

The Dodd-Frank Act and Municipal Borrowing Costs: Evidence from Nationwide Data

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Abstract

In this manuscript I provide high quality causal evidence on the role of the Dodd-Frank Act in lowering the interest costs of municipal securities by improving the quality of financial advice provided to issuers by newly regulated private sector firms and individuals. This evaluation is of considerable importance for guiding both federal financial regulation and the decision-making of municipalities seeking to finance infrastructure and development projects at the lowest cost to citizens in their jurisdiction. Using nationwide high-frequency data on the interest rate of municipal bonds issued in the United States during the period 2002 to 2018, I test three mechanisms through which quality improvements and savings may have been realized: third-party certification to address information problems, monitoring to address principal-agent problems, and technical expertise. I find that reductions in interest costs due to Dodd-Frank are greatest among bonds requiring relatively more certification. I find no evidence that the quality of monitoring improved in a way that manifested in lower costs for bonds for which those services are particularly needed, and mixed support that expertise improved. I estimate that for an average bond issue, Dodd-Frank resulted in about \$150,000 in interest cost savings. For a bond issue with a low credit rating, Dodd-Frank resulted in, on average, about \$480,000 in savings.

1 Introduction

In this manuscript I provide high quality causal evidence on the role of the Dodd-Frank Act in lowering the interest costs of municipal securities by improving the quality of financial advice provided to issuers by newly regulated private sector firms and individuals. This evaluation is of considerable importance for guiding both federal financial regulation and the decision-making of municipalities seeking to finance infrastructure and development projects at the lowest cost to citizens in their jurisdiction. Using nationwide high-frequency data on the interest rate of municipal bonds issued in the United States during the period 2002 to 2018, I test three mechanisms through which quality improvements and savings may have been realized: third-party certification to address information problems, monitoring to address principal-agent problems, and technical expertise. I find that reductions in interest costs due to Dodd-Frank are greatest among bonds requiring relatively more certification. I find no evidence that the quality of monitoring improved in a way that manifested in lower costs for bonds for which those services are particularly needed, and mixed support that expertise improved.

Municipal securities are the primary mechanism by which state and local governments raise money to execute capital-intensive public projects. While state governments have established a diversity of legal and institutional frameworks with which they regulate themselves and the municipalities under their jurisdiction, the federal government has historically been mostly hands-off ([Simonsen and Hill, 1998](#); [Johnson, Luby, and Moldogaziev, 2014](#)). The market is a four trillion dollar one, and is the source of financing for two-thirds of the infrastructure in the United States ([MSRB, 2021](#)). Industries have sprung up to facilitate the market in a variety of ways, which is particularly important because the market is decentralized and over-the-counter. To the extent that the federal government has exercised any authority in the municipal market, it has done so by regulating private-sector participants in these industries

rather than issuers.¹

In the aftermath of the 2008 financial crisis and its global economic fallout, President Barack Obama signed the Dodd-Frank Wall Street and Consumer Protection Act into law on July 21, 2010. The Act reorganized and reformed the U.S. financial regulatory system as a whole, with the aim of addressing systemic risk and vulnerability revealed by the global financial crisis of 2007 to 2010 and enhancing protections to investors and consumers (*Dodd-Frank Wall Street Reform and Consumer Protection Act, 2010*). Just as the municipal securities market was not left unaffected by turmoil in financial markets, so too did its supporting industries gain the attention of legislators bent on reform. In addition to general interest in stabilizing capital markets, the federal government is affected by municipal securities in the form of tax expenditures. Conditional on the bond issue meeting certain requirements, the federal government excludes the interest that investors earn for purchasing municipal bonds from income for tax purposes. In other words, the United States Treasury Department forgoes revenues to the benefit of state and local government borrowers, and therefore has a vested interest in a stable, efficient, and low-interest-rate municipal bond market.²

In particular, the Act contains provisions intended to enhance and ensure the quality of financial advice provided by a group of individuals and firms that advise states and localities on, among other things, the issuance of municipal bonds (*Dodd-Frank Wall Street Reform and Consumer Protection Act, 2010*). In the decade prior to and including 2010, about 60 percent of municipal bonds were issued with the involvement of a municipal advisor.³ Prior to the Act, the role was ill-defined, unlicensed, and unregulated. Municipal advisors come in many forms - from single individuals operating out of their homes, to groups in consulting firms with public sector clientele, to branches within Wall Street investment banks and firms (*Luby and Hildreth,*

¹See *Greer, Moldogaziev, and Grandage (2018)* for an account of federal regulatory activity in the municipal securities market through 2018.

²See *Johnson, Luby, and Moldogaziev (2014)* for more on the tax exemption of municipal bonds.

³Based on data from the Ipreo Municipal Application.

2014). Concerns about the quality of the financial advice, particularly the advice to use derivatives and other complex financing schemes which left muni issuers and their creditors vulnerable during the financial crisis, prompted the federal government to intervene in the municipal advisor space (Luby and Hildreth, 2014). In an amendment to the Securities Exchange Act (SEC) of 1934, Dodd-Frank requires previously unregulated municipal advisors to register with the SEC and Municipal Securities Rulemaking Board (MSRB), charges SEC with formally defining the role of municipal advisor, and charges MSRB with rulemaking authority for regulating municipal advisors. The Act also imposes on municipal advisors a federal fiduciary duty to the state and local governments they advise.

For at least three decades, scholars of the municipal securities market have written on the role of municipal advisors, particularly with regard to their effect on issuers' borrowing costs (Forbes, Leonard, and Johnson, 1992). The theoretical basis for these papers largely stems from the information economics and principal-agent literatures, specifically their ability to assuage information asymmetry through third-party certification and their usefulness in monitoring underwriters who may have monopsony power and whose business activities make them agent to both issuers and lenders (Forbes, Leonard, and Johnson, 1992; Simonsen and Hill, 1998). Since the passage of Dodd-Frank, a number of papers have explained how the Act and the subsequent regulations work or tested hypotheses related to municipal advisor quality but not directly the effect of Dodd-Frank.⁴ Only one paper has sought to produce evidence on the effect of the Act on borrowing costs. Using data from California over the period 2013 to 2015 and a quasi-experimental research design, Ivonchyk (2019) finds that the registration rules finalized in 2014 were associated with a reduction in borrowing costs for bonds issued with a municipal advisor.

The contributions of this manuscript are as follows: to expand the empirical ev-

⁴See Johnson (2013); Luby and Moldogaziev (2013); Luby and Hildreth (2014); Gao Liu (2015); Moldogaziev and Luby (2016) and Bergstresser and Orr (2014).

idence on the effect of Dodd-Frank on borrowing costs using a nationwide dataset over the period 2002 to 2018, considering the immediate effect of the federal fiduciary duty and temporary registration rule in place starting late 2010; to leverage both my comprehensive dataset and the significant policy intervention to rigorously revisit previous authors' hypotheses; and to explore the mechanisms through which municipal advising benefits issuers – namely, by comparing the relative contributions of certification, monitoring, and the provision of technical expertise.

The manuscript proceeds as follows. In the next section, I review the literature on certification, monitoring, and expertise in order to theoretically motivate the subsequent empirical work. Following that, I explain my empirical approach by describing the data and research design and distinguishing my contribution from [Ivonchyk \(2019\)](#). In section 4 I present and discuss the results of regressions of the effect of Dodd-Frank on yield. I begin with the overall market effect and then focus upon the main questions at hand – whether Dodd-Frank affected yield by improving the quality of municipal advisors' certification, monitoring, and expertise services. Finally, I conclude with a summary of the manuscript and the savings implications of my findings.

2 Theoretical Motivation

The amount of interest that issuers of municipal securities must pay to lenders is affected by the advice they receive ([Vijayakumar and Daniels, 2006](#); [Allen and Dudeney, 2010](#)). Federal regulation of municipal advisors as mandated by Dodd-Frank potentially improves the quality of advising through three mechanisms: the services of certification, monitoring, and technical expertise rendered by municipal advisors. Bond issues vary significantly in their attributes as well as the attributes of the issuer. Depending on these attributes, certification, monitoring, and expertise may be of greater or lesser value and necessity. In this section, I discuss the theory behind

each mechanism and the empirical evidence that substantiates it.

2.1 Certification

The municipal securities market suffers from information problems, most importantly the difficulty for investors of determining the creditworthiness of securities issued in a decentralized market (Diamond, 1984; Leland and Pyle, 1977; Millon and Thakor, 1985). Financial intermediaries serve to address this asymmetry in two main and interconnected ways: by direct provision of information and through third-party certification, where the certification is itself also information provision. Municipal advisors prepare the legal documents that accompany a notice of sale of securities, detailing the issuer's fiscal position and ability to pay debt service in a timely fashion (Forbes, Leonard, and Johnson, 1992). The municipal advisors are using their reputational capital to assure investors that the information and judgments they are providing are trustworthy, effectively providing third-party certification (Forbes, Leonard, and Johnson, 1992). Researchers of information asymmetry originated the concept of third-party certification in securities markets with regard to underwriters (Booth and Smith, 1986).

In the first scholarship on independent financial advisors in the primary market for municipal securities, Forbes, Leonard, and Johnson (1992) extend the theory of certification from underwriters to independent financial advisors, though they find no evidence that financial advisors lowered yields in a sample of tax-exempt bonds sold through negotiation. Soon after, Johnson (1994) found that issuers of competitively sold bonds facing relatively significant *ex ante* uncertainty, i.e., higher levels of information asymmetry, were more likely to employ a financial advisor, suggesting greater demand for certification. Vijayakumar and Daniels (2006), more than ten years later, found that the use of a financial advisor was associated with a yield reduction particularly among bonds secured by project revenues. They argue that because project

revenues are less secure than a general obligation pledge and because, in particular, investors face difficulty in understanding revenue projections as well as finding them credible, their findings can be attributed largely to the effect of certification. In their paper measuring the effect of financial advisor quality, [Allen and Dudney \(2010\)](#) argue that the value of advising may be higher for so-called opaque bonds – ones in which investors have less assurance of creditworthiness, operationalized by focusing on bonds that are unrated or lower-rated. While the authors do not explicitly use the theory of certification in explaining why advising quality may be of particular importance for issuers of opaque bonds, their finding that the effects are more pronounced in that subsample generally support the theory.

2.2 Monitoring

Financial advisors' services and potential benefits differ according to whether the bond issue is sold (to underwriters) through a competitive auction or through negotiation. In negotiated sales, a pre-selected underwriter or group of underwriters work with the municipal advisor (if one is engaged) in structuring and marketing. Scholars have also theorized that the financial advisor may serve to monitor the underwriters' activities in negotiated sales. Because the process is not a competitive one past the point when the underwriter is pre-selected, issues of monopsony power may arise. The difference between the price that underwriters pay the issuer for securities and the price they receive for the securities in reoffering to investors who will hold the securities is an important source of profits for banks that underwrite municipal securities ([Forbes, Leonard, and Johnson, 1992](#); [Moldogaziev and Luby, 2016](#)). These mixed incentives lead to a principal-agent problem, where banks are agents to both the issuer and their customers (the investors) ([Simonsen and Hill, 1998](#)). The principal-agent problem may be exacerbated in negotiated sales due to the problem of monopsony power. [Forbes, Leonard, and Johnson \(1992\)](#) were the first to hypothesize that the

use of a financial advisor might mitigate the potential for higher borrowing costs due to underwriter monopsony and principal-agent problems, for which they find weak empirical support. As data availability improved over time, [Vijayakumar and Daniels \(2006\)](#) revisited the monitoring topic, finding strong empirical support which was further supported by [Allen and Dudley \(2010\)](#) and [Luby and Moldogaziev \(2013\)](#).

2.3 Expertise/Quality

A relatively less studied topic than either certification or monitoring is the expertise which municipal advisors provide to issuers for whom they work. Particularly (but not exclusively) in competitive sales, municipal advisors provide origination services beyond simply preparing documentation. These services include determining the maturity structure of the securities, timing the market for favorable conditions for sale, hiring other service providers such as bond counsel, and responding to increasing complexity in bond issues and the securities market overall ([Clarke, 1997](#); [Vijayakumar and Daniels, 2006](#)). Many subnational governments (probably appropriately) lack the in-house expertise and administrative capacity to adequately conduct these activities themselves ([Vijayakumar and Daniels, 2006](#)).

Some bond issues are more complex than others, with so-called "vanilla" general obligation bonds typically considered the least complex. Scholars have identified a number of features or characteristics that add complexity – and therefore, need for expertise – and have produced some scholarship on the relationship between municipal advisors and complexity. [Vijayakumar and Daniels \(2006\)](#) find greater savings from involvement of a municipal advisor when issuing refunding rather than new money bonds, which they attribute to refunding securities being more complex. There are two types of refundings – current and advanced. In current refundings, proceeds from the newly issued (refunding) bonds are used to pay off the outstanding (refunded) bonds within 90 days. When the outstanding bonds cannot be called and paid back

within 90 days, the refunding is called an advance refunding. Advance refundings require additional technical and legal expertise beyond that of a current refunding. Proceeds of advance refundings are typically placed in an escrow account and invested; the investments must be made carefully and knowledgeably to avoid running afoul of federal arbitrage rules.

Vijayakumar and Daniels (2006) also find larger cost reductions for revenue and negotiated bonds, a finding supported by Allen and Dudley (2010) in their study of the effect of the quality of municipal advice. Revenue bonds (which are often sold through negotiation) are viewed as being higher complexity due to the necessity of projecting revenue streams. However, as mentioned above, revenue and negotiated bonds may also require more certification or monitoring, respectively, making the mechanism through which municipal advising is advantageous somewhat difficult to disentangle.

3 Empirical Approach

To test the effect of Dodd-Frank on municipal interest costs, I use data on primary market issues from 2002 through 2018 accessed from the Ipreo Municipal Application. These data are from issues nationwide and by all types of issuers, and ostensibly cover the universe of bond issues in the states and DC over the period. After limiting to fixed-rate bonds of three years or more maturity and eliminating those sold through private placement, the observations number 2,060,314. Summary statistics are shown in Table 1.

The dependent variable is the yield on maturity, the annual rate of return to the lender (and cost to the issuer), which is determined by the amount received by the issuer at the time of sale, the coupon rate, and the length of time before the bond matures and is repaid. I consider all bonds issued after the year 2010 to be potentially affected by the Act's regulation of municipal advisors. While the full slate of

new regulations took years to roll out, municipal advisors were required to register with SEC under a temporary rule effective October 1, 2010 (*17 CFR 240.15Ba2-6T, 2010*). Additionally, their statutory fiduciary duty was in force at this time, and it was apparent to advisors that further rulemaking would be forthcoming.

In the previous empirical work on Dodd-Frank and borrowing costs, *Ivonchyk (2019)* uses data on municipal securities issued in California in the period 2013 to 2015 to investigate the effect of policies in place by November 1, 2014 on true interest cost (TIC), finding that bonds issued with a municipal advisor after November 1, 2014 had on average a lower TIC by 11 basis points overall, with greater savings among bonds sold by negotiation. I extend his work by using data from the entire nation and a longer time period (2002 to 2018). I depart from his work by considering the immediate effect of the fiduciary duty and registration requirement, as well as, implicitly, the expectation of future regulation. An additional difference is that I use the yield for each maturity of a bond issue rather than the TIC. The latter accounts for the time-adjusted rate of interest for the entire bond issue, while the former is the time-adjusted rate for components of the issue. TIC also, at times, incorporates more information on borrowing costs other than interest paid to the investor, such as fees to municipal advisors, bond counselors, and miscellaneous costs. However, if these costs are financed through the bond issue, they may be reflected in the individual yields as well. Additionally, practitioners and scholars alike acknowledge that the TIC reported in California's publicly available bond data may not fully account for these costs either. No source exists that includes TIC and covers all issuers, a trade-off familiar to researchers of municipal securities.

3.1 Research Design

I use a generalized difference-in-differences (DID) design to test whether Dodd-Frank's regulation of municipal advisors impacted the borrowing costs for issuers. This type of

Table 1: Descriptive Statistics, N=2,060,314

Variable	Mean	Std. Dev.	Min	Max
Yield on Maturity, basis points [◊]	297	124	0	600
Issue Par Amount, ln	16.4	1.56	9.62	23.0
Years to Maturity	9.42	6.27	0	100
Bond Buyer 20 Index	4.22	0.54	2.80	6.01
Has Municipal Advisor	0.67	0.47	0	1
AAA	0.071	0.26	0	1
AA	0.35	0.48	0	1
A	0.26	0.44	0	1
BBB or lower	0.22	0.42	0	1
Not Rated	0.10	0.30	0	1
Tax Exempt	0.93	0.25	0	1
Subject to AMT	0.017	0.13	0	1
Taxable	0.048	0.21	0	1
Bank Qualified	0.40	0.49	0	1
Callable	0.87	0.33	0	1
General Obligation	0.62	0.49	0	1
Appropriation-backed	0.0030	0.054	0	1
Revenue-backed	0.37	0.48	0	1
Double-Barreled	0.0014	0.038	0	1
New Money	0.47	0.50	0	1
Refunding	0.53	0.50	0	1
State	0.12	0.33	0	1
City	0.32	0.47	0	1
City and County	0.0046	0.068	0	1
County	0.12	0.32	0	1
Higher Education	0.018	0.13	0	1
School District	0.24	0.43	0	1
Special District	0.040	0.20	0	1
Credit Enhanced	0.000057	0.0076	0	1
Issuer Insured	0.15	0.36	0	1
Insured	0.37	0.48	0	1
Sinking Fund	0.055	0.23	0	1
Competitive Sale	0.39	0.49	0	1
Negotiated Sale	0.61	0.49	0	1

Data from Ipreo Municipal Application & Thomson Reuters/The Bond Buyer.

[◊] Basis points are equal to 1/100th of a percentage point.

research design compares outcomes of a treated group after an intervention to a control group (to which the intervention does not apply) over the full study period and to the treated group prior to intervention. In this case, municipal bond issues on which a municipal advisor has been employed are the treated group; those without an advisor are the control. The post-period, or period after intervention, includes the years 2011 to 2018, after the Act was signed into law. Empirical models are in the following form, where β_1 is the primary variable of interest, β_2 controls for time-invariant differences in yield between bonds issued with a municipal advisor and those issued without, and λ controls for differences over time that affect both bonds issued with and without an advisor:

$$Yield_{migt} = \alpha_0 + \beta_1 MA_i * Post-2010_t + \beta_2 MA_i + \beta X_m + \beta X_i + \beta X_g + \gamma_g + \lambda_t + \epsilon_{migt}$$

where...

m indexes bond maturities

i indexes bond issues

g indexes issuers

t indexes years

X are vectors of covariates at the maturity-, issue-, and issuer-level

γ are issuer fixed effects

λ are year fixed effects

...and ϵ are standard errors clustered at the issuer level

The DID research design assumes that potential confounding variation which would lead to omitted variable bias is limited to two types. The first type is the result of time-invariant differences between the groups that affect the outcome of interest, i.e., between bonds issued with the aid of a municipal advisor and those without. The second type is due to change over time that affects both groups in common, such as economic

or market forces, that are correlated with the outcome. If the assumption holds, the DID design is valid and differences between the groups after the policy intervention can be attributed to the intervention.

Throughout the analysis, I explore the validity of the key assumption of the DID design – called the parallel trends assumption – with both a simple plot of mean yield over time, distinguishing between bonds issued with an advisor and those without, as well through a regression-based approach. The latter takes the form of an event study, where yield is regressed on a set of indicator variables that are the interaction of whether an issue had a municipal advisor involved and each year in the data. The year Dodd-Frank was passed, 2010, and issues without a municipal advisor are the comparison group against which each indicator (or event) is measured. The event study regressions differ from the DID designs in the main specifications only in that $\beta_1 MA_i * Post-2010_t$ and $\beta_2 MA_i$ are replaced by the indicator variables as described. The event study regressions take the form of the equation:

$$Yield_{migt} = \alpha_0 + \sum_{\tau=2002}^{2009} \xi_{\tau} I(t = \tau) * MA_i + \sum_{\tau=2011}^{2018} \zeta_{\tau} I(t = \tau) * MA_i + \beta \mathbf{X}_m + \beta \mathbf{X}_i + \beta \mathbf{X}_g + \gamma_g + \lambda_t + \epsilon_{migt}$$

An event study in which the pre-treatment (pre-2010) indicator variables show no statistically significant evidence of a trend in direction supports the validity of the research design. In other words, event estimates different from zero are acceptable, so long as their direction over time is neither statistically significantly upward- nor downward-sloping. The lack of an evident trend in the event study's parameter estimates in the pre-treatment period means that the outcome variable was neither converging nor diverging between the treatment and control groups.

3.2 Analysis Plan

Upon establishing the effect on yield overall, I move on to the main contribution of the manuscript: attempting to establish the mechanism(s) through which municipal advisor quality affects borrowing costs by focusing on certain issue attributes established in the literature as requiring greater certification, monitoring, or expertise. Relative to the literature, I place a greater emphasis on the question of the importance of expertise.

The attributes I focus on for testing the importance of certification are credit ratings and security pledge. Credit ratings are considered the strongest signal to investors of creditworthiness; the source of repayment is also viewed as important to investors' perception of the likelihood that they will be repaid in a timely fashion. I hypothesize that if Dodd-Frank improves the quality of municipal advice by way of enhanced certification, bonds with lower credit ratings will receive greater cost reductions relative to those with higher credit ratings, and bonds with a less secure pledge (i.e., project revenues) will benefit more than those with a more secure pledge (i.e., general obligation).

Should Dodd-Frank, and particularly the imposition of fiduciary responsibility therein, improve the monitoring function of municipal advisors, bonds sold through negotiation should benefit more than those sold through competition. Finally, if the scrutiny, registration requirement, and subsequent (and anticipated in 2010) further increases in regulatory burden serve to "weed out the charlatans" (Johnson, 2013) in the municipal advising industry, bonds requiring more expertise in structuring and marketing due to higher complexity may be expected to show greater cost savings than simpler issues. To test this hypothesis, I focus on refunding versus new money bonds – distinguishing between current and advance refundings – and bonds with versus those without call features.

Isolating the potential theoretical mechanisms through which municipal advisor

quality affects borrowing costs is difficult. As previously mentioned, securities backed by project revenues likely require both greater certification and greater expertise. Moreover, many bond issues simultaneously feature attributes requiring a combination of municipal advisor services and potential benefits. I attempt to address this difficulty by creating additional subsamples of the data that are as mutually exclusive as feasible.

The “certification sample” is restricted to new money, competitively sold revenue bonds. I further exclude bonds that have either a AAA rating or AA rating that is insured. By excluding refunding bonds, I limit the need for expertise; by excluding negotiated bonds, I limit the need for underwriter monitoring; by restricting to revenue-backed, relatively lower-rated bonds, I maximize the need for certification by focusing on bonds with greater information asymmetry. I will, however, be unable to distinguish between certification needs and expertise needs given project revenues as security.

The “monitoring sample” consists of new money, negotiated bonds backed by general obligation with a credit rating of AAA or of AA plus bond insurance. Underwriter monitoring is virtually exclusively a factor in negotiated sales. The remainder of the restrictions are to limit the relevance of expertise (in refunding bonds) and certification (in revenue bonds and low-rated bonds). Finally, the “expertise sample” includes only refunding, competitively sold bonds backed by revenue and with a call feature. As discussed above, refunding, callability, and revenue pledge are considered more complex; I exclude negotiated bonds in order to limit the influence of the need for underwriter monitoring.

My definition of the certification, monitoring, and expertise subsamples is far from perfect due to trade-offs between isolating specific attributes into mutually exclusive categories while maintaining a sufficient number of observations for a specification that features a large set of controls, issuer and year fixed effects, and clustered stan-

dard errors. However, I hope to advance the conceptualization of the three distinct mechanisms through which municipal advisors affect borrowing costs and how Dodd-Frank may have influenced them to varying degrees.

4 Results

For all specifications, I present figures showing the unadjusted trends in yield for bonds issued with and without a municipal advisor in the upper panel and, in the lower panel, the parameter estimates and 95 percent confidence intervals from the event study described in Section 3.2. These figures attest to the validity of the DID design if 1) the trend over time in mean yield is similar for bonds issued with and without a municipal advisor (top panel) and 2) the parameter estimates for the period 2002 to 2009 show no evidence of either an upward or downward trend (bottom panel). I report the full set of regression results (with the exception of issuer and year fixed effects) for the first specification, where all bonds are included. Subsequently I report only the parameter estimate and standard error for the primary variable of interest which measures the effect on yield of municipal advisor involvement after Dodd-Frank was adopted in 2010. In all tables of regression results I report the mean yield among bonds issued with a municipal advisor *prior to 2011*, as well as the percent change from that mean which the parameter estimate represents, the number of observations, and the adjusted R^2 . I compare to pre-Dodd-Frank yields for bonds with a municipal advisor for ease of interpretation of effect magnitude for the relevant set of securities.

4.0.1 Results for full sample and discussion of covariates

Figure 1: Yield - All Bonds

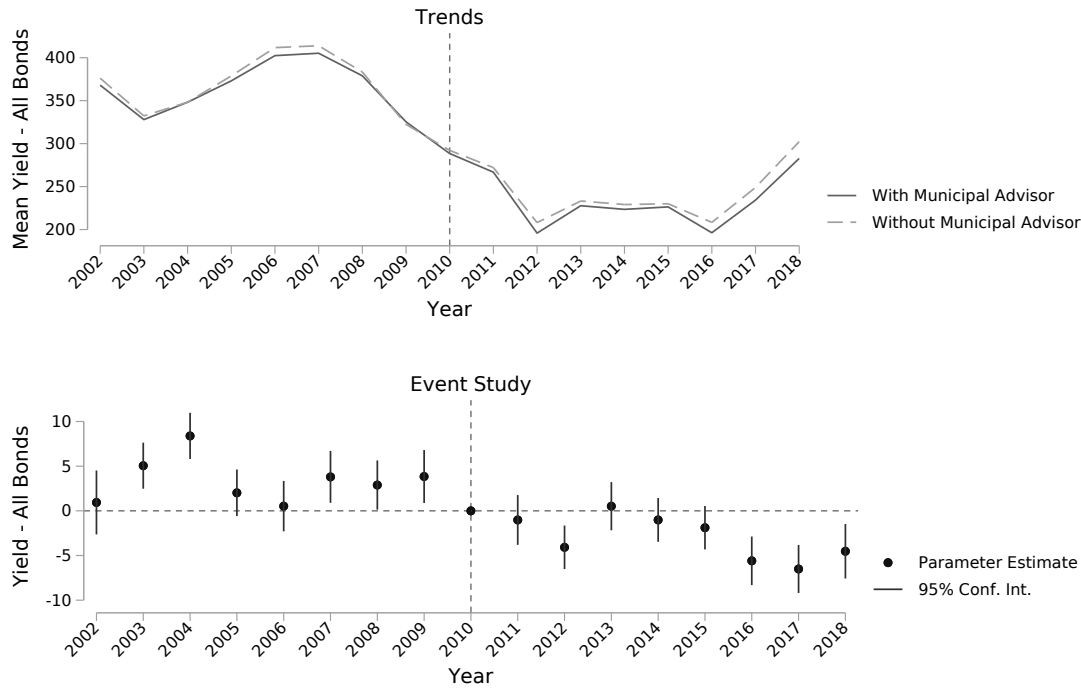


Figure 1 shows that the unadjusted trends and event study for yield among all bonds satisfy the main assumption of the research design. Table 2 displays the regression results for the full sample of bonds. Of greatest interest is the coefficient for $MA * Post-2010$. Bonds issued with a municipal advisor after Dodd-Frank were on average 5.927 basis points lower yield than those issued with a municipal advisor prior to the Act and than those issued without a municipal advisor over the period, at the 99 percent confidence level. This estimate is equal to a two percent reduction in yield from the pre-Dodd-Frank mean yield for bonds issued with a municipal advisor. The estimate on an indicator for using a municipal advisor prior to 2011 (MA) is close to zero and statistically insignificant.

As is typical in bond pricing studies, I include variables at the bond maturity, issue, issuer, and market level to account for their effect on primary market yield. Issue par amount, transformed to the natural log, is negative, though not statistically

Table 2: Effect of Dodd-Frank on Yield: All Bonds

MA*Post-2010	-5.927*** (0.657)	Revenue-backed	12.15*** (0.643)
MA	0.759 (0.576)	Double-Barreled	-4.964** (2.493)
Issue Par Amount, ln	-0.343 (0.213)	Refunding	3.191*** (0.258)
Years to Maturity	12.06*** (0.0527)	City	-2.397 (4.672)
Bond Buyer 20 Index	67.50*** (0.451)	City and County	-2.269 (9.019)
AA	12.66*** (0.810)	County	-2.483 (3.631)
A	25.57*** (1.040)	Higher Education	16.19** (6.316)
BBB or lower	27.09*** (1.307)	School District	2.942 (4.905)
Not Rated	63.17*** (1.737)	Special District	-16.75*** (4.841)
Subject to AMT	13.01*** (2.273)	Credit Enhanced	-212.7*** (56.32)
Taxable	89.18*** (0.751)	Issuer Insured	-6.192*** (0.493)
Bank Qualified	-13.03*** (0.401)	Insured	-5.290*** (0.426)
Callable	17.57*** (0.439)	Sinking Fund	4.910*** (0.684)
Appropriation-backed	13.85*** (3.602)	Negotiated Sale	11.84*** (0.496)
Constant	-142.0*** (4.780)		
w/MA 2002-10 avg. yield	357.521		
Δ from w/MA 2002-10 avg. yield	-2%		
N	2,059,569		
Adjusted R ²	0.826		

Standard errors in parentheses, clustered at issuer level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Data from Ipreo Municipal Application & Thomson Reuters/The Bond Buyer

significant. Years to maturity, the weekly Bond Buyer 20 Index (a measure of prevailing market interest rates provided by Thomson Reuters), ratings of AA, A, BBB or lower and not rated bonds (as relative to the omitted category – AAA-rated bonds)⁵, bonds subject to the alternative minimum tax or federal tax (as relative to the omitted category – exempt from federal income taxation), bonds backed by appropriation or revenue (as opposed to general obligation bonds), bonds with a call feature, refunding bonds, negotiated bonds, and bonds with a sinking fund all have a statistically significant relationship with higher yield on maturity at the 0.01 level.

Special district issuers have lower yield on maturity, on average, than state issuers, significant at the 0.01 level, while cities, counties, combined city-counties, and school districts are not significantly different than states; issuers in the higher education sector pay higher yields than states, at the 0.05 level. Double-barreled bonds (those backed both by revenue from the financed project and the taxing powers of the jurisdiction) are lower yield on average than general obligation bonds, at the 0.05 level. Bonds that are bank qualified, those that are insured or issued by an insured issuer, and those that bear a credit enhancement such as a bank letter of credit have a lower yield on average, all at the 0.01 level. These findings are consistent with the bond pricing literature (Butler, Fauver, and Mortal, 2009; Guzman and Moldogaziev, 2012; Robbins and Simonsen, 2007; Johnson and Kriz, 2002; Forbes, Leonard, and Johnson, 1992; Johnson, 1994; Moldogaziev and Luby, 2012; Moldogaziev, Greer, and Lee, 2019; Vijayakumar and Daniels, 2006).

4.1 Results - Certification

Figures 2 through 6 provide moderate support for the DID design for bonds rated

⁵Credit rating variables are constructed by taking the highest underlying rating received from Fitch, Moody's, and Standard & Poor's.

Figure 2: Yield - AAA-Rated Bonds

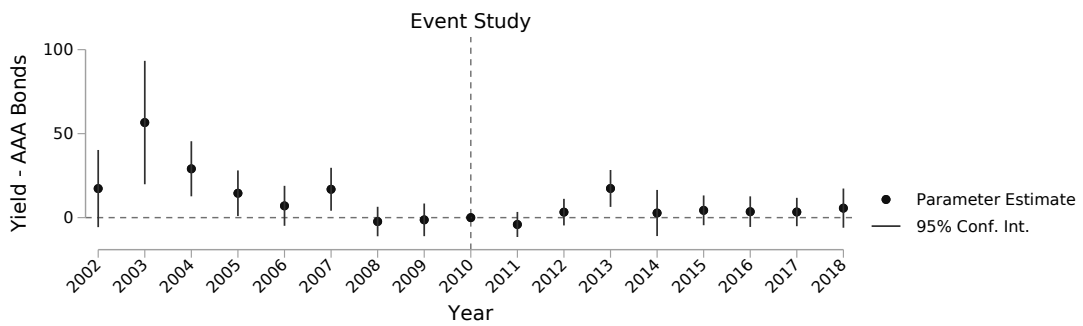
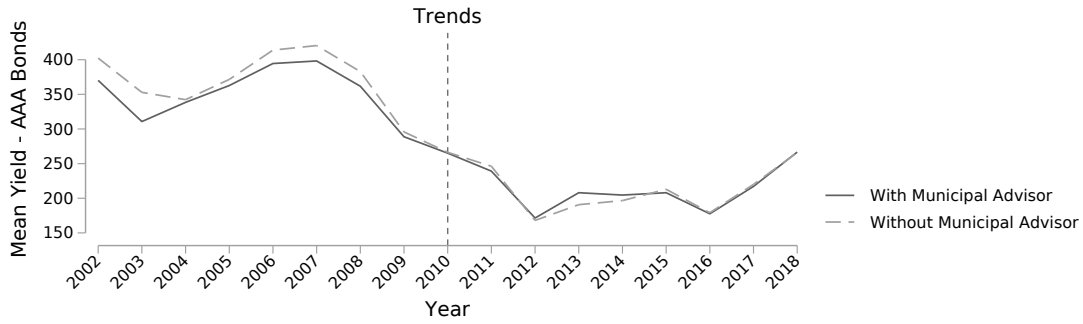


Figure 3: Yield - AA-Rated Bonds

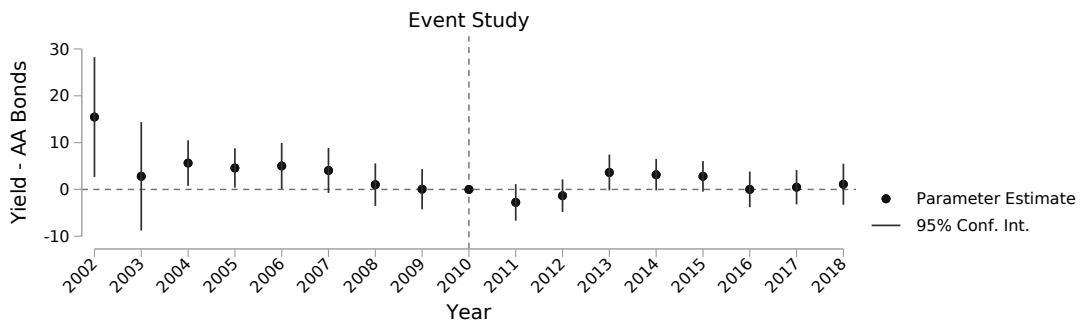
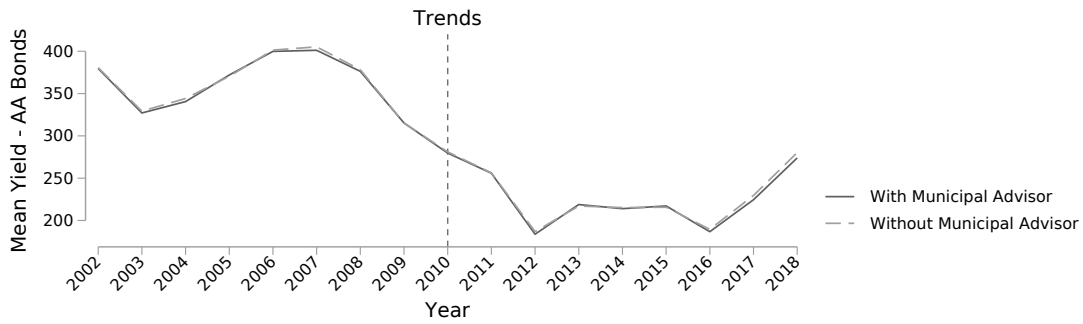


Figure 4: Yield - A-Rated Bonds

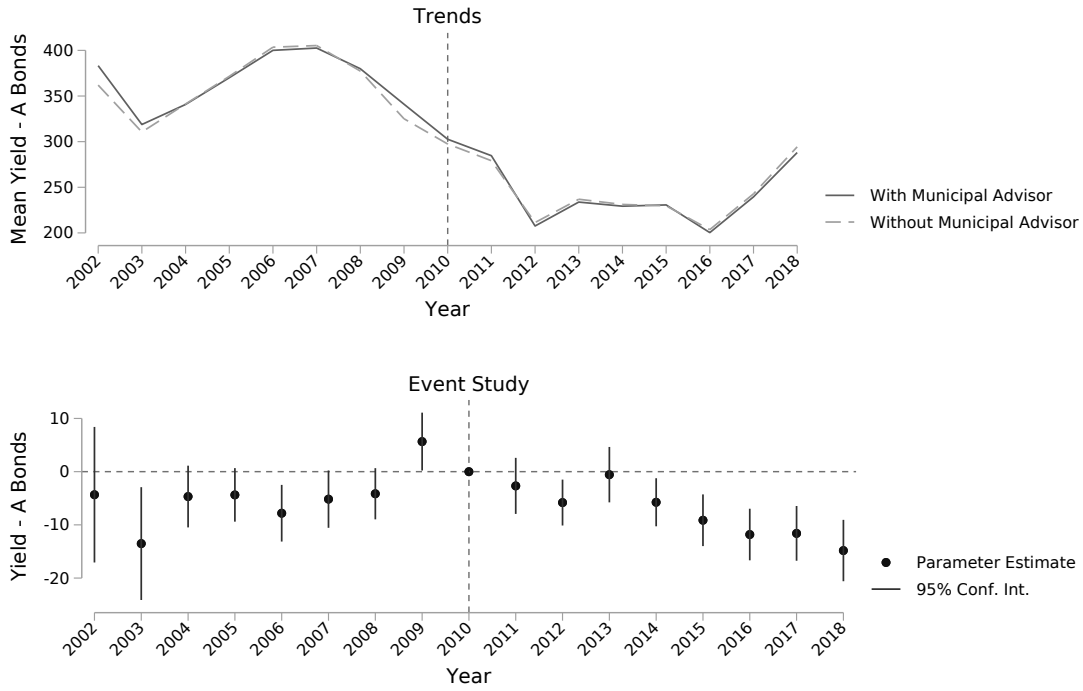


Figure 5: Yield - BBB- or lower-Rated Bonds

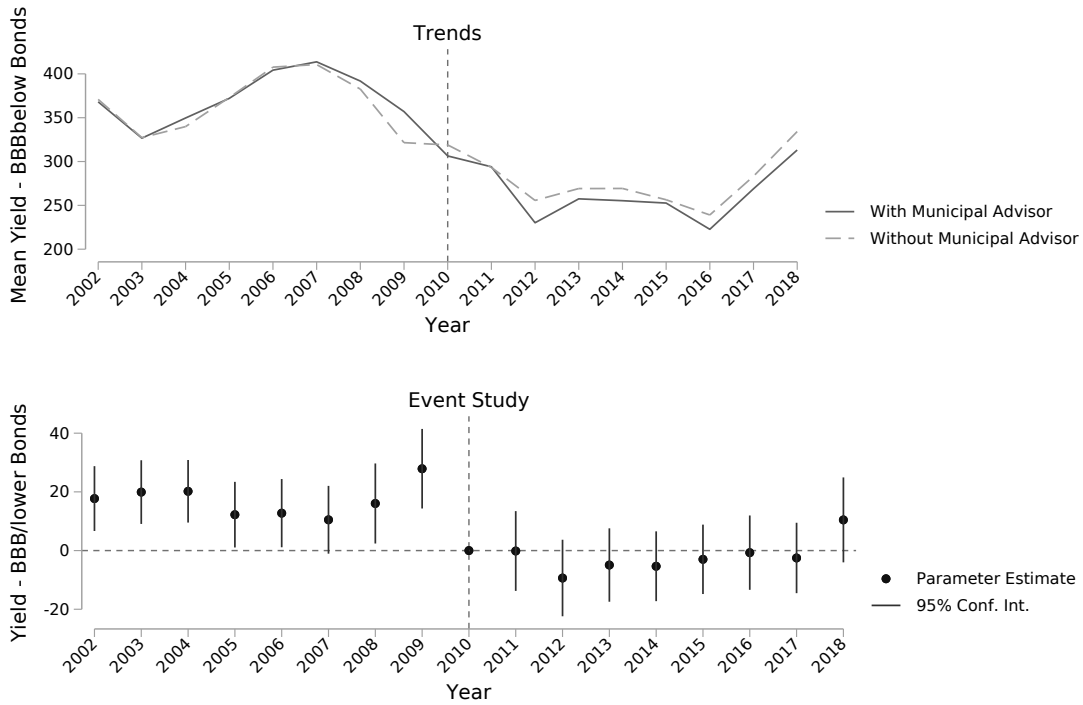
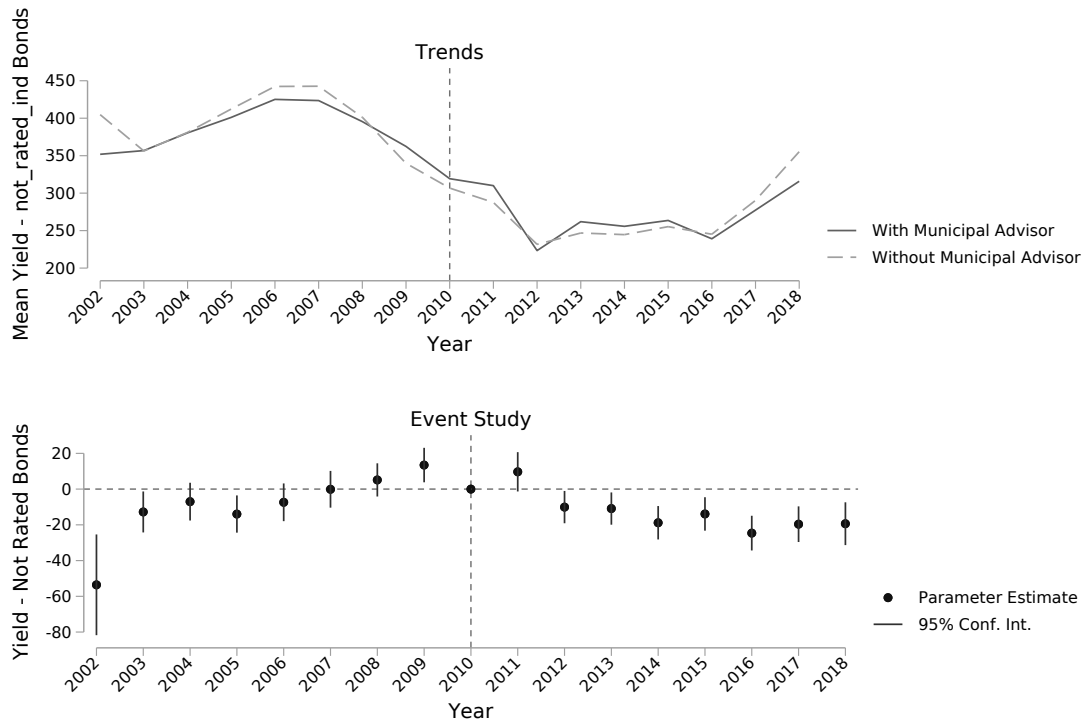


Figure 6: Yield - Not Rated Bonds



AAA, AA, A, BBB or lower, and bonds without a rating. The regression results in Table 3 support the hypothesis that bonds in greater need of certification, here operationalized by credit rating category, benefit more from the effect of Dodd-Frank on municipal advisors. Bonds rated AAA, the highest rating and a strong signal of creditworthiness, show no difference in average yield after Dodd-Frank when a municipal advisor is employed. The next highest rating, AA, shows a marginally statistically significant (at 0.1) reduction in yield of 1.6 basis points, which represents less than a one percent change from the pre-Dodd-Frank reference point. A-rated bonds show an almost five basis point reduction ($p < 0.01$, percent change of one), those with a rating of BBB or lower show a large reduction – almost 19 basis points for a five percent reduction from the pre-Dodd-Frank mean ($p < 0.01$). Finally, bonds without a credit rating show an almost eight basis point reduction, a two percent change, at the 99 percent confidence level.

Table 3: Effect of Dodd-Frank on Yield: Bonds by Credit Rating

	(1) AAA	(2) AA	(3) A	(4) BBB/lower	(5) Not Rated
MA*Post-2010	-2.531 (2.876)	-1.634* (0.965)	-4.670*** (1.183)	-18.85*** (2.694)	-7.904*** (2.351)
w/MA 2002-10 avg. yield	328.365	348.835	366.074	358.992	384.504
Δ from w/MA 2002-10 avg. yield	-1%	0%	-1%	-5%	-2%
N	146,346	711,369	531,120	459,124	210,775
Adjusted R ²	0.850	0.854	0.849	0.771	0.841

Standard errors in parentheses, clustered at issuer level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 7: Yield - All GO Bonds

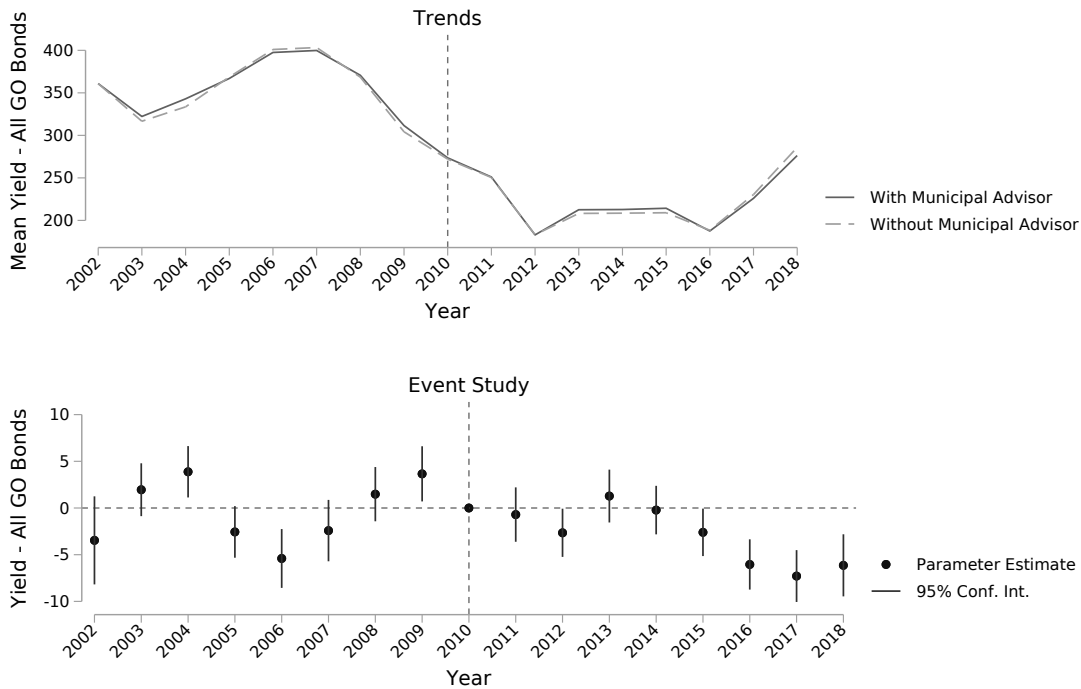


Figure 8: Yield - Unlimited GO Bonds

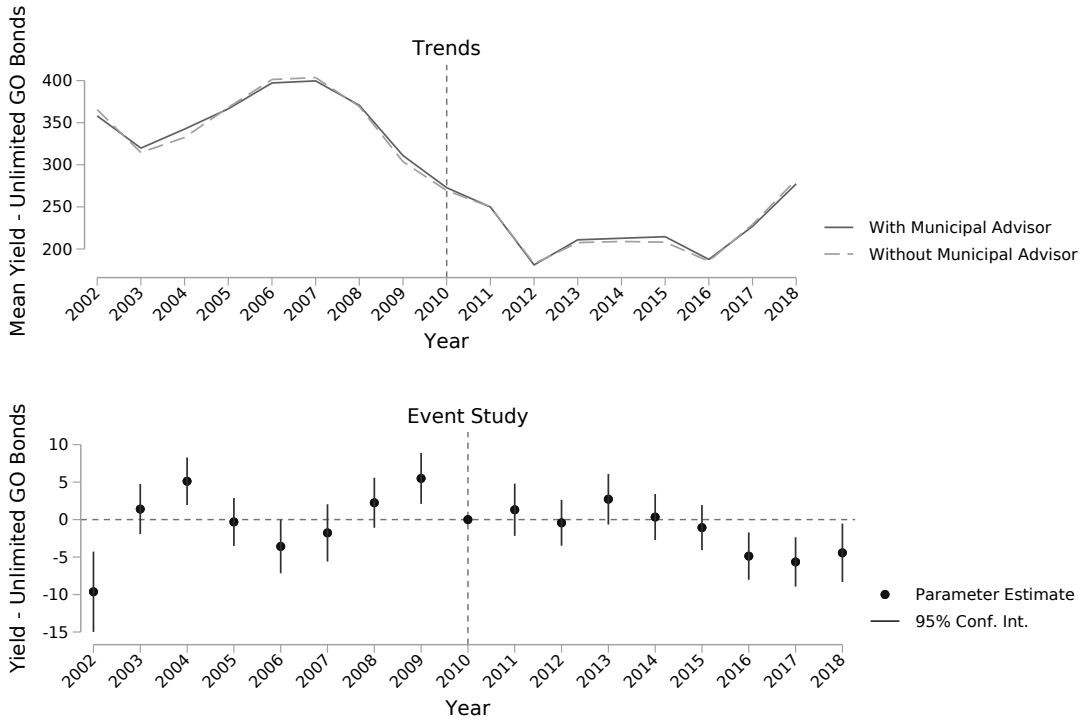


Figure 9: Yield - Revenue Bonds

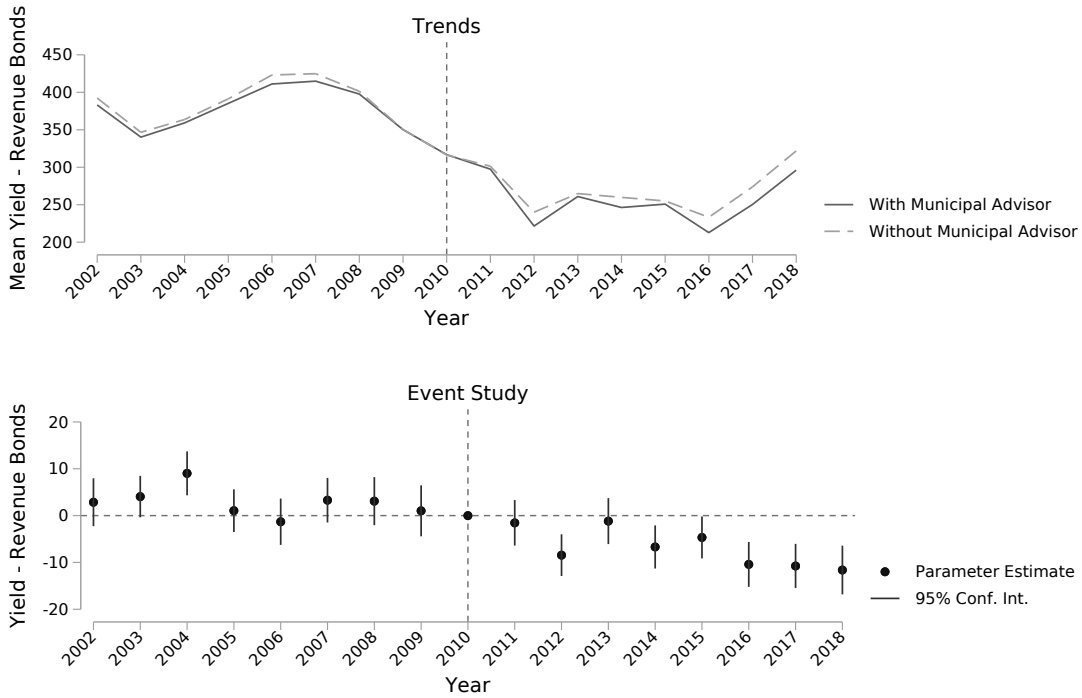


Table 4: Effect of Dodd-Frank on Yield: Bonds by Security

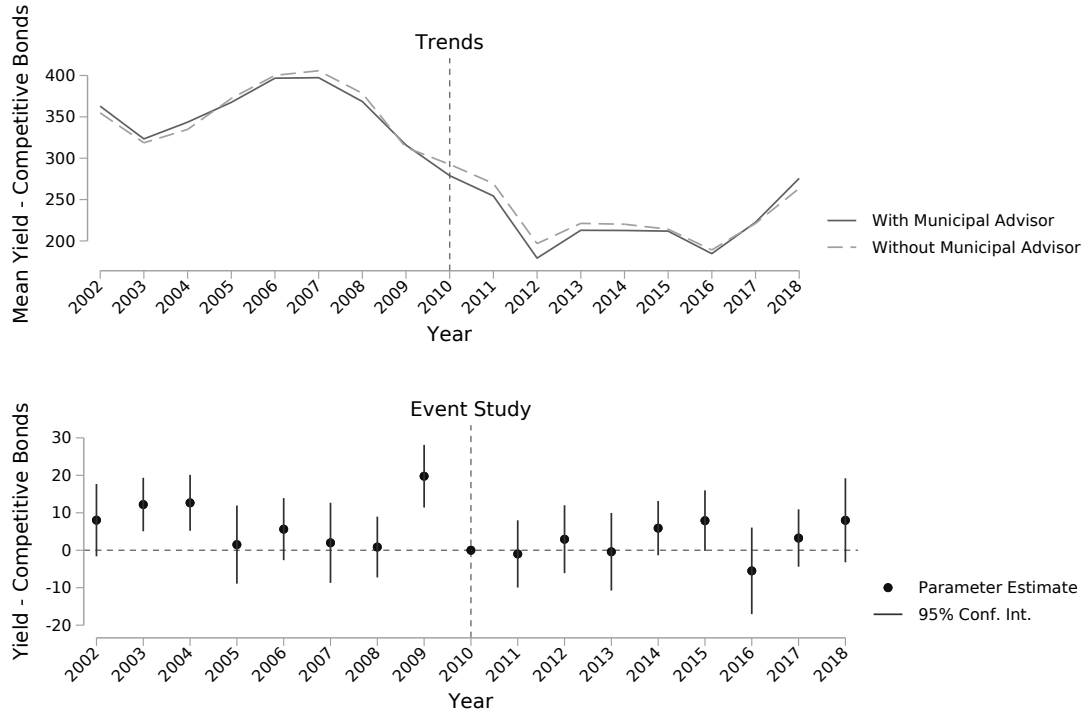
	(1)	(2)	(3)
	All GO	Unlimited GO	Revenue
MA*Post-2010	-2.423*** (0.645)	-1.270* (0.744)	-9.125*** (1.240)
w/MA 2002-10 avg. yield	349.432	349.735	373.493
Δ from w/MA 2002-10 avg. yield	-1%	0%	-2%
N	1,283,168	1,003,308	770,084
Adjusted R ²	0.857	0.859	0.785

Standard errors in parentheses, clustered at issuer level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figures 7 through 9 lend strong support for the validity of the DID design for subsamples of bonds with any general obligation pledge (including limited, unlimited, unspecified, and double-barreled), unlimited general obligation pledge, and finally those backed by project revenues. Table 4 shows that the benefit of a municipal advisor after Dodd-Frank differs by the strength of the security pledge. Though there are yield reductions for all security subsamples, the 1.3 basis point savings for unlimited general obligation (column 2) bonds is only marginally statistically significant ($p < 0.1$), and represents less than a one percent change from the average yield before the Act was adopted. When weaker general obligation pledges are included in the sample (column 1), the savings increases to 2.4 basis points ($p < 0.01$), but still represents a smaller percent change relative to the full sample in Table 2. Revenue-backed bonds show the strongest effects, with a nine basis point reduction ($p < 0.01$, percent change of two). These findings also support that the degree of certification needed was an important mechanism through which Dodd-Frank affected municipal advisors and therefore yield.

Figure 10: Yield - Competitive Bonds



4.2 Results - Monitoring

Figures 10 and 11 support the DID design for the subsamples defined by method of sale, competitive and negotiated respectively. Table 5 displays the regression results, with competitive and negotiated bonds having very similar effects – about a five basis point reduction representing a one percent change in both subsamples, though the finding in the competitive subsample is less statistically significant at $p < 0.05$. These specifications offer no support for the hypothesis that the underwriter monitoring function was improved by Dodd-Frank.

4.3 Results - Expertise

Figure 11: Yield - Negotiated Bonds

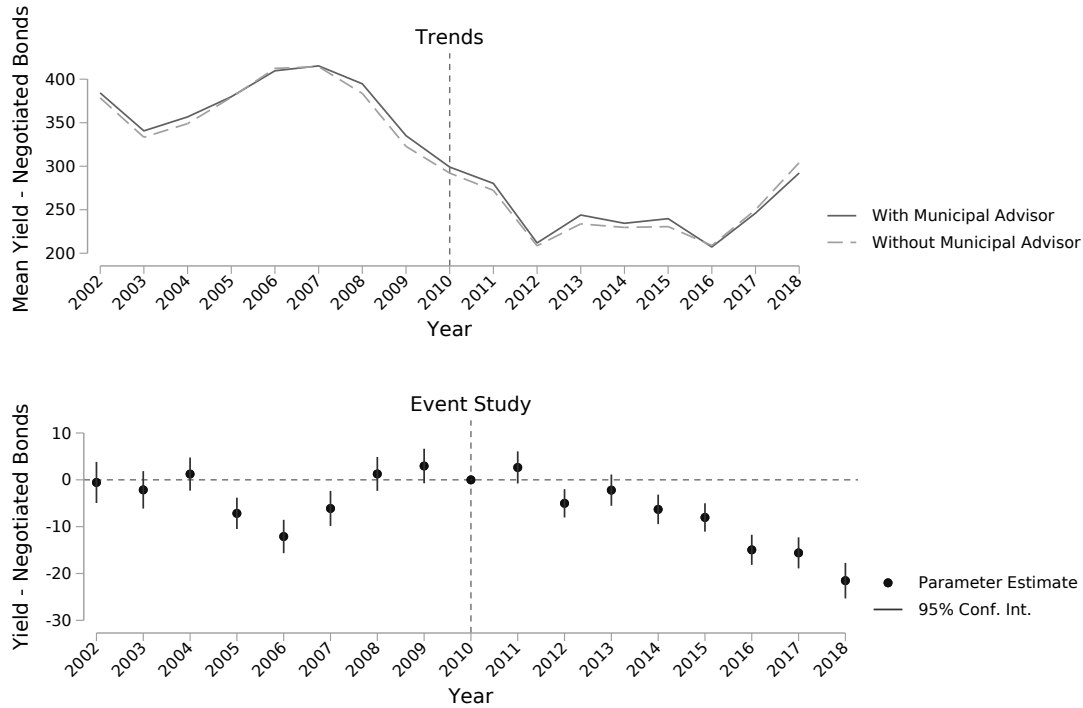


Table 5: Effect of Dodd-Frank on Yield: Bonds by Method of Sale

	(1) Competitive	(2) Negotiated
MA*Post-2010	-4.697** (2.374)	-5.199*** (0.760)
w/MA 2002-10 avg. yield	351.048	367.113
Δ from w/MA 2002-10 avg. yield	-1%	-1%
N	793,716	1,265,719
Adjusted R ²	0.862	0.810

Standard errors in parentheses, clustered at issuer level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 12: Yield - Bonds with Call Feature

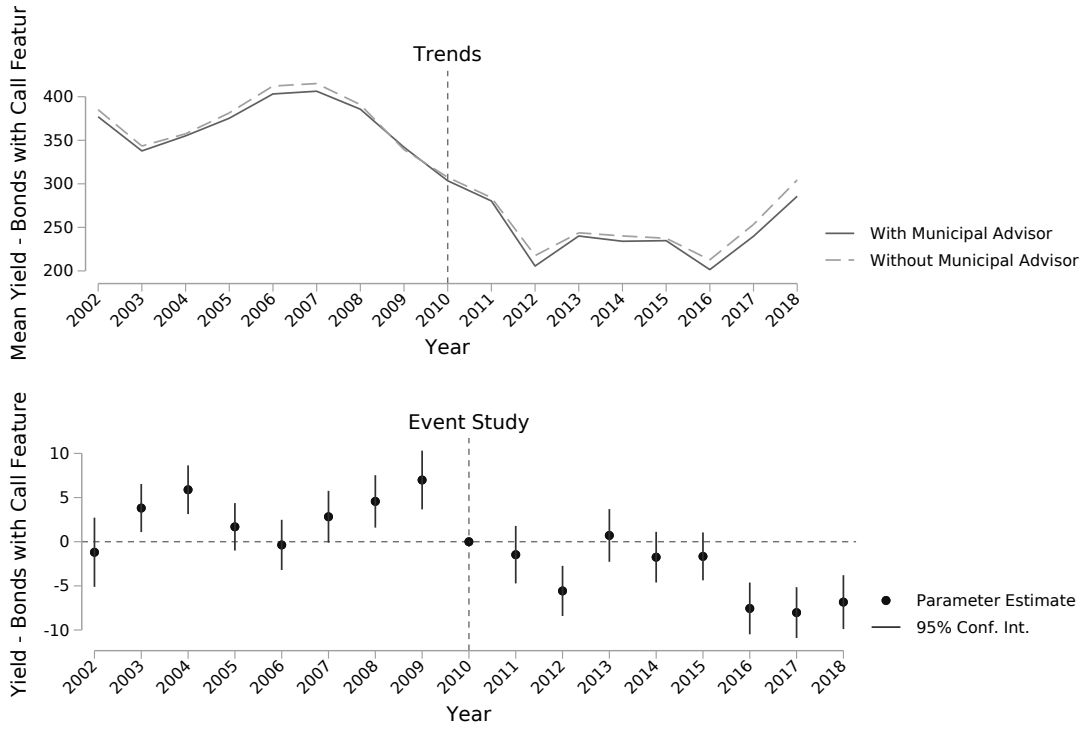


Figure 13: Yield - Bonds without Call Feature

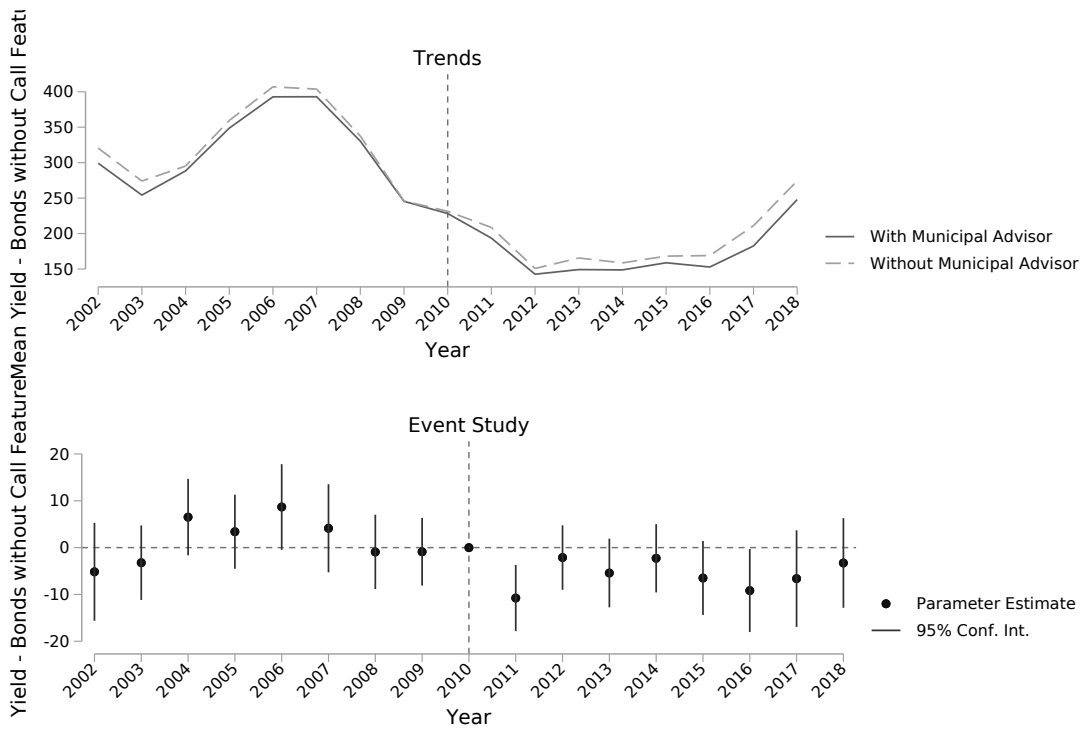


Table 6: Effect of Dodd-Frank on Yield: Bonds with and without Call Feature

	Call Feature	No Call Feature
MA*Post-2010	-7.145*** (0.696)	-6.676*** (2.428)
w/MA 2002-10 avg. yield	366.315	293.256
Δ from w/MA 2002-10 avg. yield	-2%	-2%
N	1,802,014	256,809
Adjusted R ²	0.828	0.845

Standard errors in parentheses, clustered at issuer level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The assumption of the DID design holds in the samples defined by bonds with a call feature (Figure 12) and without (Figure 13). In Table 6, we see that the difference in yield reduction between the two samples is minimal, with coefficients of approximately seven basis points and percent changes of two ($p < 0.01$).

The next set of empirical results involves dividing the sample by whether the bonds are new money, advance, or current refunding. The Tax Cuts and Job Act of 2017 eliminated the ability for state and local governments to issue advance refundings for which investors' interest income was exempt from federal taxation, effective 2018. To account for this change and anticipation of it in the months leading up to the legislation, I restrict the data for these results to 2002 to 2016.

Figures 14, 15, and 16 show the validity checks for the advance refunding, current refunding, and new money samples, respectively; all meet the assumptions of the research design adequately. In Table 7, while the parameter estimates in the advance, current, and new money subsamples are very similar and statistically significant at the 99 percent level, when compared to the pre-Dodd-Frank mean yield, advance refundings are two percent lower while the other subsamples are one percent. Given that advance refundings are likely more difficult to execute than current refundings or new money bonds, these findings suggest some improvement in municipal advisor

Figure 14: Yield - Advance Refunding Bonds

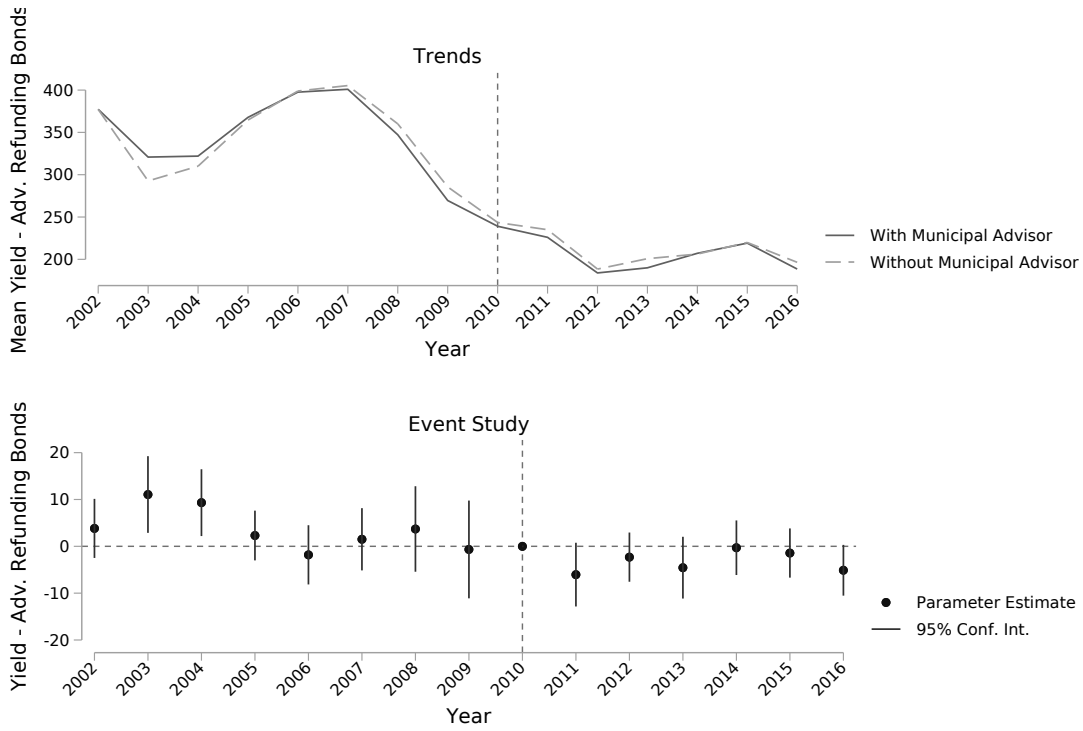


Figure 15: Yield - Current Refunding Bonds

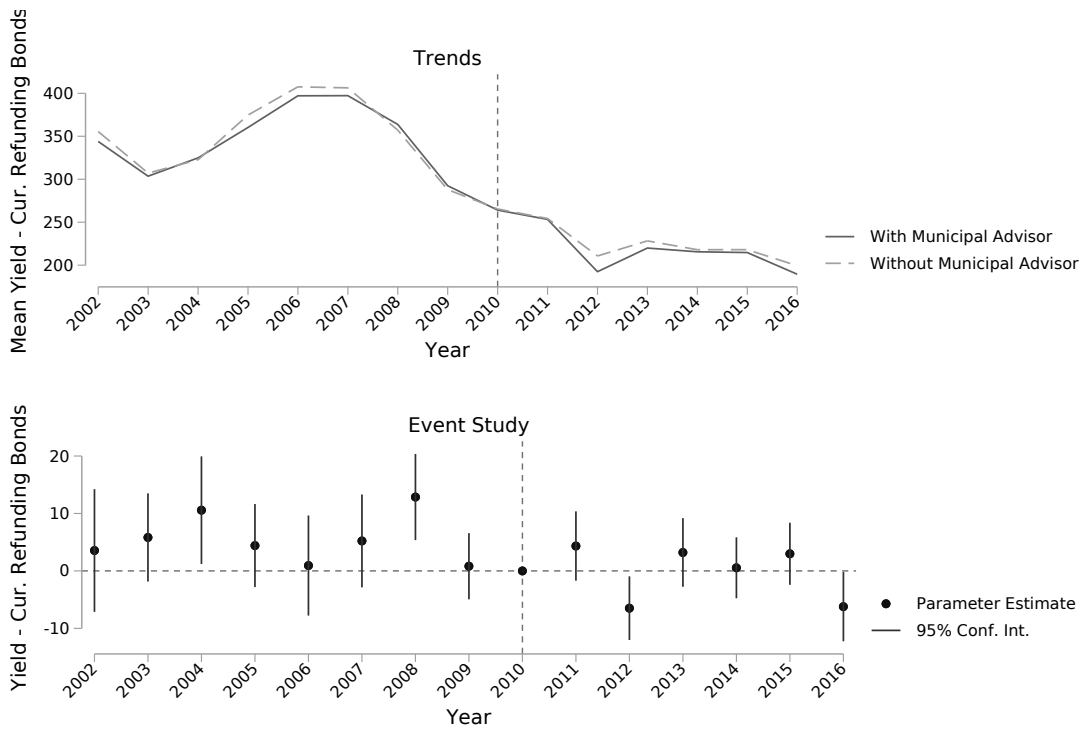
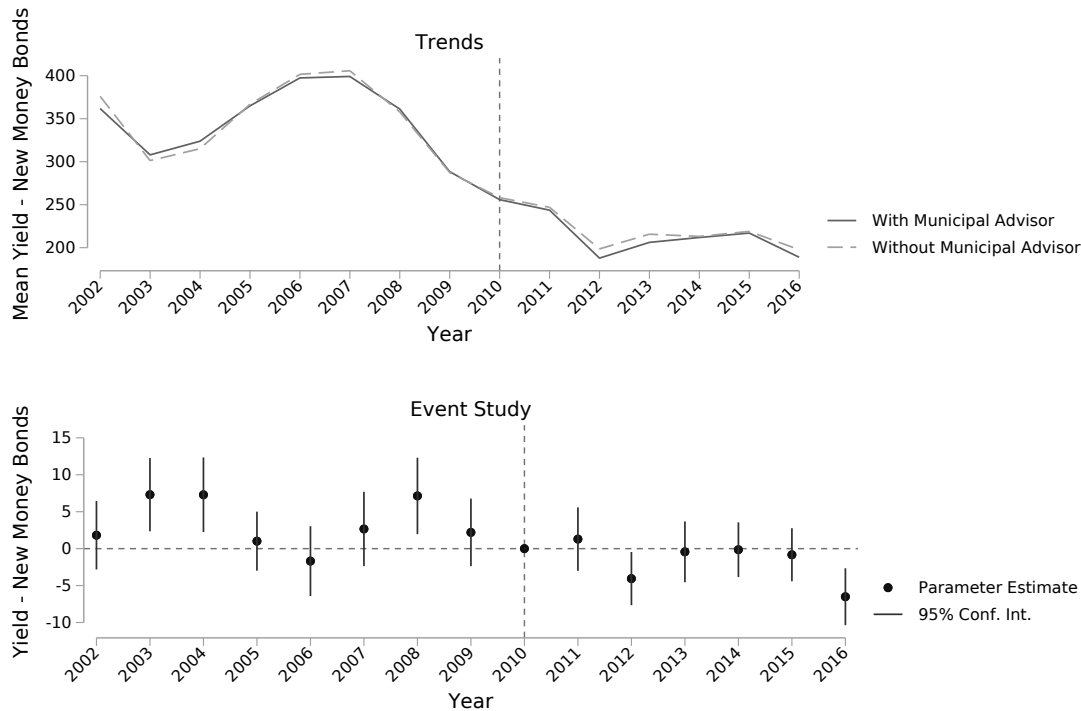


Figure 16: Yield - New Money Bonds



expertise due to Dodd-Frank.

4.4 Results - Certification, Monitoring, and Expertise Subsamples

Finally, I present results for subsamples intended to more fully isolate the effects of certification, monitoring and expertise. The trends and event studies in Figures 17, 18, and 19 all support the validity of the research design. Table 8 shows that Dodd-Frank had no effect on yield by way of municipal advisor involvement in any of the subsamples. Note, however, that sample sizes are one to two orders of magnitude smaller than any other subsample defined previously, and the coefficients are very imprecisely estimated.

Table 7: Effect of Dodd-Frank on Yield: Bonds by Money Type

	(1)	(2)	(3)
	Advance Refunding	Current Refunding	New Money
MA*Post-2010	-5.572*** (1.331)	-4.471*** (1.525)	-4.408*** (0.931)
w/MA 2002-10 avg. yield	349.79	328.407	337.078
Δ from w/MA 2002-10 avg. yield	-2%	-1%	-1%
N	384,028	393,762	777,898
Adjusted R ²	0.880	0.857	0.859

Standard errors in parentheses, clustered at issuer level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 17: Yield - Certification Sample Bonds

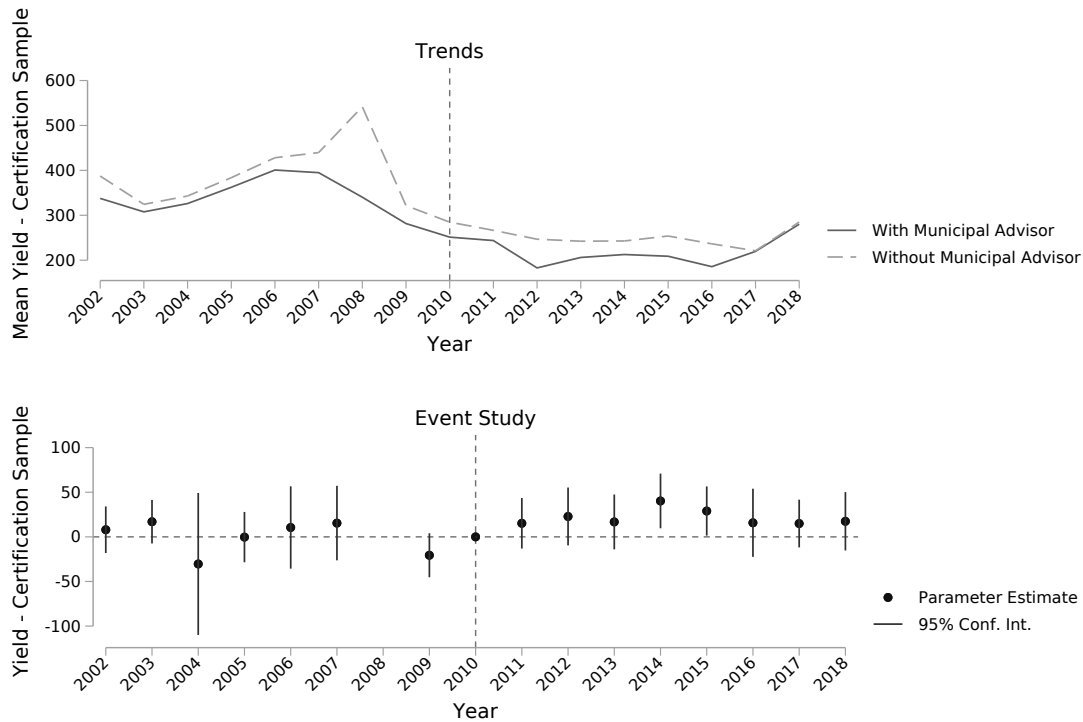


Figure 18: Yield - Monitoring Sample Bonds

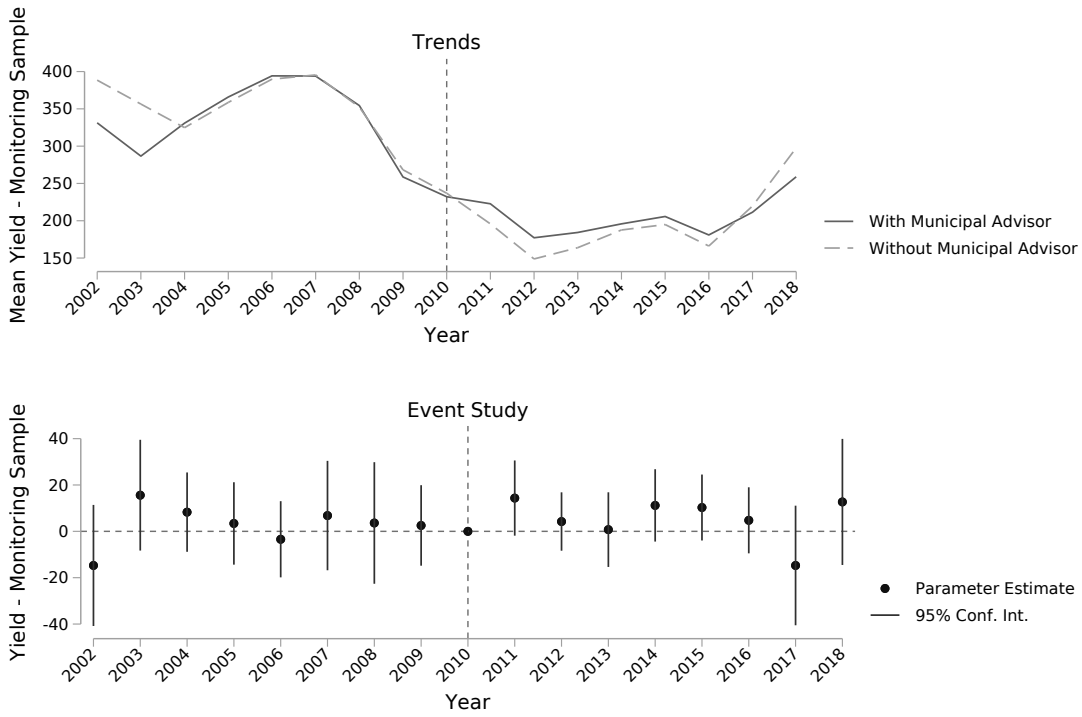


Figure 19: Yield - Expertise Sample Bonds

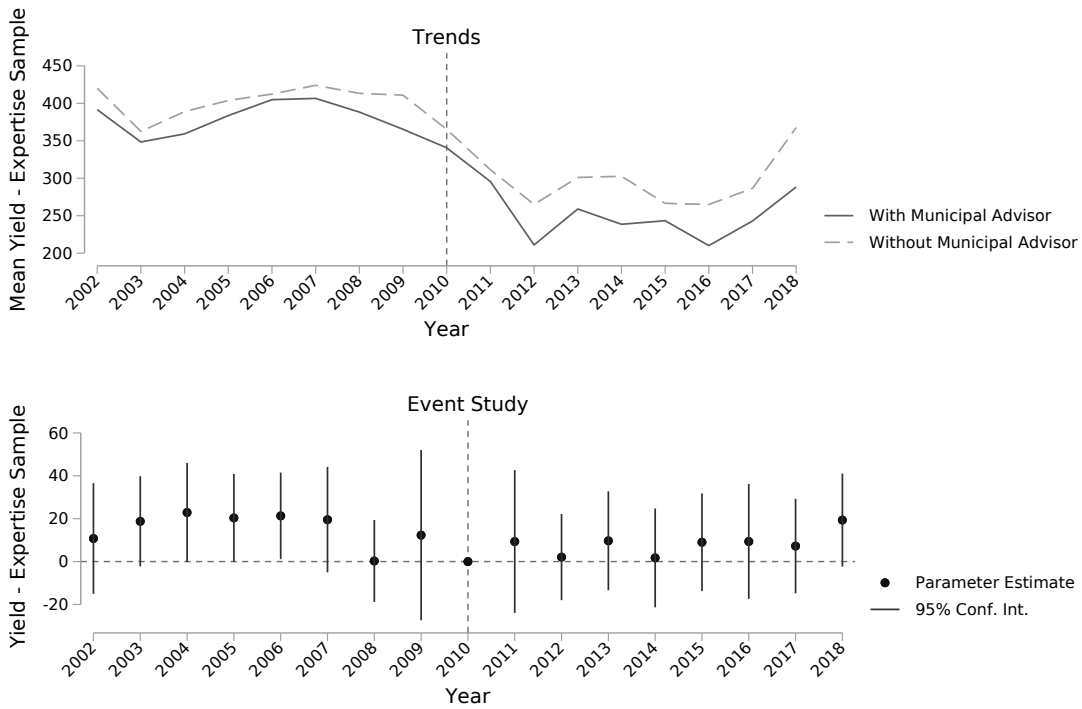


Table 8: Effect of Dodd-Frank on Yield: Certification, Monitoring, and Expertise Samples

	Certification	Monitoring	Expertise
MA*Post-2010	13.88 (12.48)	4.468 (2.811)	-7.416 (5.187)
w/MA 2002-10 avg. yield	325.245	339.179	378.637
Δ from w/MA 2002-10 avg. yield	4%	1%	-2%
N	47,938	53,062	89,496
Adjusted R ²	0.878	0.895	0.845

Standard errors in parentheses, clustered at issuer level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5 Conclusion

The severe consequences of the 2007 to 2010 financial crisis prompted President Obama and the U.S. Congress to make sweeping reforms to our system of financial market regulation. In light of troubles in the municipal securities market specifically, Congress initiated one of the most significant federal interventions into the market in years. Firms and individuals who wish to do business by advising issuers of municipal securities came under the purview of the SEC and MSRB for the first time, with legislators aiming to improve the quality of financial advice and ensure that advisors were operating in issuers' best interest. Though the rulemaking process continued for several years after the adoption of Dodd-Frank, by November 2010 advisors were required to register with the SEC and MSRB and were charged with a federal fiduciary responsibility to their municipal issuer clients. Advisors were also aware at this time that MSRB would be promulgating additional rules to come.

Municipal advisors are thought by scholars to benefit issuers by either offering third-party certification to mitigate information asymmetries caused by the difficulty for potential investors to accurately judge the likelihood that they will be paid back in a timely fashion or by monitoring investment banks who underwrite municipal securities to ensure that they deal with issuers fairly. Municipal advisors also provide technical

expertise that many governmental issuers lack in-house. To the extent that Dodd-Frank achieves the goal of improving financial advice to municipal issuers, it is likely through one or some combination of improved certification, monitoring, or expertise.

In the first work on 2010 Dodd-Frank policies affecting municipal advisors and the first work to use a nationwide dataset to explore Dodd-Frank and municipal securities more generally, I use a quasi-experimental research design to estimate the effect on yield, a measure of interest cost, when bonds are issued with a municipal advisor involved after 2010. My data cover the nation, all types of issuers, and span 2002 to 2018. I find a six basis point reduction in yield among all securities, equivalent to a two percent reduction from the average yield for bonds issued with a municipal advisor prior to the Act's adoption. I further test subsamples of securities defined by characteristics which likely result in greater need for certification, monitoring, and expertise, respectively. As a whole, my findings support the hypothesis that Dodd-Frank affected, positively, the certification capabilities of municipal advisors, with more pronounced savings for lower-rated bonds, bonds that are not rated, and bonds backed by project revenue – all attributes considered by scholars of municipal securities to benefit more from third-party certification. I find no evidence that Dodd-Frank affected the underwriter monitoring function of municipal advisors. Among bond issues considered to be more complex, I find mixed support that that technical expertise was improved in a way that manifests in lower yields. Finally, I define subsamples of securities with specific combinations of features with the intention of isolating certification, monitoring, and expertise needs and making them as mutually exclusive as possible. Within these subsamples, I find no statistically significant effect of Dodd-Frank on yield; parameter estimates are substantively large but imprecisely estimated, perhaps due to significantly reduced sample sizes and a regression specification with issuer and year fixed effects, a nontrivial number of controls, and clustered standard errors.

The magnitudes of the interest cost savings I find in this manuscript are signifi-

cant. The parameter estimate in the full sample is about six basis points, and I find reductions as large as 19 basis points among low-rated bonds. Consider the example of a bond issue of \$20,000,000, sold at par with a coupon rate of five percent, with the entire principal maturing in 20 years.⁶ A six basis point reduction in yield results in a price of \$20,150,000, or a net present value savings of \$150,000. A 19 basis point reduction in yield for the same issue results in savings of \$480,000.

One might reasonably be concerned that the increased regulatory burden to municipal advisors may result in their charging more for their services. While the data I use in my main analysis do not contain information on municipal advisor fees, data provided by California's Debt and Investment Advisory Commission does. The median municipal advisor fee in the California data from 2011 to 2018 was just under \$38,000, an order of magnitude lower than the calculated savings from Dodd-Frank in the previous paragraph.

From the perspective that minimizing the cost of borrowing for state and local capital projects is of primary importance in the design of regulatory institutions affecting municipal securities markets, the effect of Dodd-Frank's immediate provisions were a success. Municipal advisors' services – especially their ability to mitigate information asymmetries that result in higher costs of borrowing – were improved through federal action.

⁶The median principal amount for bonds issued in California in the data used in my primary analysis is \$20,000,000. Five percent coupons across the maturity spectrum are typical (Kalotay, 2021).

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