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Real effects of governmental accounting standards: Evidence from GASB statement No. 53 – Accounting and financial reporting for derivative instruments ☆

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ABSTRACT

GASB Statement No. 53, *Accounting and Financial Reporting for Derivative Instruments,* (GASB 53) significantly altered U.S. governmental sector accounting of derivative instruments by mandating the recognition of hitherto off-balance sheet derivative instruments in the government-wide statement of net assets and requiring that ineffective hedges be clearly identified. These requirements have an unfavorable financial statement impact for municipalities with net negative fair value derivative positions and municipalities holding ineffective hedges. Using a hand-collected, comprehensive dataset of municipal derivatives, we examine whether the level of U.S. municipal derivative holdings changed following the adoption of GASB 53. Consistent with GASB 53 affecting municipal officials' derivative decisions, we find a significant post-GASB 53 reduction in derivative holdings for municipalities with net negative fair value derivative positions and ineffective hedges. Our findings suggest that governmental accounting regulations could affect real decisions of municipal officials and therefore could potentially have public policy implications beyond the provision of information to stakeholders.

1. Introduction

Governmental Accounting Standards Board Statement No. 53, "Accounting and Financial Reporting for Derivative Instruments" (GASB 53), significantly changed governmental sector accounting of derivative instruments in the United States. These changes include the recognition of derivative holdings at fair value in the government-wide statement of net assets[1] and separate identification of ineffective hedges. This paper investigates whether, following its adoption, the level of derivative holdings changed for municipalities that are likely to be more affected by GASB 53.

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[1] Following the adoption of GASB Statement No. 63 (issued in June 2011), the statement of net assets is now referred to as the statement of net position.

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0278-4254/

Prior research documents that the use of derivatives by municipal governments has been steadily growing over the years (Stewart and Cox, 2008; Khumawala et al., 2016). While derivatives can be effective risk management tools and municipalities commonly employ them especially to manage interest rate risk associated with debt obligations, numerous scandals have raised concerns as to whether municipalities are executing their derivative transactions effectively. For example, in 2003 and 2004, Jefferson County, Alabama entered into a series of interest rate swap transactions which were later revealed to be both ineffective and corrupt, ultimately leading to the county filing for bankruptcy in November 2011.[2] The prospects of municipal officials entering into imprudent derivative contracts due to both officials' unfamiliarity with complex derivatives and numerous conflicts of interest associated with them were also raised in a 2012 report by the U.S. Securities and Exchange Commission (SEC, 2012).

However, prior to the introduction of GASB 53, U.S. municipalities were not required to recognize their derivative positions in the statement of net assets. Instead, pertinent information relating to derivative transactions (such as objectives, risks, notional values, and fair values) were disclosed in notes to the Comprehensive Annual Financial Report (CAFR).[3,4] GASB 53, which became effective for reporting periods beginning after June 15, 2009, significantly altered governmental sector accounting for derivatives by requiring that all derivatives be recognized at fair value in the government-wide statement of net assets. Additionally, while prior reporting requirements did not compel entities to separately identify the derivative contracts that may not substantially offset the risk exposures they are intended to hedge, GASB 53 requires that municipalities identify such ineffective hedges and that the annual change in fair values of ineffective hedges be recognized in the government-wide statement of activities under investment income or losses.

It must be noted that GASB 53 is simply a reporting regulation and it does not have a direct impact on cash flows associated with municipal derivative holdings. But it arguably improves the transparency of derivative transactions by mandating their recognition on the face of the government-wide financial statements and highlighting instances of ineffective hedging that were previously not directly observable. While it is ex-ante unclear whether a reporting regulation would alter municipal officials' behavior, prior literature from the corporate sector suggests that whether items are disclosed in notes or recognized on the face of financial statement affects managerial decisions (Imhoff and Thomas, 1988; Mittelstaedt et al., 1995; Choudhary et al. 2008; Bens and Monahan, 2008; Zhang, 2009; Amir et al., 2010). In a similar vein, disclosure versus recognition could impact municipal officials' *real* decisions if the officials believe financial statement users devote greater attention to items recognized in financial statements when compared with those that are only disclosed in notes. However, there is no extant empirical evidence in the governmental sector to support this notion. Adoption of GASB 53 presents an interesting setting to examine this because derivative disclosures are particularly important to bondholders in assessing municipalities' ability to service their debt and prior research identifies bond market participants as a group of constituents who heavily rely on municipal financial statements (Gore 2004; Gore, Sachs, and Trzcinka 2004; Baber and Gore 2008; Baber et al. 2013).

In this light, whether the heightened transparency afforded by GASB 53 by mandating the recognition of derivatives on the face of financial statements and highlighting the presence of ineffective hedges affect municipal officials' decisions to hold derivative instruments becomes an interesting empirical question. We investigate this issue by examining a hand-collected dataset of derivative usage by 61 large U.S. cities (485 municipality-year observations) over the 2005–2012 period. To better establish identification, we employ a difference-in-differences regression approach and argue that the municipalities that are most likely to alter their derivative holdings following the introduction of GASB 53 are those that face more adverse reporting consequences due to the standard. GASB 53 has adverse reporting consequences on municipalities with net negative fair value derivative positions and municipalities with ineffective hedges because recognition and expanded disclosure requirements of the standard more clearly highlight these positions. Our regression specifications control for a comprehensive set of municipality-level variables that previous literature identifies as potential determinants of derivative usage (Khumawala et al. 2016). We also include year, state, and municipality fixed effects to ensure that results are not driven by unobserved economy-wide trends and/or time invariant state and municipality-level factors.

The results obtained from the difference-in-differences specifications are very much in line with our hypotheses. Specifically, we find a significant post-GASB 53 reduction in derivative holdings for both municipalities with net negative fair value derivative positions and those that hold ineffective hedges. No such post-GASB 53 reduction in derivatives is observed for municipalities with net positive fair value derivative positions or those with effective hedges only. These results are consistent with GASB 53 affecting the derivatives holding behavior of entities that were more negatively affected by the standard.

[2] https://www.sec.gov/news/press/2008/2008–69.htm (Retrieved on Jul 15, 2019).

[3] Notional value is the total value of the hedged item covered by a derivative instrument. For example, if a municipality issues a $10 million floating rate bond and enters into a pay-fixed, receive-floating swap contract to manage the interest rate risk of the entire bond issuance, the notional value of the derivative instrument would be $10 million (the pay-fixed, receive-floating swap manages the municipality's interest rate risk by synthetically converting its floating rate interest obligations into fixed rate obligations).

[4] Fair value is the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm's length transaction. Depending on the price movements of the hedged item, a derivative could have a positive fair value (asset) or a negative fair value (liability) at any point of time between its inception and expiration. For example, a pay-fixed, received-floating swap would have a positive fair value if interest rates increase subsequent to its' inception because the swap protects its holder from the adverse effects of increased interest rates. Conversely, if the interest rates decline, the same derivative would carry a negative fair value because the payoff from the derivative (receive floating) is reduced while the payment obligation (pay fixed) remains unchanged.

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Because the 2008 financial crisis took place prior to the enactment of GASB 53, one concern is the impact of the financial crisis confounding our results. However, we believe the following research design choices allay this concern to a great degree. First, with our difference-in-differences research design, rather than investigating the *overall* change in pre- to post-GASB 53 derivative holdings, we examine the incremental post-GASB 53 change in derivative holdings for municipalities that are likely *most affected* by the accounting standard. Second, we employ control variables to explicitly control for municipality-level impact of the financial crisis and the changes in interest rate environment that took place during our sample period. Third, we employ both year and municipality fixed effects. Especially, time fixed effects should allay concerns over otherwise uncontrolled for time trends such as broad impacts of the crisis. As an additional test, we also graphically display the time trend of derivative holdings for different cross-sections of the sample used in our analyses. While we observe a decline in derivatives for almost all groups of municipalities during the financial crisis, subsequently they recover to pre-crisis level for municipalities that are relatively unaffected by GASB 53. However, the declining trend continues for affected municipalities post-GASB 53. While it is impossible to conclusively rule out the effect of financial crisis, collectively these analyses strongly suggest that what we captured is likely attributable to GASB 53.

In further robustness tests, we also examine the validity of parallel trends assumption in our difference-in-differences models by testing for any differences in the pre-treatment trends of the treatment and control groups. Specifically, we analyze the pre-GASB 53 sample by defining a pseudo post-regulation period two years prior to the enactment of GASB 53 and investigating whether post-GASB 53 changes in derivative holdings are observed for this pseudo post-GASB 53 period as well. In contrast to post-GASB 53 effect, we find no significant pseudo post-GASB 53 reduction in derivative holdings for municipalities with net negative fair value derivative holdings, or municipalities with ineffective hedges. The results of these falsification tests further enhance our confidence regarding the main inferences. Despite these efforts, we also acknowledge that definitively attributing causality is extremely difficult in settings such as ours.

The primary contributions of our paper are three-fold. First, while the governmental sector derivative usage has become quite widespread, empirical research on this subject is sparse (Stewart and Cox, 2008; Khumawala et al. 2016). We contribute to this limited body of literature by being the first paper to investigate whether reporting regulations affect governmental derivative holdings. Second, to the best of our knowledge, ours is the first paper to investigate an accounting disclosure versus recognition issue in the context of governmental accounting. Third, and more broadly, while several studies examine issues related to governmental accounting standards (e.g., see, Plummer et al. 2007; Pridgen and Wilder 2013; Naughton et al. 2015), to the best of our knowledge, we are the first to directly investigate and find results suggestive of accounting standards affecting real decisions of governmental sector officials. Hence, we believe our paper should interest academics, practitioners, and policymakers alike.

The remainder of this paper is organized as follows: Section 2 provides some institutional background on municipal derivative usage and key provisions of GASB 53. Section 3 develops the hypotheses. Section 4 presents the data and research design. Section 5 presents the main results. Section 6 discusses additional analyses and Section 7 concludes.

2. Institutional background

2.1. Use of derivatives by U.S. Municipalities

A derivative can be broadly defined as a contractual financial instrument that derives its value from the performance of an underlying item (e.g., interest rates, exchange rates, stock prices, etc.). Derivatives are widely used by organizations to hedge against risks such as unexpected changes in interest rates, exchange rates, and commodity prices.[5] Most common types of derivative instruments include forward contracts, futures contracts, swaps, and options.

Derivative usage among governmental entities such as municipalities has been growing rapidly since the 1990s. As reported by Dotson et al. (1994), a 1994 survey conducted by the Government Finance Officers Association (GFOA) and the Municipal Bond Investors Assurance Corporation (MBIA) revealed that only six percent of the over 1600 governmental sector respondents were using derivatives at the time. However, 44 percent indicated that they would consider using them in the future. Stewart and Cox (2008) examine debt-related derivative usage of the 50 states and 100 of the largest cities in U.S. in the year 2003 and find that 23 states and 23 cities engaged in derivative activities. The aggregate notional value of derivative positions held by states (cities) are reported to be $21.4bn ($10.5bn). In a more recent study, Khumawala et al. (2016) examine the nature and determinants of derivative usage among large U.S. cities and counties and find that the aggregate notional value of derivative positions grew from $22.5bn to $31.2bn over their sample period of 2005–2008. They also find that, based on notional value, approximately 98 percent of all derivatives held by municipalities pertain to the management of interest rate risk.

While municipalities appear to use derivatives primarily to hedge against interest rate risk, these hedges may not always be fully effective and/or expose municipalities to additional risks. For example, the municipality is exposed to basis risk when the variable interest rates on a derivative and an associated bond or other interest-paying financial instrument are based on different indices. The correlation between the two indices may diverge, making the hedge less than perfectly effective. The municipality faces rollover risk if the derivative instrument that is used as a hedge matures prior to the maturity of

[5] Derivatives may also be used as a speculative tool.

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the hedged debt. Unscheduled terminations of derivative instruments expose the municipality to termination risk, which will render the hedge ineffective. The municipality also faces credit risk should the credit quality of the counterparty to the derivative transaction deteriorate. In addition to constraints imposed by the nature of available derivative instruments, municipalities also run the risk of entering into ineffective derivative contracts due to both the municipality officers' unfamiliarity with the complexities of these transactions and numerous conflicts of interest associated with them.[6]

2.2. GASB 53 – accounting and financial reporting for derivative instruments

Prior to the introduction of GASB 53, derivative disclosures for governmental entities were governed by GASB Technical Bulletin No. 2003–1 (GASB TB 2003–1). Introduced in light of a rapid increase in derivative usage by governmental entities, GASB TB 2003–1 significantly expanded the amount of derivative disclosures provided in the notes to financial statements. Under GASB TB 2003–1, entities were required to provide detailed disclosures on derivatives, including the objectives of derivative usage, significant terms of the derivative instruments in use (e.g., notional value, underlying indices, options embedded, the dates when the derivatives become effective and the dates when they mature), and the risks associated with derivatives (¶¶ 6–10). In addition, entities were required to disclose fair values of derivatives at the report date (¶ 8).[7] However, most notably, GASB TB 2003–1 did not mandate the *recognition* of derivative transactions on the face of governmental financial statements. Hence governmental derivatives continued to be treated as *off-balance sheet* items without appearing either on the government-wide statement of net assets or the statement of activities.

GASB Statement No. 53, "Accounting and Financial Reporting for Derivative Instruments" (GASB 53), significantly altered the accounting for derivatives in the governmental sector by mandating that *all* derivative instruments be recognized at fair value in the government-wide statement of net assets. Largely modelled after the Statement of Financial Accounting Standards No. 133, "Accounting for Derivative Instruments and Hedging Activities" (SFAS 133) (FASB, 1998), GASB 53 became effective for financial statements for periods beginning after June 15, 2009.[8] The requirement to recognize derivatives at fair value in the statement of net assets is significant because it makes the presence and magnitude of derivatives immediately clear on the face of government-wide financial statements.

Additionally, GASB 53 established guidelines for determining when a derivative instrument qualifies as an *effective* hedging instrument. A hedging derivative is deemed effective "if the changes in cash flows or fair values of the potential hedging derivative instrument *substantially* offset the changes in cash flows or fair values of the hedgeable item" (*emphasis added*) (¶ 7). In other words, a hedge is considered effective if it substantially offsets the underlying risk that it intends to counterbalance. GASB 53 proposes a number of quantitative and qualitative approaches to establish hedge effectiveness.[9,10]

Derivative instruments that are deemed to be effective hedges qualify for hedge accounting. Under hedge accounting, annual changes in the fair value of the derivative are deferred and reported as either deferred inflows or outflows in the government-wide statement of net assets. This deferral continues until the transaction involving the hedged item ends. On the other hand, derivative instruments that are determined as ineffective are labelled as investment derivatives, and they do not qualify for hedge accounting. Annual changes in the fair value of ineffective hedges are required to be immediately recognized as investment income or loss in the government-wide statement of activities. Further, disclosures on derivatives that do and do not qualify as effective hedges should be provided separately. Thus, unlike prior disclosure requirements, GASB 53 clearly highlights the presence of ineffective hedges.

3. Hypothesis development

A large body of corporate sector literature suggests that whether items are disclosed in notes or recognized on the face of financial statements affects managerial behavior. For example, Imhoff and Thomas (1988) find that the enactment of SFAS 13, which mandated the recognition of capital leases that were previously only disclosed, resulted in firms substituting capital leases with operating leases and other sources of financing. Mittelstaedt et al. (1995) report that firms cut health care benefits following the adoption of SFAS 106, which required the recognition of underfunded health care liabilities. Choudhary et al. (2008) report firms accelerating the vesting of employee stock options to avoid the recognition of unvested stock option grants at fair value as mandated by SFAS 123R. Bens and Monahan (2008) find that FIN 46, which mandated the

[6] See, U.S. Securities and Exchange Commission's Report on the Municipal Securities Market (2012) for a detailed discussion of numerous conflicts of interest inherent in municipal derivative transactions.

[7] Prior to GASB TB 2003–1, derivative disclosures were governed by GASB Technical Bulletin No. 94–1 (GASB TB 1994–1). While TB 94–1 mandated that "...the nature of the (derivative) transactions and the reasons for entering into them should be explained" (paragraph 3, GASB TB 1994–1), the specifics of the required disclosure was quite ambiguous. Moreover, there was no requirement to disclose the fair value of derivatives.

[8] The preliminary views on GASB 53 were issued in April 2006. After the comment period, an exposure draft was issued in June 2007. The final statement was issued in June 2008.

[9] These approaches include the synthetic instrument method, dollar-offset method, regression analysis method, and the approach based on consistent critical terms. See ¶¶ 31–62 of GASB 53 for a detailed discussion on the evaluation of hedge effectiveness.

[10] The effectiveness of a hedge is impaired if the terms of the derivative contract do not create a perfect offset against the underlying exposure it attempts to hedge. For example, interest payment dates on a floating rate bond and those of a pay-fixed, receive-floating swap that intends to hedge the interest rate exposure might not perfectly overlap. Similarly, the base rate index of the bond and the swap might not be the same thereby exposing the hedge transaction to basis risk.

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balance sheet recognition of asset-backed commercial paper, resulted in banks reducing their investments in these instruments. Amir et al. (2010) report that the requirement to recognize pension assets in the balance sheet affected pension asset allocation decisions of firms in both the U.S.A. and U.K. Specifically related to derivatives, Zhang (2009) finds SFAS 133 to result in more prudent use of derivative instruments for risk management purposes.[11] These findings suggest that corporate sector managers act as if financial statement users either devote greater attention and/or attribute greater credibility to items that are recognized on the face of financial statements when compared with those that are only disclosed in notes.[12]

To the extent municipal-sector officials exhibit similar behavior, we would expect disclosure versus recognition considerations to affect transactions undertaken by municipalities as well. Derivatives provide an especially fitting setting to investigate this behavior because as reported by Khumawala et al. (2016) approximately 98 percent of all municipal derivatives pertain to interest rate related instruments, which should be of significant relevance to participants in the municipal bond market. Prior literature finds municipal governments' financial statements to be particularly useful for bond market participants (Gore 2004; Baber and Gore 2008; Baber et al. 2013).

However, at least two arguments can be made against this proposition. First, GASB 53 is a mere reporting regulation and has no direct cash flow consequences. To the extent that municipalities and financial statement users are only concerned about cash flow implications of derivatives, whether they are recognized on the face of financial statements or just disclosed in notes to the financial statements should be of little consequence. Second, it could also be argued that municipal bond investors and analysts are highly sophisticated and therefore appropriately process all relevant information provided in governmental financial reports irrespective of whether an item is recognized at the statements or disclosed elsewhere. Hence, whether municipalities change the level of their derivative holdings following the adoption of GASB 53 becomes an empirical question.

In any event, if municipal officials respond to GASB 53 by changing their derivative holding levels, such responses are unlikely to be uniform across all municipalities. It is reasonable to expect that municipalities adversely affected by the standard would respond more strongly by reducing their derivative holdings than other municipalities. Therefore, conducting analyses based on municipalities that are more and less affected by the standard enables us to better establish causality via difference-in-differences tests.

While the recognition requirements of GASB 53 likely enhances the prominence attributed to derivatives, municipalities with net negative net fair value derivative positions are likely to be more concerned about this reporting outcome. A net negative fair value derivative position suggests that the subsequent price movements of the hedged item were such that the municipality would have been better off had it not entered into the derivative transaction in the first place. While municipalities do not possess the benefit of hindsight at the time of initiating derivative agreements, negative fair value derivative positions might be perceived as evidence of municipal officials being unable to predict the overall direction of relevant price movements (e.g. interest rates). Further, municipal officials would be concerned about the implications of derivative holdings on net asset values because these are regarded as important indicators of fiscal health that play an important role in municipal credit ratings (Plummer et al. 2007; Pridgen and Wilder 2013; Benson and Marks 2014; Davies et al. 2017).

Hence, if municipalities reduce their derivative holdings in respond to GASB 53, we expect municipalities with net negative fair value derivatives to reduce their derivative holdings post-GASB 53 more than municipalities with net positive fair value derivative positions. Accordingly, we state our first hypothesis as follows:

H1. *Municipalities with net negative fair value derivative positions exhibit a larger pre- to post-GASB 53 reduction in derivative holdings than municipalities with net positive fair value derivative positions.*

GASB 53 is also likely to have a more negative impact on municipalities that hold ineffective hedges because the standard highlights their presence by requiring that interim fair value changes of these derivatives be recognized in the government-wide statement of activities and ineffective derivatives be separately identified in all subsequent disclosures. While the presence of ineffective hedges need not indicate improprieties on part of city officials, added transparency resulting from GASB 53 could deter municipal officials from continuing to enter into such contracts post-GASB 53 in order to avoid potential backlash. Hence, our second hypothesis predicts a greater post-GASB 53 decline in derivative holdings for municipalities with ineffective hedges when compared with those having effective hedges only.[13]

H2. Municipalities with ineffective hedges exhibit a larger pre- to post-GASB 53 reduction in derivative holdings than municipalities with effective hedges only.

[11] See Beatty (2007) for a brief review of the recognition versus disclosure literature.

[12] A considerable body of corporate sector literature supports the argument that capital providers assign greater valuation coefficients to recognized items than to disclosed items (e.g., see, Davis-Friday et al. 1999, 2004; Espahbodi et al. 2002; Ahmed et al. 2006; Müller et al. 2015).

[13] It is important to note that we do not contend that affected municipalities will immediately terminate their derivative programs altogether due to GASB 53. Such terminations are quite costly. A more reasonable approach would be not to renew derivative positions that expire and reduce the number of new derivative engagements. Our argument also assumes that municipalities cannot replace ineffective hedges with effective hedges in a cost-effective manner. This is a quite reasonable argument because if such alternatives were available, there is little reason to resort to ineffective hedges in the first place.

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4. Data and research design

4.1. Data

Our sample spans the eight-year period from 2005 to 2012. As GASB 53 became effective for reporting periods beginning after June 15, 2009, we code observations from reporting periods that began before (after) this date as belonging to the pre- (post-) GASB 53 period.[14] Following Khumawala et al. (2016), we limit our sample to U.S. cities with populations of over 250,000. Since smaller entities are less likely to use derivatives (Khumawala et al., 2016), this selection criterion ensures that we focus on municipalities that are more likely to hold derivatives.[15] As data on derivative usage as well as financial variables are collected from the Comprehensive Annual Financial Reports (CAFRs) we also require that CAFRs are available online for at least seven out of eight years of the sample period. We remove cities of Detroit, MI and Stockton, CA from our sample because they filed for bankruptcy during our sample period. Cities under bankruptcy protection could potentially contaminate our sample because they are likely to eliminate/alter derivative positions due to reasons that are unrelated to GASB 53. Our sample consists of 485 municipality-year observations (299 pre-GASB 53 observations and 186 post-GASB 53 observations) from 61 cities. They cover 25 states and the District of Columbia. Panel A of Table 1 reports our sample composition by state. As expected, relatively more municipalities are represented by the most populous states of California and Texas (8 and 9 respectively). All other states have one to three municipalities represented in our sample except for Arizona which has four municipalities represented.

In selecting the sample, we do not impose the condition that cities use derivatives in both pre- and post-GASB 53 periods because it raises the concern of possible regression to mean behavior biasing in favor of finding a post-GASB 53 decline in derivative usage. That is, when the pre-GASB 53 derivative holding is zero, the only possible post-GASB 53 change is an increase in derivative holdings. Removing municipalities where the only possible change is a post-GASB 53 increase in derivatives would bias towards finding an on average post-GASB 53 decrease in derivative holdings. Of the 61 municipalities in our sample, 28 employ derivatives in both pre- and post-GASB 53 periods. Six (Seven) municipalities hold derivatives in the pre- (post-) GASB 53 period only. The remaining 20 municipalities do not hold derivatives throughout the entire sample period. None of our results are sensitive to excluding these 20 municipalities from the sample. We present the sample details in terms of derivative usage in pre- and post-GASB 53 periods in Panel B of Table 1.

We access municipality CAFRs from the website of each entity and carefully review them for disclosures on derivative usage. We gather the notional value of total derivative holdings from the disclosures provided in notes to the financial statements. We also collect the net fair value of these derivative positions. For post-GASB 53 periods, we also note whether the municipality holds ineffective hedges or not. Other financial variables and municipality populations used in our regression models, too, are hand-collected from CAFRs. We collect data on unemployment rates and interest rates from the U.S. Bureau of Labor Statistics and the Federal Reserve Bank of St. Louis websites, respectively.

4.2. Research design

Our hypotheses predict a post-GASB 53 reduction in derivative holdings for municipalities that have net negative fair value derivative positions and ineffective hedges compared with those with net positive fair value derivative positions and effective hedges only. The difference-in-differences regression specifications employed to examine these hypotheses take the following form (Municipality and year subscripts are suppressed for ease of exposition):

$$Derivative = \alpha_0 + \alpha_1 Post + \alpha_2 Partition + \alpha_3 Post * Partition + \Sigma\alpha_k Controls_t + \Sigma\alpha_l Fixed\ \ Effects + \epsilon \quad (1)$$

The dependent variable *Derivative* is the total notional value of derivative holdings in each municipal-year scaled by total debt. We scale the derivative value by total debt because the vast majority of derivative instruments are employed to manage interest rate risk.[16] The binary variable *Post* takes the value of one (zero) for observations from the post- (pre-) GASB 53 period. *Partition* denotes the partition variables employed to test incremental effects predicted in our hypotheses. For tests of H1 and H2, *Partition* is captured in terms of binary variables that take the value of one if the net fair value of a municipality's derivative positions in the year prior to the enactment of GASB 53 is negative and zero otherwise (*NegFV*), and value of one if a municipality discloses having ineffective hedges in the year that immediately follows the enactment of GASB 53 and zero otherwise (*Ineffective*), respectively.[17] These partition variables are captured as time invariant, municipality-level constructs because we are intending to capture the effect of GASB 53 on a municipality at the time of its adoption. The two hypotheses predict negative coefficients on the interaction variables denoted by *Post*Partition* (α_3). In other words, H1 and H2 predict significantly negative coefficients on *Post*NegFV* and *Post*Ineffective* respectively.

[14] Approximately, the pre-GASB 53 period consists of five financial years (2005–2009) and the post-GASB 53 period consists of 3 financial years (2010–2012).
[15] It also keeps the extensive efforts involved with hand collection of data at a manageable level.
[16] In Section 6.3.1 we discuss the sensitivity of our results to alternative approaches to scaling this variable.
[17] Ideally, for tests of H2, we need to capture the holding of ineffective hedges *prior to* the enactment of GASB 53. However, this information is not disclosed in pre-GASB 53 periods. Under the reasonable premise that it is too costly to unwind *all* ineffective derivatives immediately following the adoption of GASB 53, holding of such derivatives in the first post-GASB 53 year would serve as a reasonable proxy for the presence of similar instruments prior to the enactment of GASB 53 as well.

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Table 1
Sample Composition.

Panel A: Sample composition by state		
State	# of Unique Municipalities	# of Observations
Arizona	4	32
California	8	64
Colorado	3	24
Florida	3	24
Georgia	1	8
Illinois	1	8
Indiana	2	16
Kansas	1	8
Kentucky	2	15
Maryland	1	8
Massachusetts	1	8
Michigan	1	8
Minnesota	2	16
Missouri	2	16
Nebraska	2	16
Nevada	2	14
New Mexico	1	8
New York	2	16
North Carolina	3	24
Ohio	3	24
Oklahoma	1	8
Oregon	1	8
Pennsylvania	2	16
Tennessee	2	16
Texas	9	72
Washington D.C.	1	8
Total	61	485

Panel B: Derivative users and non-users in pre- and post-GASB 53 periods	
Number of municipalities holding derivatives in both pre- and post-GASB 53 periods	28
Number of municipalities holding derivatives in pre-GASB 53 period only	6
Number of municipalities holding derivatives in post-GASB 53 period only	7
Number of municipalities not holding derivatives in either pre- or post-GASB 53 periods	20
Total	61

Table 1 presents some details on sample composition. Panel A of Table 1 presents the breakdown of the sample by state. Panel B of Table 1 indicates the number of municipalities in terms of derivative usage during pre- and post-GASB 53 periods.

We follow and expand on Khumawala et al. (2016) and include a comprehensive set of control variables that could potentially influence the level of municipal derivative holdings. We control for leverage (*Leverage*) because financially constrained municipalities find the risk management potential of derivatives more appealing. We employ log of population (*LnPop*) to control for municipality size because larger municipalities are more likely to hold derivatives.[18] We use annual population growth rate (*PopGrowth*) to control for municipality growth. We control for financial position of the municipality with total net assets scaled by total revenue (*NetAssets*) and for financial performance of the municipality with the excess of total revenue over total expenses scaled by total revenue (Δ*NetAssets*). Liquidity is controlled for using the ratio of current assets to current liabilities (*Liquidity*). We capture the municipalities' degree of fiscal self-reliance with the ratio of general revenue to total revenue (*GenRevRatio*). We also control for whether the municipality is mayor-run or manager-run (*MayorRun*). We control for financial reporting sophistication of the municipality by incorporating the binary variable *GFOA,* which takes the value of one (zero) for municipalities that participate (do not participate) in the GFOA Certificate of Excellence in Financial Reporting Program and the binary variable *BigNAuditor* that takes the value of one (zero) for municipalities that are audited by a big-4-auditor (non-big-4-auditor). We also control for municipality-level unemployment rate (*Unemployment*) to control for economic growth. All these control variables are captured at the municipality-year level and contemporaneous to the dependent variable.[19]

[18] None of our results are sensitive to employing alternative measures of municipality size such as total assets and total revenues.
[19] However, we do not observe any time series variation in *MayorRun* and *GFOA*, in essence making them time invariant, municipality-level constructs.

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Due to the timing of its' adoption, one concern is that effects of GASB 53 might be confounded by those of the 2008 financial crisis.[20] While our difference-in-differences research design should mitigate this concern to a great degree, we employ two control variables, measured at municipality and economy-wide levels respectively, to further address this issue. Based on the argument that municipalities experienced the effects of the financial crisis to varying degrees (Kneebone and Garr, 2010), we control for this uneven effects of the financial crisis with the percentage point change in the municipality-level unemployment rate over the December 2007 – December 2009 crisis period (*Crisis*) (Kneebone and Garr, 2010).[21] The financial crisis also impacted the interest rate environment due to the Federal Reserve's monetary policy responses. These changes could potentially affect derivative holding decisions because the majority of municipal derivatives are employed to manage interest rate risk. Accordingly, we control for this with the 10-year constant maturity treasury bond rate (*Interest*).[22] We also interact *Interest* and *Crisis* with *Post*.[23,24]

In all our tests, we run three regression specifications employing different choices of fixed effects. First, we employ state fixed effects to ensure that our results are not driven by state-specific factors such as legislative restrictions on municipal derivative usage. Next, we supplement this with year fixed affects to account for time variant macroeconomic factors that impact all municipalities. In the third specification we supplement year fixed effects with municipality fixed effects to ensure that our results are unaffected by time invariant, municipality-level factors either. It is worth noting that the employment of year and municipality fixed effects subsumes the main effects of *Post* and *Partition* (i.e., *NegFV* and *Ineffective*). They also render some of the control variables redundant.[25]

All variable definitions are presented in Appendix A. In all our regressions, continuous variables are winsorized at the 1st and 99th percentile to minimize the effect of outliers. However, none of the findings are sensitive to winsorization. In all regressions standard errors are clustered by municipality and year. Our results are not sensitive to alternative clustering choices.

5. Main results

5.1. Descriptive Statistics

Panel A of Table 2 presents the descriptive statistics for our sample. Descriptive statistics for the full, pre-GASB 53, and post-GASB 53 samples are reported in Columns (1), (2), and (3) of the table, respectively. The final column reports p-values for tests of differences between pre- and post-GASB 53 variable means.

The mean notional value of derivative positions is approximately seven percent of total debt (*Derivative*). We do not observe a statistically significant reduction in *Derivative* between pre- and post-GASB 53 periods. This is not necessarily surprising because not all municipalities are adversely affected by the recognition requirements of GASB 53. Nearly 45 percent of observations hold net negative fair value (*NegFV*). About 44 percent of municipalities report ineffective hedges (*Ineffective*).[26] Turning to variables that exhibit significant pre- to post-GASB 53 differences, we observe that population growth (*PopGrowth*) is significantly lower in the post-GASB 53 period. This is due to several municipalities reporting significant declines in population in post-GASB 53 years.[27] Suggesting weaker financial performance, excess of revenue over expenses (Δ*NetAssets*) and the ratio of general revenue to total revenue (*GenRevRatio*) are lower in the post-GASB 53 period. The likelihood of financial statements being audited by a big-4 auditor (*BigNAuditor*) is lower in the post-GASB 53 period. The municipal-level unemployment rate (*Unemployment*) is greater in the post-GASB 53 period when compared with the pre-GASB 53 period.

Panel B of Table 2 presents the univariate correlations. We find *DerivativeNV* to be positively associated with *NegFV* and *Ineffective* but the correlations are not excessive (0.12 and 0.28 respectively). These positive correlations are unsurprising because the municipality holding some derivatives is a precondition for the binary variables *NegFV* and *Ineffective* to take the value of one. However, the univariate correlation between *NegFV* and *Ineffective* is quite large (0.44), which raises the concern whether both these variables capture the same construct. However, untabulated additional tests indicate this high correlation to be an artifact of these variables being correlated with whether or not a municipality uses derivatives. When we

[20] According to the U.S. Bureau of Economic Analysis data, the financial crisis began in first quarter of 2008 (i.e. first period of negative GDP growth) and ended in second quarter of 2009 (last period of negative GDP growth). As discussed previously, GASB 53 became effective for financial statements for periods beginning after June 15, 2009.

[21] In untabulated sensitivity tests, we also use the December 2007 to December 2009 change in municipality-level poverty rates to capture the effect of the financial crisis. All our results remain unchanged.

[22] We use 10-year treasury rates because interest rate derivatives are typically intended to hedge against the interest rate risk of long-term municipal bonds. Use of treasury rates of other maturities (e.g., 1-year treasury rate) does not affect our results.

[23] None of our results are sensitive to the inclusion of these interaction variables.

[24] In Section 6.1, we further examine the impact of the financial crisis on municipal derivative holdings via a graphical display indicating the time-series variation of derivative holdings for different cross-sections of data used in our analyses.

[25] The control variables *Crisis, MayorRun,* and *GFOA* vary at the city-level only (time invariant). Therefore, employing of municipality fixed effects subsumes the effect of these control variables, thereby making them redundant. Similarly, the control variable *Interest* is measured annually and contemporaneous to the dependent variable but does not vary at the city-level (municipality invariant). Hence, employing time fixed effects makes this control variable redundant. None of our findings are sensitive to removing all control variables and keeping just the fixed effects.

[26] The similar mean values for *NegFV* and *Ineffective* are by coincidence and do not suggest a near-perfect overlap between the two variables.

[27] Municipalities that report over 10 percent drops in population in the post-GASB 53 period include Cleveland (OH), Phoenix (AZ), Atlanta (GA), Cincinnati (OH), and St. Louis (MO).

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Table 2
Descriptive Statistics.

Panel A: Summary Statistics on Main Variables

Variable	Full Sample				Pre-GASB 53 Period				Post-GASB 53 Period				P value for tests of pre GASB 53 and Post GASB 53 mean differences
	N	Mean	Median	S.D	N	Mean	Median	S.D	N	Mean	Median	S.D	
DerivativeNV	485	0.070	0.009	0.094	302	0.074	0.010	0.096	183	0.064	0.007	0.090	0.235
NegFV	485	0.445	0.000	0.498	302	0.445	0.000	0.498	183	0.446	0.000	0.498	0.975
Ineffective	485	0.443	0.000	0.497	302	0.445	0.000	0.498	183	0.441	0.000	0.498	0.932
Leverage	485	0.575	0.491	0.377	302	0.568	0.471	0.376	183	0.587	0.503	0.380	0.595
LnPop	485	13.244	13.094	0.703	302	13.242	13.091	0.705	183	13.247	13.125	0.702	0.938
PopGrowth	485	0.007	0.008	0.025	302	0.010	0.010	0.018	183	0.000	0.006	0.031	0.000
NetAssets	485	1.924	1.988	1.350	302	1.864	1.983	1.231	183	2.021	2.113	1.520	0.237
ΔNetAssets	485	0.055	0.049	0.104	302	0.070	0.067	0.106	183	0.029	0.034	0.096	0.000
Liquidity	485	5.057	4.442	2.980	302	5.027	4.417	2.970	183	5.106	4.442	3.005	0.778
GenRevRatio	485	0.481	0.480	0.133	302	0.490	0.489	0.131	183	0.467	0.472	0.134	0.066
Mayorrun	485	0.534	1.000	0.499	302	0.535	1.000	0.500	183	0.532	1.000	0.500	0.951
GFOA	485	0.932	1.000	0.252	302	0.919	1.000	0.273	183	0.952	1.000	0.215	0.173
BigNAuditor	485	0.278	0.000	0.449	302	0.311	0.000	0.464	183	0.226	0.000	0.419	0.041
Unemployment	485	6.866	6.500	2.776	302	5.953	4.900	2.577	183	8.334	8.000	2.440	0.000
Interest	485	3.670	3.550	0.856	302	4.187	4.240	0.538	183	2.840	3.080	0.571	0.000
Crisis	485	4.870	4.700	1.591	302	4.877	4.700	1.590	183	4.858	4.650	1.596	0.891

Panel B: Pearson Correlation Matrix on Main Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
(1) DerivativeNV	1															
(2) NegFV	**0.12**	1														
(3) Ineffective	**0.28**	**0.44**	1													
(4) Leverage	0.03	**0.26**	**0.31**	1												
(5) LnPop	0.03	**0.24**	**0.26**	**0.41**	1											
(6) PopGrowth	0.02	−0.02	−0.02	**−0.12**	0.00	1										
(7) NetAssets	**−0.10**	**−0.17**	**−0.28**	**−0.70**	**−0.41**	**0.12**	1									
(8) ΔNetAssets	0.04	**−0.12**	**−0.12**	**−0.40**	**−0.32**	**0.20**	**0.50**	1								
(9) Liquidity	**−0.17**	**−0.13**	**−0.31**	**−0.35**	**−0.16**	0.05	**0.43**	**0.29**	1							
(10) GenRevRatio	**−0.10**	**0.21**	−0.06	**0.31**	**0.08**	−0.03	**−0.32**	**−0.22**	**−0.10**	1						
(11) Mayorrun	**0.11**	**0.12**	**0.22**	**0.36**	**0.25**	**−0.12**	**−0.49**	**−0.38**	**−0.43**	**0.28**	1					
(12) GFOA	−0.03	0.00	0.01	0.06	−0.07	−0.01	−0.01	−0.01	−0.07	−0.07	−0.03	1				
(13) BigNAuditor	**0.05**	**0.18**	**0.12**	**0.24**	**0.31**	−0.02	**−0.31**	**−0.23**	**−0.11**	**0.21**	**0.20**	**−0.16**	1			
(14) Unemployment	−0.01	−0.07	0.04	−0.02	0.01	**−0.13**	**0.09**	**−0.15**	**0.13**	**−0.14**	**−0.12**	0.01	**−0.15**	1		
(15) Interest	0.03	0.00	−0.01	−0.03	0.00	**0.12**	−0.04	**0.20**	0.01	0.06	−0.01	−0.04	0.10	**−0.49**	1	
(16) Crisis	−0.02	−0.01	0.00	0.01	−0.01	**−0.16**	0.03	**−0.22**	−0.03	−0.03	−0.07	0.04	−0.06	**0.42**	0.02	1

Table 2, Panel A presents the descriptive statistics for variables used in this study. Pre- (post-) GASB 53 observations from reporting periods beginning before (after) June 15, 2009. Univariate correlations are provided in Table 2, Panel B. Correlations that are statitiscally significant at 10 percent or better are bold-faced. All variable definitions are provided in Appendix 1.

exclude municipalities that do not employ any derivatives, the correlation becomes much lower at 0.14, allaying the aforementioned concern. As noted in Section 4.1, all our findings are robust to excluding non-derivative user municipalities from the sample.

5.2. Main results

5.2.1. Tests of H1: GASB 53 and changes in the level of derivative usage for municipalities with net negative fair value derivatives

H1 argues that, if GASB 53 affects municipal officials' derivative decisions, a greater post-GASB 53 decline in derivative holdings would be expected for municipalities holding net negative fair value derivative positions. The results for tests of H1 are reported in Table 3. Column (1) of Table 3 reports results of the regression specification with state fixed effects while Column (2) adds year fixed effects. In Column (3), state fixed effects are replaced by municipality fixed effects. We follow this reporting convention in all subsequent tables as well.

In Column (1) of Table 3, we find the coefficient on *Post* to be insignificant, indicating the failure to find a significant post-GASB 53 reduction in derivative holdings for municipalities with net positive fair value derivative positions. But more importantly, as predicted in H1, we find the coefficient on our variable of interest -- the interaction term *Post*NegFV* -- to be reliably negative in all three columns. In other words, while derivative holdings of municipalities with net positive fair value derivative positions appear unaffected by GASB 53, we find an incremental reduction for municipalities with net negative fair value derivative positions. As an aside, we also note the coefficients on *NegFV* to be positive in Columns (1) and (2) of Table 3, indicating that municipalities with net negative fair value derivative positions held comparatively more derivatives pre-GASB 53. In Section 6.2, we conduct additional analyses to allay concerns that post-GASB 53 incremental decline in derivatives observed for these municipalities might be caused by regression to mean behavior rather than GASB 53.

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Table 3
Test of Hypothesis H1. GASB 53 and Changes in the Level of Derivative Usage for Municipalities with Net Negative Fair Value Derivatives.

Dependent Variable = *DerivativeNV*						
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Post	0.069	0.232				
NegFV	0.086	0.000	0.086	0.000		
Post*NegFV	**−0.066**	**0.000**	**−0.066**	**0.000**	**−0.060**	**0.000**
Leverage	−0.015	0.464	−0.014	0.482	−0.015	0.719
LnPop	0.019	0.001	0.019	0.001	0.056	0.431
PopGrowth	−0.006	0.952	−0.003	0.998	−0.070	0.476
NetAssets	−0.021	0.000	−0.021	0.000	−0.021	0.835
ΔNetAssets	0.007	0.881	0.002	0.970	0.002	0.950
Liquidity	0.001	0.980	0.001	0.874	0.001	0.838
GenRevRatio	−0.208	0.000	−0.211	0.000	−0.101	0.326
MayorRun	−0.014	0.182	−0.014	0.180		
GFOA	−0.032	0.014	−0.032	0.016		
BigNAuditor	0.001	0.905	0.002	0.787	−0.014	0.126
Unemployment	0.001	0.603	0.003	0.344	0.001	0.710
Interest	0.008	0.452				
Interest_Post	−0.004	0.777	0.006	0.515	0.003	0.673
Crisis	−0.005	0.386	−0.004	0.411		
Crisis_Post	−0.006	0.127	−0.007	0.069	−0.004	0.033
Intercept	0.379	0.000	0.402	0.000	0.453	0.000
State Fixed Effects?	Yes		Yes		No	
Year Fixed Effects?	No		Yes		Yes	
Municipality Fixed Effects?	No		No		Yes	
Observations	485		485		485	
Adjusted R-squared	0.651		0.654		0.817	

Table 3 reports regression results for the effect of GASB 53 on the level of derivative holdings for municipalities with net negative versus net positive fair value derivative positions using Model (1). The dependent variable is the notional value of total derivative holdings scaled by total debt for a municipality in a given year. The coefficient of interest is that on *Post*NegFV* (bold-faced). Robust p-values are based on Huber-White adjusted standard errors clustered by entity and year. All p-values are based on two-tailed tests. See Appendix 1 for variable definitions.

In terms of control variables, we find that larger municipalities are more likely to use derivatives (*LnPop*). Coefficients on *NetAssets* and *GenRevRatio* are negative, suggesting that the extent of derivative usage is negatively associated with both financial position and fiscal self-reliance. It also appears that municipalities with GFOA certification are likely to hold lower derivative levels. However, the introduction of municipality fixed effects in Column (3) render these control variables statistically insignificant. Adjusted r-squared values ranging from 65 percent to 82 percent indicates that our regression models are quite well specified.

5.2.2. Tests of H2: GASB 53 and changes in the level of derivative usage for municipalities with ineffective hedges

H2 predicts that municipalities with ineffective hedges are more likely to reduce their derivative holdings following the adoption of GASB 53. The results for tests of H2 are reported in Table 4. In Column (1) of Table 4, the coefficient of *Post* remains insignificant. That is, we do not observe a post-GASB 53 change in derivative holdings for municipalities with effective hedges only. In contrast, and in line with H2, we find the coefficient of interest, that on the interaction term *Post*Ineffective* to be significantly negative at 10 percent level or better in all three columns of Table 4, suggesting that GASB-53 had a negative impact on the level of derivative holdings of municipalities with ineffective hedges. As was the case with *NegFV* in the previous table, the coefficients on *Ineffective* are positive in Columns (1) and (2) of Table 4, suggesting that municipalities with ineffective hedges held higher levels of derivatives pre-GASB 53. As indicated previously, in Section 6.2 we run further tests to indicate that our results on the coefficient of interest are unlikely to be attributable to reversion to mean behavior.

Collectively, the results of difference-in-differences tests reported in Tables 3 and 4 indicate a post-GASB 53 reduction in derivative holdings for municipalities that face negative financial reporting consequences as a result of the standard. In contrast, we find no evidence of municipalities less affected by GASB 53 changing their derivative holding behavior following its adoption. To the best of our knowledge, these findings are the first to empirically document the possibility of municipalities altering real decisions in response to GASB reporting standards.

6. Additional analyses

6.1. Graphical display of derivative holdings throughout the sample period

To gain a parsimonious visual impression of how municipal derivative holdings have changed during our sample period, Fig. 1 graphically displays the time-series movement of municipal derivative holdings for different cross-sections of the data used in our analyses. While standard caveats relating to univariate analyses with no statistical significance testing apply, this

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Table 4
Test of Hypothesis H2. GASB 53 and Changes in the Level of Derivative Usage for Municipalities with Ineffective Hedges.

Dependent Variable = *DerivativeNV*						
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Post	0.053	0.928				
Ineffective	0.078	0.000	0.078	0.000		
Post*Ineffective	**−0.022**	**0.059**	**−0.024**	**0.042**	**−0.020**	**0.028**
Leverage	−0.007	0.709	−0.007	0.683	−0.015	0.689
LnPop	0.017	0.002	0.017	0.001	0.713	0.361
PopGrowth	−0.021	0.824	−0.016	0.862	−0.106	0.318
NetAssets	−0.013	0.007	−0.013	0.006	−0.005	0.651
ΔNetAssets	0.033	0.522	0.038	0.469	0.036	0.384
Liquidity	0.003	0.024	0.003	0.018	0.001	0.974
GenRevRatio	−0.133	0.000	−0.137	0.000	−0.006	0.507
MayorRun	−0.013	0.257	−0.013	0.254		
GFOA	−0.017	0.273	−0.017	0.283		
BigNAuditor	−0.005	0.559	−0.004	0.687	−0.007	0.507
Unemployment	0.001	0.886	0.001	0.693	0.001	0.793
Interest	0.003	0.816				
Interest_Post	−0.003	0.844	−0.008	0.396	−0.009	0.300
Crisis	−0.016	0.000	−0.016	0.000		
Crisis_Post	−0.003	0.526	−0.003	0.416	−0.022	0.360
Intercept	0.391	0.000	0.395	0.000	0.891	0.000
State Fixed Effects?	Yes		Yes		No	
Year Fixed Effects?	No		Yes		Yes	
Municipality Fixed Effects?	No		No		Yes	
Observations	485		485		485	
Adjusted R-squared	0.634		0.642		0.796	

Table 4 reports regression results for the effect of GASB 53 on the level of derivative holdings for municipalities with ineffective hedges versus effective hedges only using Model (1). The dependent variable is the notional value of total derivative holdings scaled by total debt for a municipality in a given year. The coefficient of interest is that on *Post*Ineffective (bold-faced)*. Robust p-values are based on Huber-White adjusted standard errors clustered by entity and year. All p-values are based on two-tailed tests. See Appendix 1 for variable definitions.

graphical illustration is useful in obtaining an impression of how 2008 financial crisis impacted municipal derivative holdings. Graphical illustrations based on negative versus positive fair value net derivative positions, and presence of ineffective hedges versus effective hedges only are presented in panels A and B of Fig. 1 respectively. As can be seen in Fig. 1, with the exception of municipalities with net positive fair value derivative holdings (i.e. *NegFV* = 0), we see a decline in derivative holdings for all subsamples during the crisis period irrespective of whether they are affected by GASB 53 or not. However, for municipalities that are likely less affected by GASB 53, these holdings subsequently recover to approximately their pre-crisis levels during the post-GASB 53 period. In contrast, we continue to observe a noticeable post-GASB 53 decline in derivative holdings for municipalities that are adversely affected by the reporting standard (i.e., municipalities with net negative fair value derivatives and ineffective hedges). These graphical illustrations further corroborate inferences obtained from multiple regressions by suggesting a post-GASB 53 cutdown of derivative holdings for municipalities affected by GASB 53.

6.2. Tests of parallel trends assumption

Based on difference-in-differences tests, our results reveal a post-GASB 53 decline in derivative holdings for municipalities that are negatively affected by the standard. While difference-in-differences tests are quite useful in establishing identification, a key factor of this research design is the validity of the parallel trends assumption. In our setting, the parallel trends assumption dictates that in the absence of GASB 53, time series changes in the level of derivative holdings would have been similar across municipalities with net negative versus net positive fair value derivatives and municipalities with and without ineffective hedges. The assumption is violated for example, since municipalities with net negative fair value derivative positions and ineffective hedges happen to hold comparatively larger amounts of derivatives, these holdings would exhibit regression to mean behavior and gone down even in the absence of GASB 53′s recognition requirements.

To further enhance the confidence that our results can indeed be attributed to GASB 53, in untabulated tests, we examine the validity of the parallel trends assumption by investigating the differences in the pre-GASB 53 trends of the treatment and control groups. Specifically, we use our 2005–2009 pre-GASB 53 sample and code the observations from the latter two years (2008–2009) as belonging to a "pseudo post" period. That is, we define the binary variable *PseudoPost* to take the value of one for years 2008–2009 and zero for years 2005–2007. Then we re-run our regressions with the pre-GASB 53 sample after replacing the variable *Post* with *PseudoPost.* If our results are spurious due to violations of the parallel trends assumption, then the findings with *PseudoPost* should be similar to those with *Post* in our earlier tests.

However, our results reveal that none of the coefficients on the variables of interest, that is interaction terms *PseudoPost*NegFV* and *PseudoPost*Ineffective*, are significant. In other words, we do not observe an incremental decline in derivative

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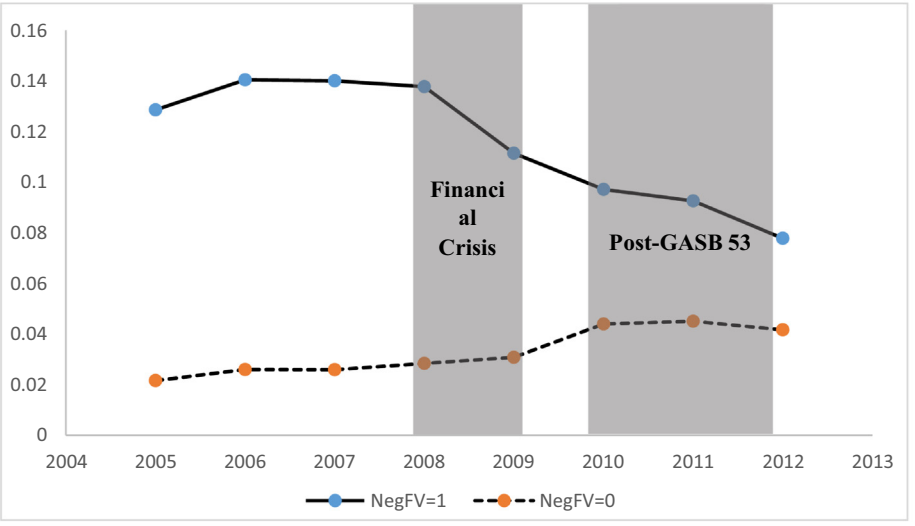
Panel A: Trend in derivative holdings for municipalities with net negative fair value and net positive fair value derivative positions



Panel B: Trend in derivative holdings for municipalities with ineffective hedges and effective hedges only

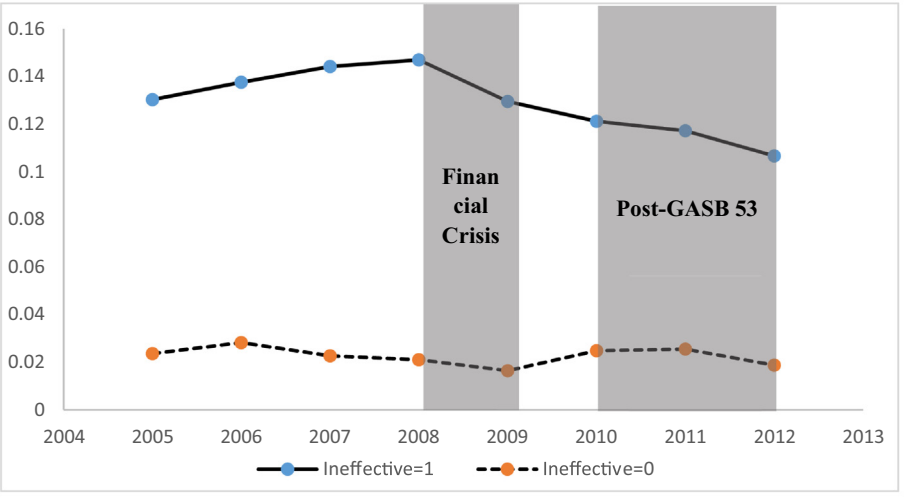


Fig. 1. Time Series Trend of *DerivativeNV*.

holdings for municipalities with net negative fair value derivatives and ineffective hedges, prior to the introduction of GASB 53. These results support the validity of the parallel trends assumption in our setting and strengthen our inferences.

6.3. Other robustness tests

6.3.1. Alternative measures of empirical proxies

In our main tests, we capture derivative holdings in terms of the notional value scaled by total debt. In untabulated tests, we examine the sensitivity of our results to unscaled measures of derivative holdings (both in terms of raw value and log transformed value). We also scale derivative measure by municipality's population. Results are similar for these alternative measures. Results are also similar when we consider partitioning variables *NegFV* and *Ineffective* as continuous variables instead of indicator variables.[28]

[28] In arriving at continuous measures of *NegFV* and *Ineffective*, we scale the fair value of derivative holdings and the notional value of ineffective hedges by the notional value of total derivative holdings.

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6.3.2. Results with a balanced panel

Our pre-GASB 53 sample consists of five years of data while the post-GASB 53 data contains only three years. An advantage of the lengthier pre-GASB 53 sample is that it allows us to conduct falsification tests using only pre-GASB 53 data (see, Section 6.2). As an additional test (untabulated), we re-examine all our tests by restricting the pre-GASB 53 period to the three years immediately preceding the adoption of GASB 53 so that the pre and post samples are balanced. All our results hold with this balanced panel as well.

7. Conclusions

Using a hand-collected dataset, we investigate changes in the level of municipal derivative holdings following the adoption of GASB 53 which mandated financial statement recognition of hitherto off-balance sheet derivative instruments and highlighted the presence of ineffective hedges. This is an important issue because concerns have been raised as to whether municipalities are sufficiently assiduous in their derivative decisions. Moreover, unlike in the corporate sector, empirical studies that examine the effect of reporting standards is sparse in the governmental sector and no prior studies investigate whether GASB pronouncements impact real decisions of municipal officials.

We find that municipalities facing unfavorable reporting outcomes due to the standard (i.e., municipalities with net negative fair value derivative positions and ineffective hedges) significantly reduced their derivative holdings following its adoption.

Our findings support the notion that GASB 53 impacted derivative holding decisions of municipal officials and, more broadly, that enhanced transparency afforded by governmental accounting standards can potentially impact decision making of governmental sector officials. These findings should be of interest to policy makers, municipal officials and academics who are interested in governmental accounting and real effects of accounting regulations.

In conclusion, we also highlight the difficulty of establishing causality in empirical studies such as ours. Our study attempts to rule out the presence of potential confounding factors by (1) conducting difference-in-differences tests, (2) employing a comprehensive set of control variables, (3) employing year and municipality fixed effects, (4) presenting graphical illustrations of the more affected and comparatively less affected municipalities' derivative holdings over time, and (5) conducting additional tests to investigate the validity of the parallel trends assumption. Collectively, these strategies should significantly mitigate concerns over confounding factors. However, we are unable to completely rule them out. For example, it is possible that following the financial crisis, municipalities with net negative derivative positions and municipalities with ineffective hedges decided to reduce the level of their derivative holdings for reasons unrelated to GASB 53 and its' reporting consequences. To that extent, our findings should be interpreted with some caution.

Appendix A. Variable definitions (Data source is indicated in parentheses).

Variable Label	Variable Definition
DerivativeNV	Total notional value of derivative holdings scaled by total level of debt in the primary government. (CAFR)
Post	A binary variable taking the value of one for post-GASB 53 reporting periods and zero for pre-GASB 53 reporting periods.
NegFV	A binary variable taking the value of one if the net fair value of the municipality's derivative positions in the year prior to the enactment of GASB 53 is negative and zero otherwise. (CAFR)
Ineffective	A binary variable taking the value of one if the municipality discloses holding derivatives that are ineffective hedges in the year that immediately follows the enactment of GASB 53 and zero otherwise. (CAFR)
Leverage	The ratio of total liability to total assets. (CAFR)
LnPop	The natural log of population. (CAFR)
PopGrowth	The annual population growth rate from year t-1 to t. (CAFR)
NetAssets	Total net assets, scaled by total revenue. (CAFR)
ΔNetAssets	Total revenue minus total expenses, scaled by total revenue. (CAFR)
Liquidity	Current assets divided by current liabilities. (CAFR)
GenRevRatio	Ratio of general revenue to total revenue. (CAFR)
MayorRun	An indicator variable taking the value of one for mayor-run municipalities and zero for manager-run municipalities. (CAFR)
GFOA	An indicator variable taking the value of one for municipalities that participate in the GFOA Certificate of Excellence in Financial Reporting Program and zero otherwise. (CAFR)
BigNAuditor	A binary variable taking the value of one for municipalities with financial statements audited by a big-

(*continued on next page*)

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Appendix A (*continued*)

Variable Label	Variable Definition
	4-auditor and zero otherwise. (CAFR)
Unemployment	Municipality-level unemployment rate. (U.S. Bureau of Labor Statistics)
Interest	10-year treasury constant maturity rate (U.S. Board of Governors of the Federal Reserve System)
Crisis	The change in municipality-level unemployment rate during financial crisis period, i.e., percentage point change in unemployment rate from December 2007 to December 2009 (U.S. Bureau of Labor Statistics)
PseudoPost	A binary variable taking the value of one for years 2008–2009 and zero for years 2005–2007.

Appendix B. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jaccpubpol.2020.106719.

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