.15%. The relationship can also be illustrated by dividing the counties into quartiles based on house price performance. As shown in Exhibit 7, with Quartile 1 representing the lowest 25% of house price performance and so on, counties with higher house price decreases also had higher bond yield spreads.

Exhibit 7: Counties with Greater House Price Declines Have Higher Yield Spreads.



Source: Standard & Poor's calculation based on Case-Shiller data from Fiserv and Standard & Poor's Evaluations, Inc. municipal bond data from InvestorTools. Yield Spreads as of June 2008. House Price changes from June 2006 through June 2008.

In addition to isolating general periods where the average house price change for the counties studied is negative, it is also possible to isolate individual observations where house price changes are negative. Taking all observations since 1999 for which a particular county had a fall in house prices over the six months results in a correlation between house price change and yield spread of -35.27%, showing that even when considering data from different periods where average spreads will be affected by changing macro factors, the level of yield spreads are determined in part by the severity of a house price decrease.

In our view, the data above all suggest an asymmetric relationship between house price changes and municipal bond spreads. Increasing house price levels have little effect on yield spread levels. However, as house prices decrease it generally leads to wider yield spreads than for counties who have not experienced weaknesses in the housing market. Also, the greater the decrease in house prices the higher the corresponding yield spreads tend to be.

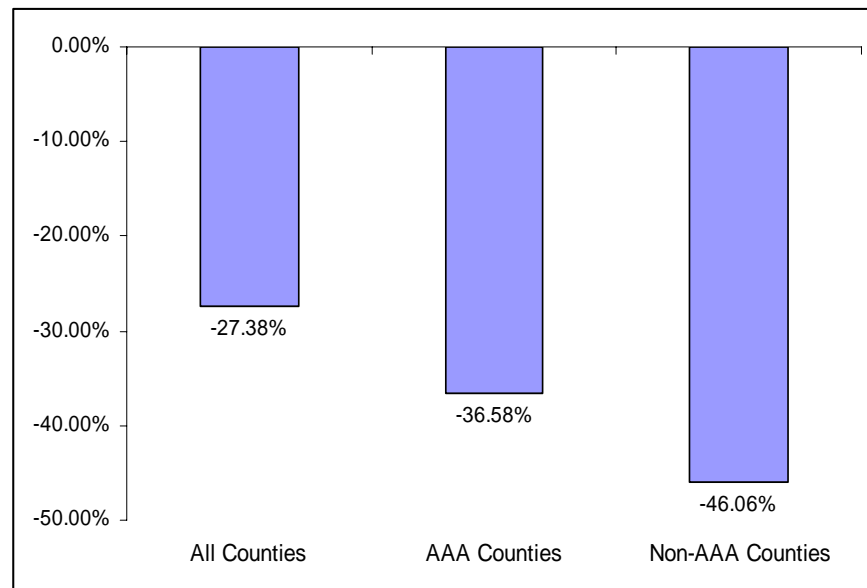
While using yield spreads and isolating observations may help mitigate the effects of systemic macro data on our results, house price changes are only one of many possible micro factors that affect yield spreads. Considering these other factors can enhance the analysis in several ways. First, by grouping counties on micro criteria, and thus holding these criteria constant, we may be able to show more significant correlations between house price changes and yield spreads than previously observed. Secondly, it is possible that counties with certain characteristics may be more sensitive to changes in house prices than other counties. In the next section, we explore various effects of two such micro variables, debt outstanding and credit ratings.

The Effect of Debt Ratings

Counties with lower debt ratings will generally have higher yields than counties with higher debt ratings. Thus we expect that grouping bonds by rating would result in higher correlations between house price changes and yield spreads since this eliminates the influence of differing ratings on observed yield spreads. Also, counties with lower debt ratings, which are generally considered by the market to have a relatively weak financial condition, should be more sensitive to deteriorating housing market conditions.

The majority of counties in this sample are AAA rated. Therefore to include a sufficient number of counties in each group it is only possible to separate the sample into two groups, AAA rated and non-AAA rated counties. Non-rated counties have been excluded for the purposes of this section. Exhibit 8 compares two-year period home price changes from June 2006 through June 2008 to yield spreads in June 2008 for AAA rated counties, non-AAA rated counties, and all of the counties in the sample as a whole.

Exhibit 8: Counties with Lower Rated Debt are More Sensitive to Declining House Prices.



Source: Standard & Poor's calculation based on Case-Shiller data from Fiserv and Standard & Poor's Evaluations, Inc. municipal bond data from InvestorTools.

Both subgroups show stronger negative correlations than when run for the entire sample. Separating the sample by ratings to eliminate the influence of ratings on yield spreads results in stronger correlations between house price changes and yield spreads. Also, counties with lower rated debt have stronger negative correlations than those with higher rated debt, exhibiting their sensitivity to worsening revenue outlooks. Since our sample includes both rated and unrated bonds we do not isolate the impact from the turmoil in the bond insurance market over the last year.

Conclusion

We have pursued several lines of inquiry exploring linkages between the housing and municipal bond markets. Our expectation is that municipal bond yield spreads have a negative correlation to house price changes, as municipalities with declining property values are expected to have increased difficulty meeting debt obligations. We found that this relationship exists, but in an asymmetric way. In times of rising housing markets little evidence of the relationship is present, but in times of declining housing markets relatively strong negative correlations between house prices and yield spreads are present that generally grow with the severity of the housing decline. This dynamic appears to characterize periods of both general housing declines as well as less systematic, isolated episodes involving limited numbers of counties.

Beyond utilizing yield spreads and isolated periods to focus on potential linkages, we also explored controlling for municipal debt outstanding and credit rating. We found that the former factor does not demonstrate discrimination power in terms of the correlation of spreads to house prices, even in declining housing markets. But there is evidence that more heavily indebted counties have experienced greater housing value declines, which may not bode well for future municipal finances in these locales. Credit ratings do, however, demonstrate discriminatory power with lower-rated counties exhibiting more negative correlations between spreads and house price declines than higher-rated peers.

Overall, the linkages between housing and municipal bond markets constitute a dynamic process with several potential feedback loops. For example, as housing contributes to the state of municipal finance, so also does municipal finance contribute to the desirability, and therefore demand, for a given county's housing stock. These linkages remain largely unexplored, and we hope that our paper will serve to provoke further research on the topic.

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