# *Exclusionary Zoning and Fiscal Health: An Analysis of Municipal Bonds*

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## *Abstract:*

This thesis explores the intersection between finance and public policy in municipalities. The factor of interest is restrictive zoning and considering whether communities with more restrictive zoning practices will lead to worsened municipal bond market outcomes. The negative consequences and history of exclusionary zoning are provided, as well as a brief overview of the municipal bond market and outcome variables. The analysis is then conducted on county-level data that has average community-level restrictiveness via the Wharton Residential Land Use Regulatory Index (WRLURI) as well as demographic controls as independent variables, and bond market outcomes as dependent variables. The analysis found that in models with fewer inputs, the WRLURI has a significant negative relationship on municipal bond yield and credit enhancement, but as additional factors were added this significance faded. For bond ratings, the analysis found no significance. This provides some descriptive evidence that exclusionary zoning could contribute to lower levels of risk in municipal finance but is inconclusive and the relationships weaken with added controls.

## *Keywords:*

exclusionary zoning, restrictive zoning, municipal bonds, city financing, WRLURI, credit enhancement, bond ratings

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## Introduction

Amidst the rising cost of living and housing shortages in major urban cities and beyond, exclusionary zoning practices have arisen as a subject of interest across many interdisciplinary spaces. Zoning is inextricably tied to development within localities throughout the country and given the importance of economic and other factors in municipal financing for a locality, it is possible that municipal zoning decisions could have significant impacts on local fiscal health. Whether from a lens of social justice, economic development, or urban politics, zoning in the United States has had widespread impacts on the makeup of every part of the country, both inside and outside of urban spaces (Schuetz 2022).

Consequences of the NIMBY (not-in-my-backyard) and YIMBY(yes-in-my-backyard) movements have been at the forefront of these issues, highlighted by cases in diverse parts of the country like Berkeley, California, and Bozeman, Montana (Asmelash 2022) (Egge 2022). As further detailed in the literature review, research connecting municipal financing to this instrumental issue is underdeveloped, and this thesis aims to fill that gap by addressing the potential connection between exclusionary zoning practices and municipal fiscal health, specifically using the municipal bond market.

### *Contribution*

Broader research on zoning as a causal mechanism for aspects of municipal health is underdeveloped. Municipal bonds are also described as an opaque area of research (Medda & Cocconcelli 2018), so contribution in both spaces fulfills a knowledge gap at the intersection of

policy and public finance. While experimental settings in this space may be difficult to find, multiple regression analysis could help paint a picture of the important factors at play.

This research question of the effects of exclusionary zoning on local fiscal health is a crucial question that is relevant across multiple spaces. As urbanization continues across American cities (Schaeffer 2022), the question of how to build a healthy, sustainable city for the future remains at the top of localities' minds, and financing is a key aspect of this.

Firstly, this research will be important for municipal policymakers. Given the significant influence these bodies have on approval of new development and/or setting and changing zoning standards within a municipality, these groups have significant sway in how cities are structured. With evidence supporting that certain zoning policies may contribute to certain outcomes, planners could work to incorporate these policies into their cities to improve their financial health and long-term prospects.

Secondly, this research is crucial for those involved in the municipal bond market, including municipal investors. Having a better understanding of the factors that are “priced in” to municipal bonds is useful in providing more information to the marketplace and may be relevant to factors of yield, so if certain zoning policies are found to have an impact on bonds, then prospective bondholders must have an understanding of the relevant factor. Additionally, rating agencies may find this interesting or useful to add or consolidate factors when considering how to rate these types of securities. Lastly, underwriters, agencies, and other financial institutions may be able to use this information to refine their understanding of the debt capacity for a particular locality, which also influences the administrative figures within a city.

Lastly, this broadly impacts those who have a stake in the well-being of cities, including residents, public employees, and local firms. A better understanding of the factors that contribute to the long-term health of a city would improve the information that communities can use to "vote with their feet" and prioritize cities that enact policies that promote sustainability, particularly amongst communities that may rely more heavily on public infrastructure within a city. Additionally, for those who directly rely on a city's health for living, such as public-sector employees and those relying on public transit, this type of information would ideally help them evaluate the costs and benefits of living in certain municipalities more effectively.

Overall, city financing is a topic with widespread relevance, and a deeper understanding of how particular factors including zoning may impact fiscal health would have wide-ranging implications. Relevant groups include city policymakers, municipal market actors, and those connected to the fiscal health of cities, and this thesis hopes to help produce relevant information that could help to craft policy suggestions to improve the information available to and policy choices amongst these groups.

## Literature Review

### *Background on Exclusionary Zoning*

Exclusionary zoning is a topic present in a wide variety of research, and analysis of the subject has inspired the hypothesis and method of analysis of this research. This section will discuss the relevant current literature for the setting of analysis and explain the definition and implication of exclusionary zoning to increase the accessibility of the subject matter and discuss where the literature stands today.

To begin, exclusionary zoning will be defined. Restrictive zoning is "a residential zoning plan whose requirements (as minimum lot size and house size) have the effect of excluding low-income residents" according to Merriam-Webster. For my analysis, the words exclusionary and restrictive may be used interchangeably. Though the connotations of the two words may be different, the consequences of additional burdens, regardless of intention, yield exclusive results. Thus, I decide to use the words interchangeably. Specific policies that contribute to exclusionary zoning include lengthy review/approval processes, parking requirements, limitations on types of structures that can be built, requiring properties to be detached, and more (Schuetz 2022). These restrictions can be appealed, but these processes can also be long and costly, and overall contribute to the dearth of development that exacerbates housing supply issues.

Notably, this practice of additional burdens on development has a variety of negative consequences and externalities. For instance, exclusionary zoning has a significant impact on housing prices (Schaeffer 2022). Harney notes the presence of this issue going back decades, and this relationship has been well understood by economists. By limiting the ability to build and develop housing, supply is significantly inhibited in communities with exclusionary practices,

with this distortion causing a significant effect on the affordable housing market. This effect is not just isolated to affordable housing, however, as housing and rent prices across most U.S. markets have significantly increased in recent years, vastly outpacing inflation and further reducing the share of affordable housing (Schaeffer 2022). These cost-of-living increases are assuredly multifaceted, but supply restrictions are a significant driver.

Exclusionary zoning relatedly contributes to lower density and limited agglomeration (Gyourko 1991). In urban areas, which have seen growing demand as urbanization has increased throughout the country, these restrictions have limited the economic activity of these areas, reducing GDP growth and preventing optimal productivity, limiting prospects such as employment and mobility (Gottlieb 2018). Not only does exclusionary zoning stifle economic growth, but it can worsen the effects of climate change as well. Restrictive features push people away from denser environments, contributing to sprawl and limiting the ability to address emissions which have greater consequences for vulnerable populations (Pendell 2021).

Exclusionary zoning also introduces further regulatory barriers for municipal stakeholders and can contribute to broader racial exclusion. This prejudiced history cannot be understated and is deeply and inextricably tied to modern zoning practices in the United States (Goetz 2021). Following the end of de jure racial segregation in housing, racist policymakers continued to use indirect methods to harm minorities. Examples include industrializing areas populated by minorities and preventing minority inflow into more affluent and whiter neighborhoods (White House 2021). Thus, minorities bore the brunt of the negative externalities, including labor opportunities and environmental outcomes.

Based on this literature documenting the variety of negative effects caused by exclusionary policies, the connection between zoning and municipal fiscal outcomes intuitively

suggests negative repercussions on municipalities with restrictive zoning policies. Despite this, other key elements benefit entrenched members of the communities. For example, exclusionary practices can stratify the tax base, as well as decrease congestion and use of services (Reeves & Halikias 2016) (Dunphy & Fisher 1996).

***Background on Municipal Bonds***

Next, I will discuss municipal bonds as well as their use for cities, and the characteristics I plan to analyze. Municipal bonds are financing tools used by local governments to raise capital for a variety of expenditures, growing from inception in the 19th century in the United States (Medda & Cocconcelli 2018). These expenditures can range from the development of new infrastructure to other day-to-day operations. There are two major types of bonds: "general obligation (GO) bonds are backed by the capacity of the local authority to levy and raise taxes, whereas revenue bonds are issued for a specific project through which revenues are generated by the fees and charges that the project can produce" (Medda & Cocconcelli 2018). Municipal issuances are crucial for projects ranging from schools to utilities to transit, and particularly for localities that provide many public services, are of significant relevance.

For this analysis, the municipal bond factors I want to further explore include bond rating, credit enhancement, and bond yield. Bond ratings are evaluations of the overall credit risk of a bond given the characteristics of an issuer, incorporating a wide variety of factors such as economic and repayment history to evaluate the likelihood of repayment. Credit enhancement is a set of strategies that can be undertaken to improve a bond's risk profile, such as insurance

(Abakah 2020). Lastly, bond yield represents the return of a bond over time, with higher risk generating higher yields.

### *Other Literature*

Several other pieces of literature have been of relevance in exploring this relationship. While I have not found research tying zoning and bonds, as mentioned, there have been other interesting studies examining the impact of other factors on municipal bonds. Two of particular interest include an analysis of corruption as well as religiosity on municipal finance.

A paper by Butler, Fauver, and Mortal found that cities with higher levels of corruption had worse bond ratings, and by controlling for other factors was able to establish a causal relationship showing that corruption was "priced in" to bond ratings (Butler, Fauver, & Mortal 2009). A study by Abakah found a similar relationship between religious beliefs and bond market outcomes. The research found that counties with higher Catholic-to-Protestant ratios have a less risky profile on the bond metrics I am interested in, suggesting a cultural element that is also priced into bonds. These papers serve as an interesting background on the subject, and as important guidance for my methodology. In particular, the Abakah (2020) paper engages in a multiple regression analysis with religious factors being the factor of interest. In my approach, I focus on the zoning index as the factor of interest, but engage in much of the same statistical analysis, and consider similar controls as those used in the past study.

## Hypothesis Development

The goal of this research is to better understand the relationship, if any, between the aforementioned factors of zoning and fiscal health. The operationalization of these variables will be discussed further in the methodology section, but the hypothesis will use these concepts to explore if restrictive zoning has an impact on the fiscal health of a municipality. This alternative hypothesis will thus be presented as follows: **$H_1$:** Municipal bond issuances from counties with more restrictive zoning policies will have significantly different bond outcomes

The evidence leans towards a negative relationship between exclusionary zoning and bond outcome, as research generally illustrates positive effects of denser environments restricted by zoning regulations, but this relationship is not a certainty. However, the negative consequences of exclusionary zoning are thoroughly documented (Schuetz 2022), and thus these outcomes may contribute to worsened bond market outcomes. Conversely, research indicates few positives for this practice outside of consideration for local community input and preventing perceived encroachment (Schuetz 2022). As mentioned, potential explanations for a positive effect could fall under the broader goals of exclusionary zoning, as communities with higher WRLURI values may find themselves dependent on a smaller and wealthier tax base, (Reeves & Halikias 2016) and with a smaller tax base also have fewer service needs and congestion for services used (Dunphy & Fisher 1996). Moreover, denser communities may have greater, less wealthy community members who make greater use of a greater number of services, with higher levels of congestion (Dunphy & Fisher 1996). Historically, restrictive patterns have shown that restrictive zoning is used to curb population growth or as a "growth management" strategy (Kang & Feoick 2006), but there is little research aiming to show zoning as causal to population growth. Future research exploring the zoning/growth dynamic would be welcome in the space.

## Methodology

### *Data*

My methodology will focus on using archival data to explore the two major conceptual measures discussed: Municipal bond data and measurements of zoning. Additionally, demographic data will be used for controls.

The source of the municipal data is the SDC Platinum Global Public Finance database. The specific variables of interest for each municipal bond to be analyzed are the municipal bond ratings, yield, and credit enhancement terms. These three variables are well-documented and often-utilized bond variables that serve to directly operationalize risk (Abakah 2020), and worse values on these metrics in the municipal bond market are indicative of worse municipal health. Yield is presented without modification, showing returns to investors on a percent basis for holding the municipal bond. Credit enhancement is transformed into a binary 0/1 variable, with 1 indicating the presence of credit enhancement for a particular bond and 0 indicating no credit enhancement. Bond ratings are analyzed using NAIC ratings equivalent of Moody's ratings on a 1-6 scale, with a lower value indicating a stronger rating. Bond ratings in particular capture the many factors going into "health" and present them in a digestible manner and yields also represent the market pricing of risk in an easily translatable manner. These measures are frequently used in similar analyses of municipal finance such as Butler, Fauver, & Mortal (2009), so I am confident in these measures as effective operationalizations with high internal validity.

On the zoning element, the data comes from the Wharton Residential Land Use Regulation Index (WRLURI), an index that compiles data and produces a value to indicate the regulatory barriers that exist to land development. This dataset is available via STATA files on the Wharton website. Several of the subindexes used in crafting the data include the presence of

local and state regulators, supply restrictions, approval delays, and more. This data is a near-perfect operationalization of restrictive zoning, as it includes relevant factors such as regulatory barriers, delays, and the extent of local and state-level involvement. Additionally, the WRLURI is another measurement that appears throughout other literature examining exclusionary zoning such as Lens & Monkkonen (2016), again granting further confidence in this operationalizing and its contribution to internal validity. The WRLURI index has an average value of 0 across communities, with positive and negative values of 1 and -1 being a standard deviation away from the average and so on. As the index solely focuses on zoning-related processes and does not include broader demographic data, the double-counting of independent variables should not be an issue.

Lastly, all demographic control data is found in the MIT Elections lab. This information includes political and demographic variables for every county in the United States, with relevant and timely data that provide robust controls. The controls by county are as follows: % of County population that voted for Donald Trump in the 2016 Presidential Election (Trump %), % nonwhite according to U.S. Census Data (Nonwhite %), and % unemployment according to U.S. Census Data (Unemployment %). This data source comes from the MIT Elections Lab. Both the nonwhite and unemployment components come from ACS 5-year data from 2012-2016, while the voting data comes from 2016.

As will be discussed in the sampling section, our unit of observation will be the county level. This was done to ensure effective matching between data sources, as well as the limited feasibility of community-level analysis given the granularity of the WRLURI index and lack of similarly detailed data elsewhere. All of the aforementioned controls are inspired by or utilized

in prior research exploring the municipal bond market to capture broader county features, (Abakah 2020) but there may be omitted variables that would be relevant to this analysis.

***Sample***

This section will discuss relevant filters and additional information describing how the final sample was reached. Matching procedures were conducted in RStudio. For the Wharton Residential Land Use Regulatory Index, the data was acquired directly from the refreshed source of values in 2018 (Gyourko, Hartley & Krimmel 2021). Given the lack of granularity of available bond data to be matched at the community level, the WRLURI data had to be transformed. WRLURI data is presented at the community level, but the county and state of each community are attached. Thus, analysis can be conducted by aggregating all communities with WRLURI values by county and state and then averaging these values, similar to how Gyourko averages said values by Metropolitan Statistical Area (Gyourko, Hartley & Krimmel 2021). This data excludes communities lacking WRLURI values, as well as County/State labeling, and those straddling multiple counties. When matched to all counties in the United States, after counties without WRLURI values are excluded, there are 1,011 matched counties with WRLURI data. These counties presumably are representative of the broader country, and we are unfortunately limited by community responses to the solicited WRLURI surveys to generate this data. Limitations will be further discussed.

The MIT Election Lab data was not transformed and matched directly to all counties. While this data is not perfectly aligned with the 2018 WRLURI refresh, the time frame is still highly salient, and more recent elections data still makes use of the 2012-2016 demographic data. All of these controls which are available for all counties were then matched with the WRLURI

data to reach a sample of 1,011 counties with controls and an averaged WRLURI index value to serve as the independent variables for analysis.

The analyzed sample of Municipal Bonds comes from the SDC Platinum database. The sample begins with all municipal bond issuances in the year 2018. This timeframe was chosen to align with the updated WRLURI values which were refreshed in 2018. There were many issues with this data that required significant cleaning and filtering to arrive at the final sample. To begin, all state/federally issued or state/federal authority bonds were excluded from the data given the focus on local issuances. Additionally, bonds with no geographic information to tie to county/state were excluded. All included issuances are given a 'stateid' value representing their state of issuance to create a dummy variable for each state to be included in the analysis. Bonds that lacked Coupon rates and/or Yield of Maturity (YOM) were also excluded. Lastly, bonds that provided multiple values for Coupon/YOM that were not differentiated were excluded. Once all filters are applied, this yields a sample of 5,770 bonds with all information present from a starting value of 10,157. Again, this sample is presumed to be representative of all local municipal issuance in 2018.

Lastly, the bond data and county-level control data must still be merged. As not all counties with WRLURI data will have bond issuances, and not all bonds will be able to be matched with available counties, the sample is further limited to counties with both a WRLURI value as well as bond issuances that meet the filters. This yields 3,961 county-matched bonds which form the basis of our analysis, with our unit of observation at the county level. This sample is used for the analysis of Credit Enhancement and YOM. For Bond Ratings, given the smaller number of available bonds with ratings, the sample was expanded to include 2017-2019 data, with the same filters being applied, yielding 174 matched bond observations.

## Analysis

The analysis is conducted via multiple linear regression models. This was executed using the software STATA. The models for the three analyses are below.

| Analysis #1: | | |
|---|---|---|
| Model #1: | Model #2: | Model #3: |
| Yield of Maturity = $\beta_0$ + $\beta_1$*(WRLURI Average) | Yield of Maturity = $\beta_0$ + $\beta_1$*(WRLURI Average) + State Fixed Effect Dummies | Yield of Maturity = $\beta_0$ + $\beta_1$*(WRLURI Average) + $\beta_2$*(Trump %) + $\beta_3$*(Nonwhite %) + $\beta_4$*(Unemployment %) + State Fixed Effect Dummies |
| Sample: All matched county/bond pairings with single yield/coupon values present from 2018 | | |

| Analysis #2: | | |
|---|---|---|
| Model #1: | Model #2: | Model #3: |
| Credit Enhancement Present = $\beta_0$ + $\beta_1$*(WRLURI Average) | Credit Enhancement Present = $\beta_0$ + $\beta_1$*(WRLURI Average) + State Fixed Effect Dummies | Credit Enhancement Present = $\beta_0$ + $\beta_1$*(WRLURI Average) + $\beta_2$*(Trump %) + $\beta_3$*(Nonwhite %) + $\beta_4$*(Unemployment %) + State Fixed Effect Dummies |
| Sample: All matched county/bond pairings with single yield/coupon values present from 2018 | | |

| Analysis #3: | | |
|---|---|---|
| Model #1: | Model #2: | Model #3: |
| Bond Rating = $\beta_0$ + $\beta_1$*(WRLURI Average) | Bond Rating = $\beta_0$ + $\beta_1$*(WRLURI Average) + State Fixed Effect Dummies | Bond Rating = $\beta_0$ + $\beta_1$*(WRLURI Average) + $\beta_2$*(Trump %) + $\beta_3$*(Nonwhite %) + $\beta_4$*(Unemployment %) + State Fixed Effect Dummies |
| Sample: All matched county/bond pairings with a credit rating present from 2017-2019 | | |

These factors are crucial for this analysis, as the WRLURI variable is our variable of interest, and the control variables serve as salient demographic factors to increase the strength of the relationships examined. Within STATA, the control variables can be assessed for multicollinearity. Trump % serves as a proxy for political orientation, Nonwhite % as a proxy for demographic diversity, and Unemployment % as a proxy for the economic health of the counties present in the analysis. The State Fixed Effect Dummies represent the effects of the state of issuance and are used to further distinguish if the state is a relevant factor.

Outside of these three models, an output of the summary statistics of the sample and VIF (variance inflation factor) of the control variables will be shown. The summary statistics will show data for the outcome and control variables, and the VIF calculation will serve as a check on multicollinearity issues.

### *Additional Considerations*

Unfortunately, based on the data source and sampling strategy, our understanding of the relationship between zoning and municipal bond market outcomes can only be considered at the county level, limiting the impact of this research on municipal level decision-making. Instead, this analysis can be considered to be an aggregate understanding of how groups of communities impact said outcomes. There are also limitations purely based upon sample size, as not every county has a WRLURI value present, and some counties may not have had an issuance to be matched. An analysis with a larger scope may address this issue. The sample size is of note for the bond rating analysis, as this sample size is much smaller and subsequently holds less power.

Since the analysis would theoretically weight county data with more municipal issuances higher, this may also cause concern. However, more frequent issuances may be reflective of greater needs or use of services, and thus would be intuitive to have a greater impact than a county with few to no issuances. Lastly, the possibility of endogenous or omitted factors cannot be ruled out. While these controls are substantive, they cannot fully describe differences between counties. Variables of interest for future analysis may include education levels, public service expenditures, governance factors, and more.

## Results

### *Summary Statistics*

Table 1: Summary Statistics for Yield and Credit Enhancement Sample

| Variable | Obs | Mean | Std. dev. | Min | Max |
|---|---|---|---|---|---|
| Trump % | 3,961 | 0.206 | 0.068 | 0.047 | 0.427 |
| Nonwhite % | 3,961 | 0.308 | 0.179 | 0.029 | 0.931 |
| Unemployment % | 3,961 | 0.068 | 0.019 | 0.012 | 0.211 |
| WRLURI Average | 3,961 | 0.234 | 0.815 | -2.637 | 4.862 |
| Coupon | 3,961 | 3.458 | 1.507 | 0.100 | 65.000 |
| CE Present | 3,961 | 0.156 | 0.363 | 0.000 | 1.000 |
| Yield of Maturity | 3,961 | 29.740 | 44.565 | 0.900 | 119.283 |
| Years to Maturity | 3,961 | 10.165 | 8.882 | 0.019 | 42.978 |

Table 2: Summary Statistics for Bond Rating Sample

| Variable | Obs | Mean | Std. dev. | Min | Max |
|---|---|---|---|---|---|
| Trump % | 174 | 0.176 | 0.059 | 0.059 | 0.319 |
| Nonwhite % | 174 | 0.457 | 0.221 | 0.039 | 0.931 |
| Unemployment % | 174 | 0.069 | 0.016 | 0.024 | 0.130 |
| WRLURI Average | 174 | 0.074 | 0.733 | -1.402 | 2.821 |
| Yield of Maturity | 174 | 12.975 | 31.753 | 0.800 | 107.526 |
| NAIC Rating | 174 | 1.023 | 0.185 | 1.000 | 3.000 |

***Test for Multicollinearity***

Table 3: VIF Statistics for Both Samples

| Yield and CE Sample | | | Bond Rating Sample | | |
|---|---|---|---|---|---|
| **Variable** | **VIF** | **1/VIF** | **Variable** | **VIF** | **1/VIF** |
| Trump % | 2.26 | 0.442246 | Trump % | 2.99 | 0.33445 |
| Nonwhite % | 2.47 | 0.404968 | Nonwhite % | 2.81 | 0.356289 |
| Unemployment % | 1.3 | 0.76991 | Unemployment % | 1.25 | 0.802169 |
| WRLURI Average | 1.08 | 0.922058 | WRLURI Average | 1.09 | 0.917452 |
| Mean VIF | 1.78 | | Mean VIF | 2.03 | |

Given that the VIF of all of the independent variables falls well below 5, a standard for presuming problematic levels of multicollinearity (Vatcheva, Lee, McCormick, and Rahbar 2016), the use of all variables can continue without concern in both samples. This issue would occur if the control variables and WRLURI variables were heavily correlated with each other, limiting our ability to make causal inferences in the analysis.

***Yield of Maturity***

Table 4: Effects of Zoning Regulations on Bond Yield

| Variables | Model 1: WRLURI | Model 2: WRLURI and State Level Fixed Effects | Model 3: WRLURI, State Level Fixed Effects, and Controls |
|---|---|---|---|
| WRLURI | -2.693*** | 0.972 | 1.298 |
| | (-0.868) | (-0.848) | (-0.914) |
| Trump % | | | -13.51 |
| | | | (-17.9) |
| Nonwhite % | | | 3.633 |
| | | | (-8.552) |
| Unemployment % | | | 130.9*** |
| | | | (-44.98) |
| Constant | 30.37*** | 37.65*** | 28.91** |
| | (-0.736) | (-9.078) | (-12.09) |
| | | | |
| Observations | 3961 | 3961 | 3961 |
| R-squared | 0.002 | 0.303 | 0.307 |

*** p<0.01, ** p<0.05, * p<0.1, rows alternate between coefficient and (SD)

***Credit Enhancement Present***

Table 5: Effects of Zoning Regulations on Credit Enhancement

| Variables | Model 1: WRLURI | Model 2: WRLURI and State Level Fixed Effects | Model 3: WRLURI, State Level Fixed Effects, and Controls |
|---|---|---|---|
| WRLURI | -0.0326*** | -0.0238*** | -0.00695 |
| | (-0.00705) | (-0.00748) | (-0.00804) |
| Trump % | | | 0.273* |
| | | | (-0.157) |
| Nonwhite % | | | -0.0734 |
| | | | (-0.0752) |
| Unemployment % | | | 2.657*** |
| | | | (-0.396) |
| Constant | 0.163*** | 0.403*** | 0.132 |
| | (-0.00598) | (-0.0801) | (-0.106) |
| | | | |
| Observations | 3961 | 3961 | 3961 |
| R-squared | 0.005 | 0.18 | 0.19 |

*** p<0.01, ** p<0.05, * p<0.1

***Bond Ratings***

Table 6: Effects of Zoning Regulations on Bond Ratings

| Variables | Model 1: WRLURI | Model 2: WRLURI and State Level Fixed Effects | Model 3: WRLURI, State Level Fixed Effects, and Controls |
|---|---|---|---|
| WRLURI | 0.0121 | 0.0236 | 0.00568 |
| | (-0.0192) | (-0.0277) | (-0.0323) |
| Trump % | | | 0.0937 |
| | | | (-0.559) |
| Nonwhite % | | | 0.198 |
| | | | (-0.218) |
| Unemployment % | | | -1.364 |
| | | | (-1.64) |
| Constant | 1.022*** | 0.979*** | 0.980*** |
| | (-0.0141) | (-0.0689) | (-0.232) |
| | | | |
| Observations | 174 | 174 | 174 |
| R-squared | 0.002 | 0.039 | 0.049 |

*** p<0.01, ** p<0.05, * p<0.1

## Discussion of Findings

For both the analysis of Credit Enhancement and Yield, Model #1 regressions illustrate that the WRLURI is significant, but has a negative coefficient, providing cursory descriptive evidence that suggests that higher levels of zoning restrictions contribute to lower levels of risk as presented in the municipal bond market. However, when moving to Models #2 and #3, the significance of the WRLURI fades or disappears completely. Given the impact of fixed effects on the significance of the WRLURI, it is likely that county level differences in bond outcomes could be correlated with state level differences, considering broader macroeconomic trends for instance. The control variables also have varied significance, with unemployment notably being highly significant for Credit Enhancement and Yield in Model #3, aligning with the importance of economic factors in bond outcomes.

Amongst the three analyses, the bond rating analysis stands out. No factors showed significance in this rating, and the sample size was over an order of magnitude smaller than the analysis conducted on all filtered bonds. Municipal bonds are simply rated less frequently, often due to smaller issuances paired with complicated processes leading costs to outweigh potential benefits. While no conclusions can be drawn from this regression, it encourages further analysis with a more robust sample, as well as steps to ensure systemic bias from the challenges in rating bonds do not impact the results.

## Conclusion

This thesis explored the relationship between restrictive zoning and municipal fiscal health. The background of these subjects was explored, particularly the negative consequences of restrictive zoning practices, as well as where the literature currently stands today. Given the lack of research on the relationship between these subjects despite theoretical connectedness, this research aimed to fill the gap by conducting a multiple regression analysis.

Through a rigorous filtering process, data at the county level was derived to conduct said analysis. Baseline multiple regression models revealed a significant relationship between WRLURI values for a county and subsequent municipal bond outcomes for said county, with greater restrictions contributing to less risk, but as further complexity and control factors were added this relationship became insignificant. This evidence weakly suggests that more restrictive zoning policies at the aggregate county-level could translate to lower levels of risk in measures of the municipal bond market when measuring the presence of credit enhancement and yield, prevailing over other negative consequences, but is inconclusive. However, results were ambiguous in the bond rating regression, with no factors showing significance.

### *Future Insights*

Several limitations and points for consideration have been mentioned. Future research on this subject with greater data granularity and a broader sample would be welcome additions to the space and ideally, contribute novel findings.

Exploration of the directional outcomes would be interesting as well. The notion that restrictive zoning creates less risk is an interesting question and evaluating the factors that would lead to this may also reveal interesting insights.

Lastly, general research is needed on the subject matter. Municipal bonds are a notoriously opaque field, and methods to measure exclusionary zoning are not as well refined as they could be. For robust economic research and substantive policy recommendations, these sources of data must be improved, and empirical evidence must continue to be gathered.

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