Demographic Fractionalization and the Municipal Bond Market

Daniel Bergstresser, Randolph Cohen, and Siddharth Shenai*

This paper studies the impact of ethnic and religious fractionalization on the U.S. municipal debt market and finds that issuers from more ethnically and religiously fractionalized counties pay higher yields on their municipal debt. A two standard deviation increase in religious fractionalization is associated with a six basis point increase in bond yields, and a two standard deviation increase in ethnic fractionalization is associated with a 10 basis point increase. To provide a scale for these results, a four-notch rating change, from AAA to AA–, is associated with an eight basis point increase in yields. Additional analysis suggests that at least some of this effect is not driven by the risk of the bonds but reflects, instead, inefficiency in the underwriting process.

A variety of researchers have explored the impact of ethnolinguistic diversity on economic outcomes. Easterly and Levine (1997) propose that ethnolinguistic fractionalization can explain the poor growth observed in post-colonial Africa: borders left by the former colonial powers have resulted in ethnically divided countries that make for

*Daniel Bergstresser is an associate professor of finance at the Brandeis International Business School (IBS). Randolph Cohen is a senior lecturer at the Massachusetts Institute of Technology Sloan School of Management. Both are also active in consulting and other activities in the investment management industry. Siddharth Shenai works at Bracebridge Capital.

The authors are grateful for support from Harvard Business School. They are also grateful for comments from Bart Mosley, Alexander Whalley, Andrei Shleifer, and Alberto Alesina, and from seminar participants at the Brandeis University 2012 Municipal Finance Conference, the U.S. Securities and Exchange Commission, Harvard Business School, Boston College, the University of Southern California, and the University of California, Merced. Finally, they are grateful for excellent research assistance from Mei Zuo.

This paper was delivered at the Brandeis International Business School's 2012 Municipal Finance Conference in Boston, Massachusetts, on August 3, 2012. Daniel Bergstresser can be reached by email at *dberg@brandeis.edu*.

challenging governance.[1] In the American context, Glaeser, Scheinkman, and Shleifer (1995) find no effect of racial fragmentation on the growth rates of cities, but Alesina and La Ferrara (2000) find that more ethnically fragmented communities have lower participation in civic associations such as church groups, fraternities, and service groups. These social institutions contribute to social capital and can have positive economic effects, as discussed by Putnam (1993, 1995). Similar research on religious diversity, however, is lacking, although McCleary and Barro (2006b) examine the relationship between religious observance and economic growth.

In this paper, we use American counties as a laboratory for studying the impact of fractionalization. This approach has at least two advantages. First, using American counties holds constant a variety of underlying factors that cannot be kept constant in cross-country analysis. Second, because local authorities borrow in credit markets, the yield that they pay on their debt is a natural index for comparing their performance. Higher yields on municipal debt must reflect either higher risk (if capital markets are working efficiently) or cross-locality differences in the efficiency with which the municipal underwriting process works.

We construct fractionalization measures of ethnic diversity using data from the 2000 Census, and of religious diversity using the 2000 Religious Congregations and Membership Study, a survey of the major religious denominations conducted by the Association of Statisticians of American Religious Bodies.[2] In this context, fractionalization represents the probability that two randomly selected members of a group will share a particular attribute. For example, in a society that is half white and half Hispanic, the ethnic fractionalization measure would be 0.5; there would be a 50% chance that any two randomly selected people would be of the same ethnicity. Fractionalization is the most common measure used to capture the extent to which a particular society is divided across a particular characteristic.

We focus on ethnic and religious fractionalization because these characteristics are both salient and relatively fixed. Wealth, income, and education are not directly observable, and like age they vary mechanically over the life cycle. Ethnic and religious affiliations are generally more static. These measures capture the underlying concept that we focus on, namely the strength of social ties across citizens and between citizens and officials in a local area.

---

[1] Gettleman (2011): "More than any other continent, Africa is wracked by separatists. There are rebels on the Atlantic and on the Red Sea. There are clearly defined liberation movements and rudderless, murderous groups known principally for their cruelty or greed. But these rebels share at least one thing: they direct their fire against weak states struggling to hold together disparate populations within boundaries drawn by 19th-century white colonialists."

[2] We access these data through the American Religion Data Archive and refer to them throughout the paper as the ARDA data.

We find evidence that municipal issuers in religiously fractionalized counties pay more to borrow than those in other counties. The point estimates suggest that a one standard deviation increase in fractionalization (0.091) is associated with a three basis point (= 0.3025 * 0.091) increase in the offering yield of debt issued by jurisdictions in the county. A change in religious fractionalization from the level observed in highly fractionalized Juneau, Alaska (where our fractionalization index is 0.1746, indicating a 17% chance that two randomly selected people reporting a religion are of the same religion) to highly homogeneous Rich County, Utah (where the fractionalization index is 0.8365) would be associated with a 20 basis point reduction in municipal bond yield at offering. This effect is robust to the inclusion of controls for the overall level of religious observance in a county.

Ethnic fractionalization is also associated with higher bond yields. In contrast to the religion result, the pure effect of ethnic fractionalization is somewhat difficult to disentangle from the phenomenon whereby more homogeneously white counties pay less to borrow. While the existence of religiously homogeneous communities of a variety of religious backgrounds allows separate identification of the fractionalization effect, the ethnically homogeneous counties are almost uniformly ethnically white counties.[3] In a specification including just ethnic fractionalization, a one standard deviation increase in ethnic fractionalization is associated with a five basis point increase in bond yields. However, in a specification including both ethnic fractionalization and the share of the county population that is white, the fractionalization variable is statistically insignificant. The result for the white share of population variable suggests that going from 100% white to 100% nonwhite would be associated with a 24 basis point increase in bond yields. Although disentangling an ethnic fractionalization effect from a "share white" effect is difficult at the county level, analysis of richer data at the sub-county level suggests that both effects are at work.

Finding a relationship between ethnoreligious fractionalization and municipal bond yields, we investigate potential causes of this relationship. By definition, one can divide the mechanisms at work into those that reflect risk and those that are not related to the risk of the municipal bonds. One hypothesis is that more fractionalized localities pay more to borrow because their bonds are riskier; in that sense, higher yields reflect efficient operation of municipal capital markets. Alternatively, higher yields could reflect less efficient monitoring of the bond underwriting process, meaning that more fractionalized places pay more to borrow but that those higher costs do not reflect higher risk. We use the shorthand of "risk" versus "monitoring" in describing these two competing hypotheses.

---

[3] The only exception is a handful of counties in south Texas that are homogeneous and Hispanic.

Our analyses suggest that at least part of the fractionalization effect reflects monitoring rather than risk. When we use credit ratings as a proxy to control for risk, we find that more fractionalized places pay more to borrow, even controlling for the risk of their bonds. We also find some evidence that the prices of bonds issued by fractionalized localities increase in the first 120 days post-issuance, suggesting that the yields at issuance are higher (and prices at issuance are lower) than the eventual market equilibrium. We also find that the fractionalization effect is driven by the smaller issues rather than the larger ones. If the fractionalization effect reflected risk, there is no reason to expect that the effect would be different across issue size. In our view, the fact that the fractionalization effect is strongest for the smallest issues—bonds that are often issued with minimal oversight and attention—is more consistent with the hypothesis that our observed yield differences reflect differential failures in monitoring than that they reflect differences in risk. Taken as a whole, our results suggest that religious and ethnic composition have an impact on municipal borrowing costs in the United States, and that at least some of this effect is unrelated to the risks of the bonds that localities issue.

The remainder of this paper is organized as follows: The first section presents a brief review of the relevant literature on the economic effects of ethnoreligious fractionalization. The second section describes the empirical tests applied in this paper. The third section describes, in detail, the dataset and econometric methodology that we employ. The fourth section presents and interprets the results of our econometric analysis. A brief final section concludes.

THE EXISTING LITERATURE

The index of fractionalization we use in this paper is the ethnolinguistic fractionalization (ELF) measure developed by Soviet anthropologists in the 1960s and defined as one minus the Herfindahl index of ethnolinguistic shares.[4] This measure represents the likelihood that two randomly chosen individuals in a given population belong to different subgroups. In an empirical paper, Easterly and Levine (1997) show that the high ELFs in

---

[4] The Herfindahl index is the sum of the squares of the different groups' shares. So, for example, a population that was 80% Hispanic and 20% Asian would have a Herfindahl index of (0.8 x 0.8 + 0.2 x 0.2), or 0.68. There would be a 68% chance that two randomly selected individuals were from the same group, and also a 32% chance that they were from different groups. This Herfindahl-based measure is not the only measure of diversity that one could choose: Alesina et al. (2003) explore "polarization" measures of diversity. These measures, however, involve explicitly or implicitly specifying a distance between different groups. Although this is natural for measures of diversity in income or wealth, we do not know of any unambiguous one-dimensional measure of religious or ethnic identity and thus use only the fractionalization measure that is more common in the literature.

Sub-Saharan Africa explain characteristics associated with low economic growth, including political instability, underdeveloped financial systems, high government deficits, and distorted currencies. The authors conclude that ethnolinguistic fractionalization, caused in particular by the ad hoc nature of the national boundaries drawn by colonial powers, explains much of Africa's post-colonial failure to generate sustained economic growth.

Collier and Gunning (1999) also demonstrate the explanatory power of ELF with respect to economic growth in African nations. Collier (2000) further finds that the impact of diversity on economic growth in a sample of countries between 1960 and 1990 was a function of the political context—diverse dictatorships saw slow growth, while diverse democracies did not. La Porta et al. (1999) look at the determinants of the quality of government across countries. Among their findings are that nations that are ethnolinguistically heterogeneous have inferior government performance. The dimensions of government performance that they investigate include measures of corruption, bureaucratic delays, tax compliance, and property rights. Alesina et al. (2003) extend this work to include measures of linguistic and religious fractionalization. Their measure of religious diversity is the same as ours, and they point out that, at least in the international context, religious identity is often more reliably measured than linguistic or ethic membership, making the religious fractionalization measure particularly useful for empirical research.

Several studies have focused on the economic and fiscal impacts of ethnolinguistic and racial fractionalization at the city, county, and state levels in the United States. Glaeser, Scheinkman, and Shleifer (1995) investigate the socioeconomic determinants of economic growth of U.S. cities between 1960 and 1990. City growth is one reasonable measure of the success of different areas; if people are free to move across cities, then achieving city growth represents at least relative success. The authors find that the non-white share exerts a minimal impact on subsequent city growth. Among cities with large non-white shares, they find that increased segregation is positively related to subsequent growth. One interpretation that they offer is consistent with costs of fractionalization: they suggest that segregation in heavily non-white cities lessens ethnic conflict. Alesina, Baqir, and Easterly (1999) develop a model connecting heterogeneity of preferences across ethnic groups in a political unit to the amount and type of public goods that the political unit supplies, and they test the model on U.S. cities, urban counties, and states. They find that the provision of productive public goods (roads, hospitals, schools, etc.) in cities and counties is inversely related to ethnic fragmentation, and they suggest two reasons, which they reflect in the model: (1) different ethnic groups can have different preferences over which public goods should be produced, and (2) different ethnic groups can have their marginal utility of the public good reduced by other groups' consumption. They find some empirical evidence that the fiscal balance before intergovernmental transfers tends to be worse in more ethnically fragmented cities.

A study by Vigdor (2004) looks at response rates to the 2000 Census questionnaire. Responding to the Census reflects individual provision of a local public good. Because federal grants to local areas are determined by Census counts, an uncounted individual costs his locality as much as $500 per year. Vigdor shows that Census response rates are lower among counties that are more racially, generationally, and socioeconomically heterogeneous—the provision of this important local public good appears to be lower in more fractionalized localities.

Theoretical work by Alesina and Drazen (1991) explores the relationship between fractionalization and the economic outcomes. Both papers present models where sociopolitical fragmentation may lead to conflicts over the allocation of the tax burden and to the consequent delay of deficit reduction policies. In these models, delayed stabilization is the result of a war of attrition game, where different groups try to force the other to bear the cost of the stabilization. In the context of our research on municipal debt, this effect would make debt issued by fractionalized localities more risky than debt issued by more homogeneous localities because the more fractionalized localities would tend to delay (and possibly fail to enact) budget stabilization packages in the face of persistent deficits.

McCleary and Barro (2003, 2006a, 2006b) have recently brought analytical rigor to inquiry exploring the relationship between religion and economic outcomes. They present cross-country examination of the two-way interaction between economic growth and religion. With religion as the dependent variable, McCleary and Barro (2006b) find that per capita GDP has a significant negative relationship with all religiosity indicators (e.g., monthly church attendance, belief in hell, etc.). With religion as an independent variable, they find that belief in hell has a strongly positive effect on economic growth, whereas monthly religious service attendance has a strongly negative effect. Hilary and Hui (2009) use one of the same data sources as we use here to investigate the effect of individual religiosity on the risk-taking behavior of firms. Using the rate of religious adherence at the county level from the Association of Religion Data Archives (the same ARDA data used in this paper), they find that corporations located in highly religious counties take on less risk, measured by variance in returns on equity and assets, and have higher returns on assets and lower rates of investment.

HYPOTHESES AND EMPIRICAL ANALYSIS

We investigate the relationship between religious and ethnic diversity and municipal bond yields. Municipal bond yields reflect the costs that localities face when they borrow. In efficient credit markets, yields reflect a time premium, a risk premium, and a premium for the credit quality of the underlying issuer. Our empirical analysis controls for the time premium using fixed effects for the maturity of the instrument; because the risk-free yield curve fluctuates over time, we allow these fixed effects to be time-varying. With the time effect controlled for, and with an additional control for the liquidity of the bond, in an efficient capital market the resulting coefficients will reflect the combined premium for risk and default charged to the municipal borrowers. Any part of this spread that is uncorrelated with the risk of the instrument will reflect some inefficiency in the underlying issuance process.[5]

Our main null hypothesis is that neither religious nor ethnic diversity (fractionalization), as measured by the Herfindahl index, has an impact on this premium charged; the alternative hypotheses are that either religious or ethnic diversity could affect the premium. The Herfindahl index is just one minus the ELF fractionalization measure, so our results can be thought of interchangeably in terms of concentration or diversity/fractionalization.[6]

Establishing a relationship between ethnoreligious fractionalization and bond spreads, we continue by investigating the extent to which the relationship reflects risk. Because our spread measures are based on regressions that have controlled for the yield curve and bond liquidity, we view the part that is orthogonal to risk (however measured) as being consistent with some inefficiency in the bond issuance process. As a shorthand, we refer to this as "monitoring," but this monitoring is a residual that may reflect many underlying sources. It may reflect inefficient monitoring of the local officials—often treasurers—charged with issuing municipal debt. Whalley (2011) shows empirically that the background of local treasurers has a significant impact on municipal borrowing costs—in particular, localities in California with appointed treasurers (who are often finance professionals) have lower borrowing costs than localities that elect their treasurers. Any model in which local treasurers trade off effort versus job effectiveness, and where the local officials internalize only benefits that accrue to constituents of their own type, will deliver a relationship between fractionalization and municipal effectiveness—in this case, the spreads that municipalities pay on their bonds.

---

[5] A common assumption in capital markets is that rational arbitrageurs enforce price efficiency. In the municipal context, an issuer who issued bonds cheap (at high yield) relative to the eventual market equilibrium would cost taxpayers money. In private capital markets, the assumption is that such inefficient behavior will rapidly be competed away. In municipal capital markets, the same forces may be at play, but with municipal authorities enjoying (at least in the short run) something like a monopoly, this equilibrating process may take a very long time.

[6] See note 4 regarding use of the Herfindahl index.

DATA AND ECONOMETRIC METHODOLOGY

Data on religious observance and fractionalization come from the 2000 Religious Congregations and Membership Study, a survey conducted by the Association of Statisticians of American Religious bodies (ASARB). These data have also been used in Hilary and Hui (2009) and are available through the Association of Religion Data Archives (ARDA). The survey covered 149 Christian denominations, as well as Jewish and Islamic total adherents, by county. The survey also counted temples for six Eastern religions, but not members. A number of churches, disproportionately historically African-American religious bodies, declined to participate in the survey in 2000; estimates of county-level membership counts described in Finke and Sheitle (2005) are used for these congregations.

The fractionalization measure (1—the Herfindahl index) is based on a division of religious bodies into eight groups. These groups are Mainline Protestant, Evangelical Protestant, Catholic, Eastern Orthodox, Other participating Christian groups (predominantly LDS [Mormon] congregations), and Jewish and Muslim congregations. The "Other non-participating" category captures the Finke and Sheitle (2005) county-level estimate of the count of adherents of denominations that did not participate. Table 1 describes the different denomination measures. The table presents results both on a bond-weighted and a county-weighted basis. Based on the survey, religious membership amounts to 63% of the mean county population, with a standard deviation of 21%. The Mainline Protestant denominations have now been eclipsed in membership by the Evangelical Protestant denominations and Catholic churches.[7]

Our goal with this eight-category religion division is to capture the strength or weakness of social ties within a locality.

Table 2 describes the adherent and dispersion measures for a handful of counties. The counties presented are the largest counties, the most concentrated and fractionalized counties, and the most concentrated and fractionalized large counties. The most religiously homogeneous large county is Salt Lake County, Utah, where more than half of the population is in the "Other participating Christian" category, largely LDS congregations. El Paso, Texas; Bristol, Massachusetts; and Hidalgo, Texas, are also highly homogeneous in terms of religion and are predominantly Catholic. Highly religiously fractionalized counties include Montgomery

[7] Splitting the Protestant denominations into Evangelical Protestant groups and Mainline Protestant groups follows general practice in working with the ARDA data. There are very important differences between these groups. For example, the belief in the literal inerrancy of the Bible is much more common among Evangelical Protestants than among Mainline Protestant Christians.

Table 1: Descriptive Statistics for County Religion Data

		Count	Mean	25th %ile.	50th %ile.	75th %ile.	SD
Total members/1000 population	Bond	1207399	621.2	502.1	619.9	723.3	165
	County	2023	628.3	477.3	621.8	772.5	207.2
Mainline Protestant	Bond	1207399	112.5	60.8	88.9	136.6	83.8
	County	2023	145.1	67.6	109.2	187.9	118.4
Evangelical Protestant	Bond	1207399	151.9	61.8	108.3	204.8	128.8
	County	2023	228.6	95.6	175.7	346.2	168.7
Catholic	Bond	1207399	221.6	102.5	201.1	317.5	147.9
	County	2023	138.7	22.6	92.5	205.6	146.6
Orthodox	Bond	1207399	2.5	0.0	0.9	3.3	3.8
	County	2023	0.7	0.0	0.0	0.0	2.7
Other participating Christian[a]	Bond	1207399	33.5	7.4	18.2	40.7	58.9
	County	2023	20.5	0.1	5.9	14.8	75.2
Jewish	Bond	1207399	16.4	0.0	2.9	18.2	32.5
	County	2023	2.8	0.0	0.0	0.0	13.2
Muslim	Bond	1207399	4.3	0.0	1.4	6.2	6.3
	County	2023	0.8	0.0	0.0	0.0	3.0
Other non-participating Christian[b]	Bond	1207399	99.2	59.2	78.2	116.4	64.5
	County	2023	94.7	51.5	71.3	100.7	77.5
Religion Herfindahl (x 10000)[c]	Bond	1207399	3304	2650	3133	3685	912
	County	2023	3880	3028	3584	4482	1161

Note: Table shows descriptive statistics based on 2000 Religious Congregations and Membership Study by the Association of Statisticians of American Religious Bodies (ASARB). Survey covered 149 religious bodies. Data were accessed from the Association of Religion Data Archives (ARDA) and are described at *http://www.thearda.com/Archive/Files/Descriptions/RCMSCY.asp*.

[a] Other participating congregations are predominantly LDS (Mormon) congregations.

[b] Other non-participating congregations include religious congregations that did not choose to participate in the 2000 survey. Count based on adjustments described in Finke and Sheitle, 2005 ("Accounting for the Uncounted: Computing Correctives for the 2000 RCMS Data") to correct for non-participation of religious bodies that did not participate in the 2000 Survey. The bulk of the non-participating bodies (estimated at 25.10 million out of the 29.05 million non-participants are historically African-American congregations. The remainder include the Baptist Bible Fellowship (1.2 million estimated members), the Jehovah's Witnesses (1.04 million estimated members), and other smaller groups.

[c] Herfindahl = 1 – ELF. We use the Herfindahl and ELF measures interchangeably; a higher Herfindahl = less fractionalization.

Table 2: Religious Fractionalization for Particular Counties

		Congregants/1000 Population									
	Population	Total	Mainline Protestant	Evang. Protestant	Catholic	Orthodox	Other (Participating)	Jewish	Muslim	Other (Not Participating)	Herf. Index (x 10000)
Large counties											
Los Angeles, CA	9519338	771.5	35.6	61.8	399.9	3.3	80.3	59.3	9.8	121.5	3190
Cook, IL	5376741	852.2	53.4	50.2	399.3	9.4	64.0	43.6	17.8	214.5	2991
Harris, TX	3400578	672.6	81.9	204.8	181.9	2.4	32.8	10.6	14.0	144.2	2298
Maricopa, AZ	3072149	475.7	48.3	99.9	172.6	2.3	74.4	19.5	3.3	55.4	2259
Orange, CA	2846289	541.1	38.7	79.6	273.9	2.5	53.1	21.1	13.9	58.3	4026
Concentrated counties											
Rich, UT	1961	932.9	0.0	0.0	0.0	0.0	849.1	0.0	0.0	83.8	8365
Arthur, NE	444	795.0	723.0	0.0	0.0	0.0	0.0	0.0	0.0	72.0	8352
Banner, NE	819	139.8	127.0	0.0	0.0	0.0	0.0	0.0	0.0	12.8	8335
Van Buren, TN	5508	376.1	0.0	341.5	0.7	0.0	0.0	0.0	0.0	33.9	8323
Concentrated counties > 500000 population											
Salt Lake, UT	898387	760.1	20.6	20.6	59.6	4.1	570.2	4.7	3.9	76.4	5807
Bristol, MA	534678	696.0	40.4	25.8	502.0	2.6	29.1	21.7	3.5	70.9	5381
El Paso, TX	679622	728.9	25.6	75.3	514.8	1.3	17.3	7.4	0.9	86.3	5254

Hidalgo, TX	569463	563.1	28.2	73.4	390.1	0.2	11.9	0.9	1.1	57.3	5105
Fractionalized counties											
Montgomery, MD	873341	774.6	100.8	78.8	212.0	6.1	128.9	96.0	21.1	130.9	1746
Alexandria, VA	128283	730.3	127.3	85.4	188.3	16.3	78.5	42.1	29.5	162.9	1773
Juneau, AK	30711	345.1	71.7	81.9	71.6	31.7	43.5	9.3	0.0	35.4	1781
Washtenaw, MI	322895	442.1	92.3	64.9	129.3	2.7	44.9	21.7	15.1	71.2	1905
Fractionalized counties > 500000 population											
Montgomery, MD	873341	774.6	100.8	78.8	212.0	6.1	128.9	96.0	21.1	130.9	1746
Pinellas, FL	921482	445.5	86.3	99.1	121.6	10.5	34.5	26.3	4.6	62.6	1914
Broward, FL	1623018	730.7	27.0	77.9	210.6	3.9	139.1	131.2	4.1	136.9	1994
Palm Beach, FL	1131184	833.8	47.1	91.5	265.6	1.7	153.3	147.6	0.7	126.3	2048

Note: Table shows descriptive statistics based on 2000 Religious Congregations and Membership Study. See notes to Table 1 for description of the ARDA Religious Congregations and Membership Survey on which this table is based.

County, Maryland, which has a relatively even split across Mainline Protestant, Evangelical Protestant, Catholic, LDS, Jewish, and other non-participating denominations.

Data on ethnicity come from the 2000 Census. Ethnicity and Hispanic identity are overlapping: households can report being Hispanic alongside any ethnicity. For the purposes of our analysis, we create a non-overlapping "Hispanic" category including all households that report Hispanic identity. Other categories, including black, white, American Indian, Asian, and Pacific Islander, are based on households that do not also report being Hispanic.

Table 3 presents descriptive statistics for county ethnicity data, again weighted by bond and weighted by county. The difference between the bond-weighted and county-weighted results reflects the large number of sparsely populated, heavily white counties and the large share of the population that lives in some very large counties with large Hispanic populations. Table 4 presents ethnicity data and ethnic fractionalization for a handful of counties. The most ethnically fractionalized large counties include Alameda, California; Hudson, New Jersey; and San Francisco, California, which have Herfindahl indices below 3,159. This measure reflects the fact that the odds that any two randomly selected citizens would be of the same ethnicity are less than one-third. There are a number of highly concentrated small counties, in particular very white rural counties in Montana, North Dakota, South Dakota, and West Virginia. The ethnically homogeneous large counties include the heavily white Macomb, Michigan, and Bucks, Pennsylvania. Hidalgo County in Texas is relatively unusual in being a large and highly concentrated county with a predominantly Hispanic population.

We also use additional demographic data from the Census (see Table 5). We control for wealth and income using the median house value and median income in the county. Weighted by bond, the mean of the median county household income measures is $44,000; the mean of the median county home value measures is $123,000. Data on government debt and spending come from the Census of Governments, 1992–2007. The Census of Governments is conducted every five years by the U.S. Census and covers municipal revenues, expenditures, debt, assets, and numbers of employees. These data include annual data on spending and receipts, at the county level, for all subunits within each county. We include total expenditure and total municipal indebtedness taken from the Census of Governments as controls in many of our empirical specifications. The average debt per capita is $3,873; the average expenditure per capita is $4,273.

Data on the municipal bond characteristics, issue date, and yield come from Mergent. Our sample includes all municipal bonds listed in Mergent that were issued between 1995 and 2010. Mergent also provides data capturing whether the municipal bonds are insured or uninsured. The

Table 3: Descriptive Statistics for County Ethnicity Data

		Count	Mean	25th %ile.	50th %ile.	75th %ile.	SD
Hispanic[a]	Bond	1206389	112.7	18.4	50.6	156.1	143.9
	County	2022	61.6	9.3	18.1	51.9	118.6
White[a]	Bond	1206389	747.6	619.2	795.8	912.1	196.6
	County	2022	825.9	739.6	899.7	960.4	178.5
Black	Bond	1206389	88.5	13.3	52.3	123.3	106.2
	County	2022	79.0	2.6	15.7	88.9	133.7
American Indian	Bond	1206389	7.0	1.8	2.8	5.2	25.1
	County	2022	13.2	1.8	2.9	6.3	50.7
Asian	Bond	1206389	27.9	5.4	15.5	36.3	35.9
	County	2022	8.2	1.8	3.3	6.9	19.0
Pacific Islander	Bond	1206389	0.8	0.2	0.3	0.5	2.9
	County	2022	0.5	0.1	0.2	0.4	3.9
Other	Bond	1206389	1.3	0.6	1.1	1.6	1.5
	County	2022	0.7	0.2	0.5	0.9	0.9
Two or more races	Bond	1206389	14.1	8.6	12.6	16.5	9.3
	County	2022	10.9	5.9	8.4	12.3	11.5
Race Herfindahl (x 10000)[b]	Bond	1206389	6532	4820	6574	8361	2020
	County	2022	7594	5977	8141	9229	1810

Note: Table shows descriptive statistics based on the 2000 Census.
[a] Hispanic category includes all Census respondents who identify themselves as “Hispanic.” “Hispanic ancestry” and ethnicity are separate questions; many respondents reporting Hispanic ancestry also report white (or black) ancestry. Remaining categories include only households that do not identify themselves in the Census as Hispanic; thus “white” households include the white, non-Hispanic households.
[b] Herfindahl = 1 – ELF. We use the Herfindahl and ELF measures interchangeably; a higher Herfindahl = less fractionalization.

underlying sample is reasonably comprehensive, with 2.5 million individual bonds. The mean bond offering yield is 4.04%, and the standard deviation is 1.16 percentage points. Credit rating data come from Standard and Poor’s and include both the rating for the instrument and the underlying rating for the issuer in cases where bond insurance on the instrument creates a wedge between the issuer’s underlying rating and the instrument’s rating. Data on bond liquidity come from the Municipal Securities Rulemaking Board (MSRB) trades database; we calculate liquidity as the (log) number of interdealer trades during the 60 days after the bonds are issued. We use interdealer trades because the interdealer trades are the only trades

Table 4: Ethnicity Mix for Large Counties

	Population	Hispanic	White	Black	American Indian	Asian	Pacific Islander	Other	Two or More Races	Herf. Index (x 10000)
Large counties										
Los Angeles, CA	9519338	445.6	310.9	94.7	2.7	118.1	2.4	2.1	23.4	3187
Cook, IL	5376741	199.3	475.9	258.6	1.3	48.0	0.3	1.4	15.3	3356
Harris, TX	3400578	329.3	421.2	182.2	2.1	50.9	0.4	1.3	12.6	3218
Maricopa, AZ	3072149	248.5	662.2	35.3	14.9	21.0	1.2	1.3	15.5	5025
Concentrated counties										
Hand, SD	3741	2.9	991.4	0.3	1.3	0.8	0.0	0.0	3.2	9830
Griggs, ND	2754	4.0	990.9	0.0	2.2	1.5	0.0	0.0	1.5	9820
Liberty, MT	2158	1.9	990.7	0.0	0.9	3.2	0.0	0.5	2.8	9816
Burke, ND	2242	3.6	990.2	1.3	2.2	1.3	0.0	0.0	1.3	9805
Concentrated counties > 500000										
Macomb, MI	788149	15.8	915.9	26.8	2.9	21.2	0.2	0.9	16.3	8406
Bucks, PA	597635	23.4	911.5	31.7	1.0	22.7	0.1	0.8	8.4	8329
Ocean, NJ	510916	50.0	898.7	28.2	1.0	12.6	0.1	0.8	8.4	8113
Bristol, MA	534678	36.0	893.9	18.3	1.9	12.5	0.2	17.0	20.2	8015
Hidalgo, TX	569463	883.5	104.3	3.4	0.8	5.6	0.0	0.3	2.0	7914

Fractionalized counties										
Hawaii, HI	148677	94.9	297.4	4.0	3.2	258.1	105.5	1.8	234.9	2305
Maui, HI	128094	78.5	319.4	3.8	2.7	302.9	102.8	1.6	188.2	2460
Kauai, HI	58463	82.2	278.5	2.8	2.4	349.1	86.8	1.4	196.8	2525
Alameda, CA	1443741	189.7	409.4	146.2	3.7	202.7	5.9	3.2	39.1	2677
Robeson, NC	123339	48.6	308.1	249.9	376.7	3.1	0.4	1.6	11.6	3018
Fractionalized counties > 500000										
Alameda, CA	1443741	189.7	409.4	146.2	3.7	202.7	5.9	3.2	39.1	2677
Hudson, NJ	608975	397.6	353.4	121.6	1.5	92.6	0.3	6.0	27.0	3071
San Francisco, CA	776733	141.0	436.3	75.7	2.6	306.6	4.6	3.3	29.8	3109
New York, NY	1537195	271.8	457.9	152.7	1.6	93.2	0.4	3.6	18.8	3159

Note: Table shows descriptive statistics based on the 2000 Census.

Table 5: Summary Statistics, All Variables (Weighted by bond)

					Percentile		
Variable	**Source**	**Count**	**Mean**	**Standard Deviation**	**25th**	**50th**	**75th**
Bond offering yield	Mergent	1902459	4.04	1.16	3.50	4.15	4.79
Bond insurance dummy	Mergent	1902459	0.51	0.50	0.00	1.00	1.00
Competitive bidding	Mergent	1902459	0.22	0.42	0.00	0.00	0.00
Negotiated offer	Mergent	1902459	0.27	0.44	0.00	0.00	1.00
Bond size ($000)	Mergent	1871976	2403.37	25907.00	165.00	425.00	1265.00
Issue size ($000)	Mergent	1902459	43385.00	190270.00	3435.00	8915.00	26930.00
Count of interdealer trades in first 60 days	MSRB	1902459	2.97	11.92	0.00	1.00	2.00
LTCR	S&P	988063	3.62	2.33	1.00	3.00	5.00
SPUR	S&P	801564	4.25	2.23	3.00	4.00	6.00
Religion Herfindahl	ARDA	1207399	3304	912	2650	3133	3685
Religion: Member households/1000	ARDA	1207399	642	180	515	634	753
Ethnicity Herfindahl	Census	1206389	6532	2020	4820	6574	8361
Ethnicity: White households/1000	Census	1206389	748	197	619	796	912
Med. house val. ($000)	Census	1206389	122	65	82	102	147
Median income ($000)	Census	1206389	44	11	37	43	49
Log total population	Census	1206389	12.31	1.65	11.07	12.38	13.53
LTD per capita ($000)	Census of govts., Census	1206389	3.90	5.30	1.90	2.90	4.50

Govt. exp. per capita ($000)	Census of govts., Census	1206389	4.30	4.40	3.00	3.70	4.50
Butler-Fauver-Mortal Corruption measure 1[a]	BFM (2009)	1640144	23.07	24.97	0.00	14.27	45.80
Butler-Fauver-Mortal Corruption measure 2[a]	BFM (2009)	1640144	21.29	13.88	9.00	18.00	33.00
Population percent change (past 5 years)	SEER[b]	1202780	0.06	0.08	0.01	0.04	0.09
Change in white share (past 5 years)	SEER	1202780	–0.02	0.02	–0.03	–0.02	–0.01
Change in race Herfindahl (past 5 years)	SEER	1202780	–0.03	0.02	–0.04	–0.02	–0.01
Top federal tax rate	NBER[c]	1640144	35.79	2.57	33.52	35.35	38.00
Top state tax rate	Mergent	1640144	5.07	3.21	3.00	5.69	7.50
Top total tax rate	Mergent	1640144	40.87	3.01	38.79	40.79	42.84
Unemployment rate	LAUS[d]	1206389	5.55	2.35	4.00	5.10	6.50
Standard deviation of unemployment rate	LAUS	1206389	1.69	0.67	1.29	1.59	1.98
Bond callable	Mergent	1902459	0.44	0.50	0.00	0.00	1.00
GO Bond	Mergent	1902459	0.47	0.50	0.00	0.00	1.00
Bond putable	Mergent	1902459	0.00	0.04	0.00	0.00	0.00
Bond subject to AMT	Mergent	1902459	0.03	0.16	0.00	0.00	0.00
Taxable bond	Mergent	1902459	0.04	0.19	0.00	0.00	0.00
Bond taxable at state level	Mergent	1902459	0.08	0.26	0.00	0.00	0.00
Refunding bond	Mergent	1902459	0.37	0.48	0.00	0.00	1.00

[a] BFM corruption measure 1 is the share of quarters in which the state is in the top quartile of states in terms of corruption convictions per capita. BFM corruption measure 2 is the Better Government Association's corruption ranking for the state.
[b] SEER is the Surveillance, Epidemiology, and End Results survey, a program of the National Cancer Institute. SEER publishes annual estimates of county population racial breakdowns.
[c] NBER is the National Bureau of Economic Research. NBER publishes annual state-level tax rates.
[d] LAUS stands for the Bureau of Labor Statistics' Local Area Unemployment Statistics database.

available in the 1995–1997 subperiod, and we use the first 60 days post-issuance in order to have a consistent window for all of the bonds issued in our sample. In our sample, the mean number of interdealer trades is 1, and the mean is 2.98. In calculating the log, we first add 1 to the count of trades.

We also use data on state-level corruption from Butler, Fauver, and Mortal (2009). We use two corruption measures: the first is the share of calendar quarters in which the state was in the top quartile of states in terms of corruption convictions per capita. The second measure is the Better Government Association's corruption ranking for the state. We also use time-varying ethnic diversity measures taken from the Surveillance, Epidemiology, and End Results (SEER) survey, which has annual measures back to 1990. Instrumental variables analysis uses 1980 Census data to create instruments for the 2000 fractionalization and white share measures; 1980 is the earliest Census that allows for construction of ethnicity measures including Hispanic origin.

We also construct measures of county population growth from the SEER data, and tax rate measures come from the National Bureau of Economic Research (NBER). Finally, measures of county-level unemployment and unemployment volatility come from the Bureau of Labor Statistics, through their local area unemployment statistics (LAUS) program.

RESULTS OF THE ANALYSIS

This section presents the empirical results of our analysis of both ethnic and religious fractionalization, as measured by the respective Herfindahl indices,[8] and their effects on municipal credit markets. The first subsection looks at the relationship between municipal bond yields and measures of fractionalization. The second subsection addresses the question of whether the higher bond yields in more fractionalized counties reflect risk or monitoring.

Fractionalization and Municipal Bond Yields

Our first specification (Table 6) fits the bond offering yield on measures of ethnic and religious fractionalization using a minimal set of controls. These controls include log county size, log issue size, log bond size, and maturity-by-month dummy variables. The maturity-by-month dummy variables allow for a nonparametric time-varying yield curve effect and allow us to interpret the resulting coefficients in terms of spreads over a

[8] As noted in footnote 4, the ethnolinguistic fractionalization (ELF) measure is just 1 – the Herfindahl index, so we use the Herfindahl measure in our analysis and interpret the coefficient estimates as reflecting the impact of a declining degree of fractionalization.

benchmark yield curve. The main independent variable in column (1) is the religion Herfindahl index, which has a coefficient of –0.3025. This result is highly significant in both statistical and economic terms: a two standard deviation increase in fractionalization would be associated with a six basis point increase in bond spreads. To put this increase into context, Figure 1 shows the relationship between credit ratings and spreads during our sample period: moving from an AAA-rated instrument to an AA–instrument, a move of four ratings notches, is associated with an eight basis point increase in yields.

Column (2) controls for total religious observance, using the members per capita variable. The variable is not statistically significant in this specification, although it becomes significant with the broader set of controls used in Table 7. Column (3) uses the ethnicity Herfindahl index. The coefficient of –0.2435 suggests that a two standard deviation increase in fractionalization is associated with a 10 basis point increase in bond yields. Column (4) uses the "share white" and finds an effect of similar economic and statistical magnitude.

Column (5) controls for the religious variables together, column (6) for the ethnicity variables together, and column (7) for all four variables in the same regression. The religious Herfindahl measure is consistently significant, as is the share of county population that is white. In regressions where ethnic fractionalization is measured at the county level, including

Figure 1: Coefficients from Regression of Bond Yield on Rating

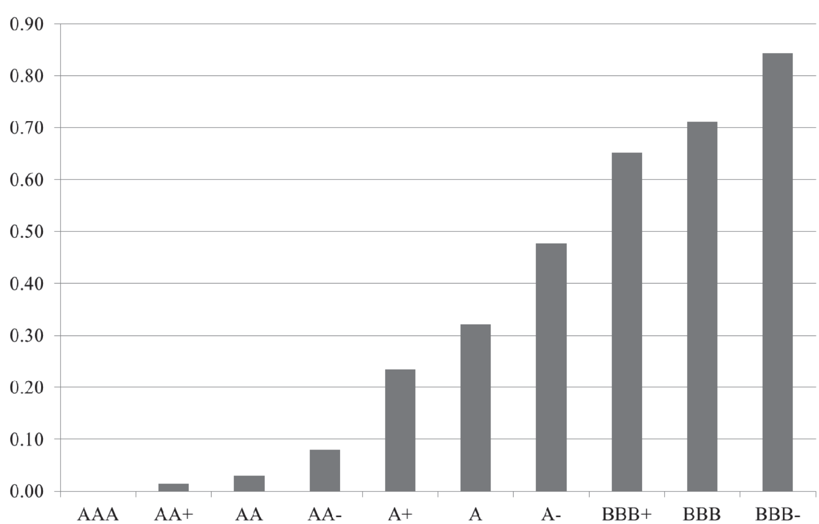


Table 6: Regressions of Bond Offering Yield on Fractionalization, All Municipal Bonds, Minimal Controls

Independent Variable	Mean /SD	Bond Offering Yield									
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Religion Herfindahl, county	0.330 /0.091	–0.3025***				–0.2844***		–0.3279***			
		(0.0713)				(0.0815)		(0.0783)			
Religion members per capita, county	0.621 /0.165		–0.0687			–0.0343		–0.0723			
			(0.0561)			(0.0576)		(0.0545)			
Race Herfindahl, county	0.653 /0.202			–0.2435***			–0.0370	0.0560			
				(0.0395)			(0.0609)	(0.0626)			
Race share white, county	0.748 /0.197				–0.2667***		–0.2390***	–0.3377***			
					(0.0376)		(0.0575)	(0.0615)			
Race Herfindahl, city	0.691 /0.212								–0.1656***		
									(0.0442)		
Race share white, city	0.745 /0.239								–0.1929***		
									(0.0343)		
Race Herfindahl, 1990, county	0.723 /0.196									–0.2467***	
										(0.0382)	
Race Herfindahl, change over past 5 years, county	–0.027 /0.021									0.4771*	
										(0.2447)	

Race share white, 1990, county	0.807 /0.175										−0.2678***
											(0.0408)
Race share white, change past 5 yrs	−0.024 /0.018										−0.5072
											(0.4962)
Additional control variables: Log county size, log issue size, log bond size, maturity-by-month dummies											
Observations		1189975	1189975	1189995	1189995	1189975	1189995	1189975	703883	1184969	1184969
R-squared		0.8126	0.8122	0.8130	0.8134	0.8126	0.8134	0.8141	0.8165	0.8133	0.8132
Robust standard errors in parentheses											

Note: Dependent variable is bond offering yield. Sample includes all municipal debt issues that can be mapped to county data. Excluded would be state and supra-county bonds. Cities that cross county boundaries are assigned to the county with the largest number of zip codes. Standard errors are clustered by county.
* Significant at 10%; ** significant at 5%; *** significant at 1%.

both ethnic fractionalization and the share white delivers a significant coefficient on the share white variable and an insignificant coefficient on the fractionalization variable.

Column (8) uses city-level data. This approach leads to a smaller sample but also allows us to control for demographic characteristics at a finer level. In particular, although the ethnically homogeneous counties are almost exclusively white, there are ethnically homogeneous cities of each of several races. In the city-level specification, both the fractionalization and share white measures are statistically significant. Columns (9) and (10) use the SEER annual data to calculate measures of ethnic diversity from 1990, five years before the start of the sample. The results suggest that the preexisting fractionalization and share white measures are correlated with bond yields. Although predetermination does not automatically imply causation, the fact that the 1990 ethnicity measures are correlated with bond yields does allow us to rule out potential competing stories where bond yields in the 1995–2010 sample are causing the differences in ethnic diversity measures.

Table 7 uses a richer set of control variables, including detailed control for the characteristics of the bond and also the county. While the magnitude of the results is attenuated somewhat with this richer set of controls, the broad picture of the results is not affected. In column (1), which includes the full set of controls but only the religion Herfindahl index among the measures of fractionalization, the coefficient of –0.1460 implies that a two standard deviation change in religious fractionalization is associated with a three basis point change in bond yields. The coefficient on the ethnic Herfindahl index in column (3) suggests that a two standard deviation change in fractionalization is associated with a five basis point change in bond yields.

Table 8 shows the coefficients on the controls. These coefficients are interesting in their own right and also allow us to place the magnitude of the coefficients of our diversity measures into context. The coefficient of –0.5948 on median county house values suggests that a two standard deviation change in house values is associated with a 7.7 basis point change in bond yields. With controls for both county debt and expenditures, an interesting pattern emerges. The coefficient on county debt per capita is significant at the 10% confidence level and has a negative sign, suggesting that a two standard deviation change in debt outstanding is associated with a two basis point change in bond yields. A two standard deviation increase in county expenditures is associated with a nine basis point increase in bond yields. This pattern of results suggests that county borrowing costs are more highly correlated with expenditure levels than with the debt outstanding.

Table 7: Regressions of Bond Offering Yield on Fractionalization, All Municipal Bonds, Maximal Controls

Independent Variable	Mean /SD	Bond Offering Yield									
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Religion Herfindahl, county	0.330 /0.091	–0.1460***				–0.1209***		–0.0693*			
		(0.0379)				(0.0384)		(0.0386)			
Religion members per capita, county	0.621 /0.165		–0.0580**			–0.0349		–0.0853***			
			(0.0250)			(0.0257)		(0.0282)			
Race Herfindahl, county	0.653 /0.202			–0.1361***			–0.0867**	–0.0558			
				(0.0334)			(0.0431)	(0.0442)			
Race share white, county	0.748 /0.197				–0.1323***		–0.0634	–0.1189**			
					(0.0352)		(0.0449)	(0.0488)			
Race Herfindahl, city	0.691 /0.212								–0.0533*		
									(0.0319)		
Race share white, city	0.745 /0.239								–0.0747***		
									(0.0286)		
Race Herfindahl, 1990	0.723 /0.196									–0.1528***	
										(0.0331)	
Race Herfindahl, change	–0.027 /0.021									0.2330	
										(0.2401)	

(Continued)

Table 7 (*Continued*)

Independent Variable	Mean /SD	Bond Offering Yield									
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Race share white, 1990, county	0.807 /0.175										–0.1261***
											(0.0397)
Race share white, change past 5 yrs	–0.024 /0.018										–0.4811*
											(0.2895)
Additional control variables: County size, issue size, bond size, bond trade count in first 60 days (all in logs), county median house price, county median income, county government debt and expenditure per cap, BFM corruption measures 1 and 2, competitive issue, negotiated issue, bond insurance dummy, GO dummy, callable dummy, putable dummy, AMT tax dummy, taxable dummy, state-tax dummy, state top tax rate, state share of households with income > 200k, county population growth (5 year), county unemployment rate, county standard deviation of unemployment rates, refunding bond dummy, maturity-by-month dummies.											
Observations		1186441	1186441	1186461	1186461	1186441	1186461	1186441	702167	1184969	1184969
R-squared		0.8799	0.8799	0.8800	0.8800	0.8799	0.8801	0.8802	0.8851	0.8801	0.8800
Robust standard errors in parentheses											

Note: Dependent variable is bond offering yield. Sample includes all municipal debt issues that can be mapped to county data. Excluded would be state and supra-county bonds. Cities that cross county boundaries are assigned to the county with the largest number of zip codes. Standard errors are clustered by county.
* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 8: Regressions of Bond Offering Yield on Fractionalization, All Municipal Bonds

Ind. Var.	Mean /SD	Coef.	Ind. Var.	Mean /SD	Coef.	Ind. Var.	Mean /SD	Coef.
Religion Herfindahl, county	0.330 /0.091	−0.0693*	Competitive issue	0.224 /0.417	−0.1215***	Refunding bond	0.370 /0.483	−0.0085
		(0.0386)			(0.0090)			(0.0054)
Religion members per capita, county	0.621 /0.165	−0.0853***	Negotiated issue	0.265 /0.441	0.0598***	Constant	1.000 /0.000	4.6654***
		(0.0282)			(0.0090)			(0.1420)
Race Herfindahl, county	0.653 /0.202	−0.0558	Bond insurance dummy	0.576 /0.494	−0.1851***	Observations		1186441
		(0.0442)			(0.0124)	R-squared		0.8802
Race share white, county	0.748 /0.197	−0.1189**	Callable bond dummy	0.442 /0.497	0.0705***			
		(0.0488)			(0.0108)			
Log county population	12.306 /1.650	0.0071	GO bond dummy	0.472 /0.499	−0.1213***			
		(0.0054)			(0.0101)			
Log issue size	16.090 /1.724	−0.0221***	Putable bond dummy	0.001 /0.038	−0.7330***			
		(0.0028)			(0.1217)			
Log bond size	13.081 /1.607	−0.0196***	AMT taxable	0.028 /0.164	0.2560***			
		(0.0039)			(0.0174)			
Log bond trade count	0.740 /0.922	−0.0042**	Taxable	0.038 /0.192	1.4128***			
		(0.0020)			(0.0170)			

(Continued)

Table 8 (*Continued*)

Ind. Var.	Mean /SD	Coef.	Ind. Var.	Mean /SD	Coef.	Ind. Var.	Mean /SD	Coef.
Median county house value	0.122 /0.065	–0.5948***	State taxable	0.076 /0.264	0.0119			
		(0.1511)			(0.0104)			
Median county income	0.044 /0.011	0.1608	State top tax rate	40.868 /3.011	0.0024			
		(0.8247)			(0.0029)			
County govt. debt/ capita	0.004 /0.006	–1.9207*	State share of high-income households	0.023 /0.009	0.5705			
		(1.1102)			(0.9383)			
County govt. exp./ capita	0.004 /0.005	8.8465***	County population change	0.062 /0.080	0.2475***			
		(1.8132)			(0.0693)			
BFM corruption measure 1	23.073 /24.965	–0.0006***	County unemployment rate	5.552 /2.354	0.0186***			
		(0.0001)			(0.0019)			
BFM corruption measure 2	21.288 /13.879	0.0010***	County unemployment S.D.	1.692 /0.666	–0.0271***			
		(0.0004)			(0.0065)			

Note: Dependent variable is bond offering yield. Sample includes all municipal debt issues that can be mapped to county data. Excluded would be state and supra-county bonds. Cities that cross county boundaries are assigned to the county with the largest number of zip codes. Standard errors are clustered by county. Maturity-by-month dummy variables included in the regression.

Focusing on the corruption measures from the Butler, Fauver, and Mortal (2009) paper, the coefficients are statistically significant and have the expected signs. With each coefficient, a two standard deviation change in the corruption measure is associated with a three basis point change in bond yields. The fact that our fractionalization measures continue to be significant once the Butler et al. corruption measures are included suggests that the local fractionalization measures are capturing some effect that is orthogonal to those authors' measures of corruption.

Counties with higher rates of population increase appear to borrow at higher rates, once we have controlled for county-level economic activity. Like our fractionalization measures, the rate of population increase can be viewed as a proxy for the strength of social networks within an area. If social networks take time to build, a population of recent arrivals will have weaker ties than a population that has been more static. County unemployment rates are positively associated with borrowing costs.

Our results support the hypothesis that measures of religious and ethnic fractionalization are correlated with municipalities' borrowing costs. Table 9 shows the results of an effort to assign some causal interpretation to that correlation, or at least to go further toward ruling out alternative stories behind the correlations documented in Tables 6 and 7. Because fractionalization measures may change with economic growth, which may also influence municipal borrowing costs, the goal in Table 9 is to find an instrumental variable that influences our fractionalization measures without exerting an independent effect on recent municipal borrowing costs. Our approach is to construct measures of the share white and ethnic fractionalization based on data from long before the sample period and use these measures constructed on the earlier period as instruments for the ethnic fractionalization in the 2000 Census. If the ethnic diversity measures based on the 2000 Census are correlated with recent economic activity, using diversity from the 1980 Census as an instrument will cleanse the variable of this source of correlation. The 1980 Census is the earliest Census that allows us to construct measures of ethnic diversity that separate out white and black non-Hispanic respondents.

Columns (3), (4), and (5) in Table 9 are instrumental variable specifications similar to the specifications in Table 6, with a minimal set of additional control variables. Columns (8), (9), and (10) are IV specifications with controls that are analogous to the richer set of controls in Table 7. In all specifications, both ordinary least squares (OLS) and using pre-sample ethnic diversity measures as instruments in IV specifications, we find a strong relationship between fractionalization and municipal bond yields. The magnitude of the coefficients is very similar across OLS and IV specifications, a result that reflects the very slow evolution of empirical measures of ethnic fractionalization and diversity. Taken together, the results in

Table 9: Instrumental Variable Regressions of Bond Offering Yield on Fractionalization, All Municipal Bonds

Independent Variable	Mean/SD	Bond Offering Yield									
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Technique		OLS	OLS	IV	IV	IV	OLS	OLS	IV	IV	IV
Instrument		NA		1980 Race Share White, 1980 Race Herfindahl			NA		1980 Race Share White, 1980 Race Herfindahl		
Controls		Table 6 (Minimal)					Table 7 (Maximal)				
Race Herfindahl, county	0.653 /0.202	–0.2435***		–0.3285***		–0.2037***	–0.1361***		–0.1936***		–0.2247***
		(0.0395)		(0.0478)		(0.0532)	(0.0334)		(0.0378)		(0.0458)
Race share white, county	0.748 /0.197		–0.2667***		–0.2890***	–0.1385***		–0.1323***		–0.1368***	0.0386
			(0.0376)		(0.0432)	(0.0403)		(0.0352)		(0.0392)	(0.0419)
Constant		4.9725***	4.9946***	5.1361***	5.0376***	5.1487***	4.5380***	4.5240***	4.5926***	4.5234***	4.5867***
		(0.0903)	(0.0882)	(0.0944)	(0.0815)	(0.0937)	(0.1357)	(0.1419)	(0.1365)	(0.1466)	(0.1384)
Observations		1189995	1189995	1187099	1187099	1187099	1186461	1186461	1183611	1183611	1183611
R-squared		0.8130	0.8134	0.8138	0.8137	0.8139	0.8800	0.8800	0.8803	0.8802	0.8803

Robust standard errors in parentheses

Note: Dependent variable is bond offering yield. Sample includes all municipal debt issues that can be mapped to county data. Excluded would be state and supra-county bonds. Cities that cross county boundaries are assigned to the county with the largest number of zip codes. Standard errors are clustered by county.
* Significant at 10%; ** significant at 5%; *** significant at 1%.

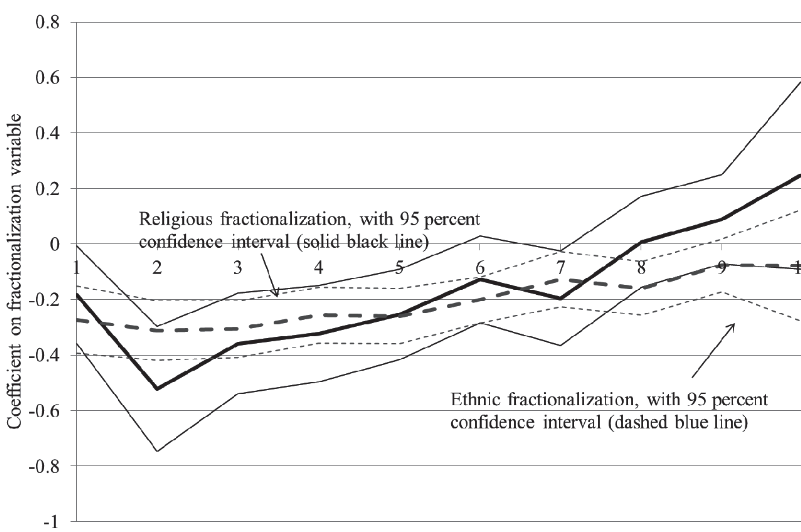
Table 6 through Table 9 suggest that municipal bond yields are positively associated with measures of religious and ethnic diversity. Although not absolutely fixed, the measures of diversity move slowly enough to suggest that our observed correlations do not reflect some underlying exposure of both variables to short-term or medium-term variables such as economic growth.

Risk Versus Monitoring

Having established a relationship between measures of religious and ethnic diversity and municipal borrowing costs, we now investigate the cause of this observed relationship. One hypothesis is that bonds issued by more fractionalized places are riskier than bonds issued by other places, a hypothesis we call the "risk" hypothesis. Our "monitoring" hypothesis is a residual hypothesis—any part of our observed differences that do not appear to reflect risk represents some inefficiency or failure of monitoring in the underwriting process for localities' municipal debt.

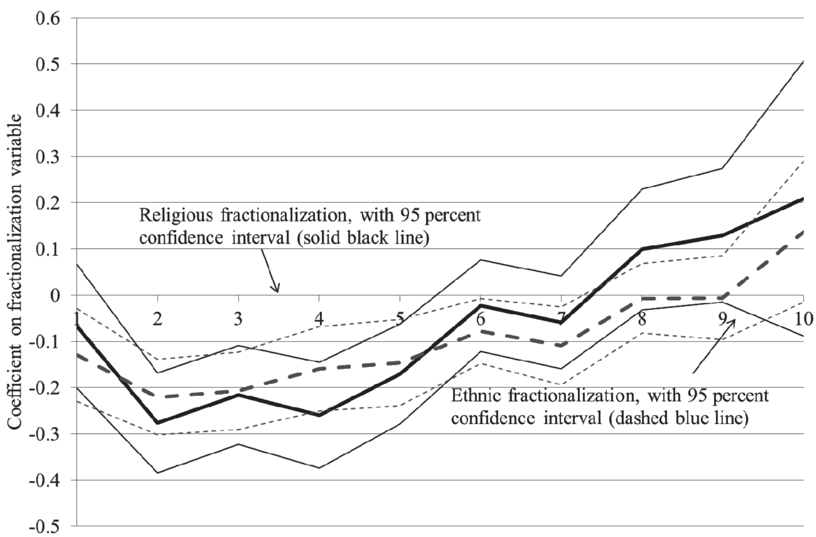
We begin this analysis by investigating how the relationship between fractionalization and bond yields varies across issues of different size. Figures 2 and 3 present the coefficients on religious and ethnic fractionalization, estimated separately on each decile of issue size. Figure 2 is based on regressions

Figure 2: Coefficients on Fractionalization by Issue Size Decile, Minimal Controls



Note: Minimal control regression specification (as in Table 6) fit by decile.

Figure 3: Coefficients on Fractionalization by Issue Size Decile, Maximal Controls



Note: Maximal control regression specification (as in Table 7) fit by decile.

with the minimal set of controls used in Table 6. Figure 3 is based on regressions with the maximal set of controls. Coefficient estimates are the dark lines, with two standard error bands around each set of estimates.

The fractionalization results in Tables 6 and 7 appear to be driven by the smaller-sized issues, a result that is, in our view, more consistent with the monitoring hypothesis than with the risk hypothesis. If the relationship were driven by the risk of the underlying instruments, there would be no reason to expect that the observed relationship should not also hold for the large issues—if risk matters for smaller issues, it should matter for the larger ones as well. But the large issues also attract a great deal of attention, while the smaller issues often attract minimal outside scrutiny. The fact that our fractionalization results are disproportionately driven by the small issues suggests that a monitoring problem, rather than risk differences, is at play

Continuing our focus on the relationship between fractionalization and municipal bond risk, Table 10 looks at the relationship between bond rating transitions and fractionalization.[9] The sample includes only bonds

[9] We focus on rating transitions because municipal default is rare enough that empirical tests using default as a dependent variable have minimal econometric power.

Table 10: Regressions of Bond Rating Transitions on Fractionalization

Independent Variable	Mean /SD	Bond Offering Yield									
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Controls		Table 6 (Minimal)					Table 7 (Maximal)				
Religion Herfindahl, county	0.330 /0.091	0.0060***				0.0024**	–0.0011				–0.0002
		(0.0009)				(0.0010)	(0.0009)				(0.0011)
		[0.0131]				[0.0052]	[–0.0024]				[–0.0004]
Religion members per capita, county	0.621 /0.165		0.0036***			0.0036***		–0.0023***		0.0007	
			(0.0004)			(0.0005)		(0.0005)			(0.0006)
			[0.0143]			[0.0143]		[–0.0091]			[0.0028]
Race Herfindahl, county	0.653 /0.202			0.0031***		0.0040***			0.0072***		–0.0010
				(0.0005)		(0.0008)			(0.0006)		(0.0009)
				[0.0150]		[0.0194]			[0.0349]		[–0.0049]
Race share white, county	0.748 /0.197				0.0010***	–0.0005				0.0099***	0.0107***
					(0.0004)	(0.0006)				(0.0005)	(0.0008)
					[0.0047]	[–0.0024]				[0.0468]	[0.0506]
Observations		3.49e+07	3.49e+07	3.49e+07	3.49e+07	3.49e+07	3.03e+07	3.03e+07	3.03e+07	3.03e+07	3.03e+07
R-squared		0.0003	0.0003	0.0003	0.0002	0.0003	0.0038	0.0038	0.0039	0.0039	0.0039

Robust standard errors in parentheses

Note: Month-by-bond observations. Dependent variable is categorical variable coded to 1 for bond downgrades in a given month, 0 for no change, and –1 for upgrades. Sample includes all municipal debt issues that can be mapped to county data and for which there are S&P credit ratings assigned to the underlying issuer (SPURs). Excluded would be state and supra-county bonds. Cities that cross county boundaries are assigned to the county with the largest number of zip codes. Standard errors clustered by county are in parentheses below the coefficient estimates. In brackets below the coefficient estimates and standard errors are the incremental downgrades per year for a two standard deviation increase in the independent variable.
* Significant at 10%; ** significant at 5%; *** significant at 1%.

for which Standard and Poor's assigns a rating to the underlying issuer, known as the "SPUR." On net, there does not appear to be any evidence that the bonds issued by more fractionalized places are downgraded at a more rapid pace than bonds issued by less fractionalized places. If anything, the places that are whiter and the places that are more homogeneous appear to have somewhat worse performance in terms of ratings transitions, although the result depends on the set of other controls included in the regressions. In the specification in column (10), which has a full set of controls and includes all of the diversity measures, the only significant coefficient is on the population share that is white. The positive coefficient suggests that, controlling for other factors, the counties that are whiter get downgraded more frequently than other counties. In this specification, the effect amounts to about 0.0506 rating notches (where the move from AA to AA–represents one notch) per year for a two standard deviation increase in the share white. In none of the other specifications is the effect large in economic magnitude.

Table 11 investigates the relationship between ratings at issuance and fractionalization. Because the long-term credit rating assigned to a bond at issuance is a function both of the credit quality of the underlying issuer (the SPUR), as well as the credit quality of a financial guarantor (if the bond is sold with bond insurance), the table presents three different types of regressions. In columns (1) through (4), the dependent variable is the long-term credit rating of the bond, reflecting both issuer credit quality and insurance. The dependent variable in columns (5) through (8) is the SPUR, and columns (9) through (12) use a dummy for bond insurance as the dependent variable. The results suggest that, even controlling for other observables, Standard & Poor's assigns more favorable credit ratings to issuers in counties with higher levels of religious observance (column (6)). There are no statistically significant relationships between measures of fractionalization or the share white and underlying issuer credit quality. The fact that bonds issued by more ethnically homogeneous counties are issued with higher credit ratings (column (3)) reflects the fact that more ethnically homogeneous counties are more likely to purchase bond insurance policies for the debt that they issue; there is no statistically significant difference in the S&P assessment of the bonds' underlying credit quality (column (7)).

On net, the results in Tables 10 and 11 do not point to an unambiguous win for the risk hypothesis versus the monitoring hypothesis. Table 11 suggests that Standard & Poor's views the bonds issued by more ethnically heterogeneous places as being slightly riskier than other bonds, but the statistical significance of this effect appears to be driven by bond insurance policies purchased by localities rather than the credit quality of the underlying issuers themselves. Post-issuance, there do not appear to be major

Table 11: Regressions of Bond Long-Term Credit Rating on Fractionalization, All Municipal Bonds

Independent Variable	Bond Long-Term Credit Rating				Bond SPUR				Bond Insurance Dummy			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Religion Herfindahl, county	–0.4365				–0.5225				0.1658***			
	(0.3813)				(0.5388)				(0.0572)			
Religion members per capita, county		–0.5516***				–0.9452***				–0.1155***		
		(0.2086)				(0.2743)				(0.0412)		
Race Herfindahl, county			–0.6758**				–0.6828				0.1673***	
			(0.3374)				(0.5555)				(0.0433)	
Race share white, county				–0.4939				–0.2711				0.1869***
				(0.3338)				(0.5551)				(0.0457)
Additional control variables: County size, issue size, bond size, bond trade count in first 60 days (all in logs), county median house price, county median income, county government debt and expenditure per capita, BFM corruption measures 1 and 2, competitive issue, negotiated issue, bond insurance dummy, GO dummy, callable dummy, putable dummy, AMT tax dummy, taxable dummy, state-tax dummy, state top tax rate, state share of households with income > 200k, county population growth (5 year), county unemployment rate, county standard deviation of unemployment rates, refunding bond dummy, and maturity-by-month dummies.												
Observations	579018	579018	579018	579018	464577	464577	464577	464577	1186441	1186441	1186461	1186461
R-squared	0.0975	0.0984	0.0987	0.0981	0.1901	0.1932	0.1913	0.1901	0.2137	0.2143	0.2150	0.2154
Robust standard errors in parentheses												

Note: Dependent variable in columns (1) through (4) is bond S&P long-term credit rating, scaled 1 (AAA) to 20 (D). Dependent variable in columns (5) through (8) is bond underlying rating (SPUR), not including effect of insurance. Dependent variable in columns (9) through (12) is dummy set to 1 for bonds sold with bond insurance. Sample includes all municipal debt issues that can be mapped to county data. Excluded would be state and supra-county bonds. Cities that cross county boundaries are assigned to the county with the largest number of zip codes. Standard errors are clustered by county.

* Significant at 10%; ** significant at 5%; *** significant at 1%.

differences in ratings transition experience for bonds across our measures of fractionalization. To the extent that there are differences, it appears that the ratings transition performance of more diverse places is better than the ratings transition performance of homogeneous places. This result as well is not consistent with the hypothesis that the bonds issued by the more diverse places are actually riskier than the bonds issued by the more homogeneous places.

Table 12 takes a different approach, using the S&P credit rating on the bond (as of the date of issuance) as a proxy for its risk and looking at differences in offering yield conditional on this proxy. The specification is the same as in Tables 6 and 7, except that the maturity-by-month of issue interaction has an additional interaction with the credit rating at the date of issue. This allows for a time-varying yield/credit curve. The coefficients on our diversity variables in this regression thus reflect offering yield differences conditional on the risk (as measured by S&P) of the instrument. The results suggest that, in particular for the measures of ethnic diversity, some of the observed differences in yields are not driven by the credit risk of the instruments. In columns (1) through (5), which use the minimal control set, the religion Herfindahl index, the race Herfindahl index, and the share white are all statistically significant and large in economic magnitude. Adding the additional controls (columns (6) through (10)) leaves the religion Herfindahl statistically insignificant, but the significance of the ethnic diversity measures remains in the specifications where they are included separately. In column (10), which includes all of the diversity measures together, no measure is individually significant—a result we ascribe to the collinearity among these diversity measures.

The results in Table 12 suggest that some part of the relationship between diversity and bond yields that we find in this paper is coming from monitoring rather than risk. This result is more robust for the ethnic diversity measures than for the religious diversity measures.

Using credit ratings as proxies for risk, as in Table 12, is not absolutely uncontroversial. The approach in Table 13 is to look at the post-issuance trading prices of the municipal bonds in our sample. We compare the post-issuance transaction prices of bonds issued by more and less diverse places. If there are differences in offering yields across localities of different diversity, and if these differences do not reflect risk, and if the markets in which these bonds trade are both efficient and liquid enough to observe trades, then we will observe price increases post-issuance among the bonds issued by fractionalized places. Note that this test requires that markets be both efficient and liquid enough to observe trades: it could be that the bonds issued by diverse places are not riskier but that they never trade once placed with their initial investors. In that case, our observed yield differences would represent windfall loss to diverse issues and windfall gain to the investors who purchase them, but no trades would be observed.

Table 12: Bond Offering Yield on Fractionalization, All Municipal Bonds, Controlling for Credit Rating

Independent Variable	Mean /SD	Bond Offering Yield									
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Controls		Table 6 (Minimal)					Table 7 (Maximal)				
Religion Herfindahl, county	0.331 /0.091	–0.1281**				–0.1927***	–0.0358				–0.0066
		(0.0510)				(0.0490)	(0.0296)				(0.0315)
Religion members per capita, county	0.622 /0.166		–0.0111			–0.0030		–0.0164			–0.0284
			(0.0281)			(0.0277)		(0.0170)			(0.0181)
Race Herfindahl, county	0.654 /0.202			–0.0772***		0.0762**			–0.0511***		–0.0300
				(0.0268)		(0.0309)			(0.0177)		(0.0247)
Race share white, county	0.748 /0.197				–0.1010***	–0.1668***				–0.0458***	–0.0331
					(0.0226)	(0.0311)				(0.0163)	(0.0232)
Additional control variables: County size, issue size, bond size, bond trade count in first 60 days (all in logs), county median house price, county median income, county government debt and expenditure per capita, BFM corruption measures 1 and 2, competitive issue, negotiated issue, bond insurance dummy, GO dummy, callable dummy, putable dummy, AMT tax dummy, taxable dummy, state-tax dummy, state top tax rate, state share of households with income > 200k, county population growth (5 year), county unemployment rate, county standard deviation of unemployment rates, refunding bond dummy, maturity-by-month dummies, and S&P credit rating of bond interacted with month of issuance.											
Observations		581932	581932	581932	581932	581932	579018	579018	579018	579018	579018
R-squared		0.8814	0.8813	0.8814	0.8815	0.8817	0.9342	0.9342	0.9342	0.9342	0.9342
Robust standard errors in parentheses											

Note: Dependent variable is bond offering yield. Sample includes all municipal debt issues that can be mapped to county data. Excluded would be state and supra-county bonds. Cities that cross county boundaries are assigned to the county with the largest number of zip codes. Standard errors are clustered by county.
* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 13: Regressions of 120-Day Post-Issuance Price Change on Fractionalization, All Municipal Bonds

Independent Variable	Mean /SD	120-Day Post-Issuance Price Change									
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Controls		Table 6 (Minimal)					Table 7 (Maximal)				
Religion Herfindahl, county	0.331 /0.091	–0.0030				0.0226	–0.0901***				–0.0727**
		(0.0373)				(0.0402)	(0.0304)				(0.0344)
Religion members per capita, county	0.622 /0.166		–0.0611***			–0.0741***		–0.0163			–0.0071
			(0.0192)			(0.0203)		(0.0165)			(0.0194)
Race Herfindahl, county	0.654 /0.202			–0.0485**		0.0071			–0.0425**		–0.0419
				(0.0227)		(0.0334)			(0.0173)		(0.0345)
Race share white, county	0.748 /0.197				–0.0619***	–0.0792**				–0.0236	0.0070
					(0.0222)	(0.0337)				(0.0189)	(0.0368)
Additional control variables: County size, issue size, bond size, bond trade count in first 60 days (all in logs), county median house price, county median income, county government debt and expenditure per capita, BFM corruption measures 1 and 2, competitive issue, negotiated issue, bond insurance dummy, GO dummy, callable dummy, putable dummy, AMT tax dummy, taxable dummy, state-tax dummy, state top tax rate, state share of households with income > 200k, county population growth (5 year), county unemployment rate, county standard deviation of unemployment rates, refunding bond dummy, percent difference between offering price and par, and maturity-by-month dummies.											
Observations		994962	994962	994962	994962	994962	991851	991851	991851	991851	991851
R-squared		0.1299	0.1302	0.1300	0.1301	0.1304	0.1410	0.1409	0.1409	0.1409	0.1410
Robust standard errors in parentheses											

Note: Dependent variable is 120-day post-issuance percent price change. Sample includes all municipal debt issues that can be mapped to county data. Excluded would be state and supra-county bonds. Cities that cross county boundaries are assigned to the county with the largest number of zip codes. Standard errors clustered by county.
* Significant at 10%; ** significant at 5%; *** significant at 1%.

The results in Table 13, which uses as a dependent variable the price increase during the first 120 days post-issuance, also suggest that part of our observed differences in yields reflects monitoring rather than risk.[10] Although the set of control variables included has some impact on our estimates, there is strong evidence that the bonds issued by more ethnically fractionalized localities trade at higher prices once they are issued. The price increase is small in economic magnitude: the coefficient of –0.0425 in column (8) suggests that a two standard deviation increase in ethnic diversity would be associated with a 1.6 basis point increase in the post-issuance price change. Scaling these results against Tables 6 and 7, where the dependent variable is the bond offering yield rather than the prices, suggests that a small but statistically significant part of the discount at offering is retraced in trades during the 120 days post-issuance.

This result can be viewed as strong evidence that at least some of the discount in the price of the bonds issued by more diverse places reflects monitoring rather than risk. The residual here does not necessarily reflect risk; as described above, this test relies both on windfall gains to the initial investors and a liquid market for the bonds once issued. It is possible that the monitoring effect is much larger, but unobserved because of a lack of trading. But taken as a whole, our results do suggest that at least part of the observed discount in municipal debt issued by diverse places reflects something other than risk differences.

CONCLUSION

Taken as a whole, these results suggest that ethnic and religious fractionalization play a role in determining municipal issuers' borrowing costs. Issuers in more fractionalized counties appear to pay more to borrow. The effect is statistically significant, robust across samples, and large in economic magnitude—comparable in magnitude to results in Butler, Fauver, and Mortal (2009) on corruption and municipal bond yields. We cannot place a precise bound around the share of the observed spread differences that reflect higher risk in more diverse places, but a variety of tests all point toward the conclusion that at least part of the spread difference is not driven by risk, that it reflects, instead, differential failures across localities in the efficiency with which the bond underwriting process is working.

References

Alesina, Alberto, Reza Baqir, and William Easterly (1999). "Public Goods and Ethnic Divisions." *Quarterly Journal of Economics, 114(4),* 1243–1283.

Alesina, Alberto, Arnaud Devleeschwauwer, William Easterly, Sergio Kurlat, and Romain Wacziarg (2003). "Fractionalization." *Journal of Economic Growth, 8(2),* 155–194.

---

[10] We use the weighted-average transaction price over the first 120 days post-issuance.

Alesina, Alberto, and Allan Drazen (1991). "Why Are Stabilizations Delayed?" *American Economic Review, 81(5),* 1170–1188.

Alesina, Alberto, and Eliana La Ferrara (2000). "Participation in Heterogeneous Communities." *Quarterly Journal of Economics, 115(3),* 847–904.

Butler, Alexander, Larry Fauver, and Sandra Mortal (2009). "Corruption, Political Connections, and Municipal Finance." *Review of Financial Studies, 22(7),* 2873–2905.

Collier, Paul (2000). "Ethnicity, Politics, and Economic Performance." *Economics and Politics, 12(3),* 225–245.

Collier, Paul, and Jan Willem Gunning (1999). "Explaining African Economic Performance." *Journal of Economic Literature, 37(1),* 64–111.

Easterly, William, and Ross Levine (1997). "Africa's Growth Tragedy: Politics and Ethnic Divisions." *Quarterly Journal of Economics, 112(4),* 1203–1250.

Finke, Roger, and Christopher Scheitle (2005). "Accounting for the Uncounted: Computing Correctives for the 2000 RCMS Data." *Review of Religious Research, 4(1),* 5–22.

Gettleman, Jeffrey (2011). "In Sudan, a Colonial Curse Comes Up for a Vote." *New York Times*, January 8, 2011.

Glaeser, Ed, Jose Scheinkman, and Andrei Shleifer (1995). "Economic Growth in a Cross-Section of Cities." *Journal of Monetary Economics, 36(1),* 117–143.

Hilary, Gilles, and Kai Wai Hui (2009). "Does Religion Matter in Corporate Decision Making in America?" *Journal of Financial Economics, 93(3),* 455–473.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny (1999). "The Quality of Government." *Journal of Law, Economics, and Organizations, 15(1),* 222–279.

McCleary, Rachel, and Robert Barro (2003). "Religion and Economic Growth." *American Sociological Review, 68(5),* 760–781.

McCleary, Rachel, and Robert Barro (2006a). "Religion and Political Economy in an International Panel." *Journal for the Scientific Study of Religion, 45(2),* 149–175.

McCleary, Rachel, and Robert Barro (2006b). "Religion and Economy." *Journal of Economic Perspectives, 20(2),* 49–72.

Putnam, Robert D. (1993). *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton, NJ: Princeton University Press.

Putnam, Robert D. (1995). "Bowling Alone: America's Declining Social Capital." *Journal of Democracy, 6(1),* 65–78.

Vigdor, Jacob (2004). "Community Composition and Collective Action: Analyzing Initial Mail Response to the 2000 Census." *Review of Economics and Statistics, 86(1),* 303–312.

Whalley, Alexander (2011). *Elected Versus Appointed Policymakers: Evidence from City Treasurers*. NBER Working Paper 15643. Cambridge, MA: National Bureau of Economic Research.