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ESSAYS ON DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS
IN LOCAL UNITS OF GOVERNMENT

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ESSAYS ON DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS
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ABSTRACT

The defined benefit nature of many public employee pensions places a significant risk on the government sector employers. The management of this risk has been called into question with \$1.25 trillion in estimated underfunding of state pensions (Moody's, 2016), highlighting the importance of this topic on both academic and practitioner research agendas. Recognizing the magnitude of the public pension problem, the Government Accounting Standards Board (GASB) issued new standards for pension financial reporting that require recognition of the full net pension liabilities on the face of the financial statements effective with fiscal years beginning after June 15, 2014.

Based on an extensive review of the literature on determinants and consequences of pension funded status (Essay 1), this dissertation examined a determinant and a consequence of pension funding at local units of government participating in an agent multi-employer defined benefit pension plan. Specifically, this dissertation focused on the association of pension funded status with: (a) employer accounting basis choice as a measure of quality in financial reporting

(Essay 2) and (b) decisions made by terminating public-sector employees to take lump sum withdrawals (Essay 3).

Prior studies have generally utilized aggregate data at the state systems level and have primarily focused on the magnitude and determinants of pension funding. This dissertation is differentiated by its larger sample size than most prior pension studies and the use of data at the local employer (i.e. municipality or agency) level with such participants in a single multi-employer agent plan (having common investment and board governances across participants).

The main findings from the pension funding determinant paper, Essay 2, suggest that conformity with Generally Accepted Accounting Principles (GAAP) is positively associated with better pension funding in the subset of municipalities that are healthy funded (funding ratios of 80% to 100%). The pension funding consequence paper, Essay 3, finds an inverse association between the employer's pension funded ratio and the probability of its separating employees to take a lump sum withdrawal of their pension contributions. Both essays further provide for implications and considerations for policy-setters and regulators as they relate to pension funding in this setting.

Keywords: Pension funding, Defined Benefit Plans, Local Government, GASB, GAAP

TABLE OF CONTENTS

ACKNOWLEDGEMENTS.....	ii
ABSTRACT.....	iv
LIST OF TABLES.....	x
LIST OF FIGURES.....	xii
CHAPTER 1: SUMMARY OF RESEARCH.....	13
References.....	23
CHAPTER 2: ESSAY 1 - PENSION FUNDING DETERMINANTS AND CONSEQUENCES: A REVIEW OF THE LITERATURE.....	29
Abstract.....	29
Introduction.....	30
Background on Defined Benefit Plans.....	32
Multi-Employer Agent Versus Cost-Sharing Plans.....	35
Level of Defined Benefit Plan Pension Funded Status.....	36
Determinants of Pension Funding.....	37
Early Works.....	37
More Recent Studies.....	39
Aggregate at the States' Plan Level.....	44
Aggregate at the Local Level Across States.....	48
Aggregate at the Local Level or Single State.....	50
Consequences of Pension Funding.....	52
Opportunities for Future Research.....	57

TABLE OF CONTENTS (CONT.)

References	61
CHAPTER 3: ESSAY 2 - UNFUNDED PENSIONS AND FINANCIAL REPORTING OF	
LOCAL UNITS OF GOVERNMENT	68
Abstract	68
Introduction	69
Literature Review	73
Financial Reporting	73
Pension Funding	74
IMRF Background	76
Hypothesis Development	77
Research Design	79
Sample and Data Collection	80
Methodology	82
Endogeneity	86
Summary Statistics	86
Results	92
Main Test	92
Sensitivity Tests	98
Untabulated Sensitivity Tests	111
Discussion and Conclusion	111
Contribution	114
Limitations	115

TABLE OF CONTENTS (CONT.)

References	116
Appendix	122
CHAPTER 4: ESSAY 3 - DETERMINANTS OF DISTRIBUTION DECISIONS BY NON-VESTED EMPLOYEES: DOES EMPLOYER'S PENSION FUNDING MATTER?	124
Abstract	124
Introduction	126
Background	130
Defined Benefit Pensions	130
Pension Reforms	131
Defined Benefit Pension Participant Vesting	131
Institutional Background: IMRF	132
Lump Sum Withdrawal Choices of Non-Vested Employees	133
Literature Review	134
Lump Sum Withdrawals Literature	135
Lump Sum Withdrawals in the Public Sector	136
Retirement Savings Leakage	139
Hypothesis Development	140
Pension Funding	140
Reciprocal Service	143
Research Design	148
Sample and Data	148
Methodology	152

TABLE OF CONTENTS (CONT.)

Summary Statistics.....	154
Results.....	160
Endogeneity and Instrumental Variable Approach.....	160
Multivariate Analysis.....	164
Sensitivity Tests.....	166
Additional Analysis.....	168
Discussion and Conclusion.....	174
Contribution.....	175
Limitations.....	176
References.....	177
Appendix.....	185
VITA.....	186

LIST OF TABLES

Table	Page
CHAPTER 2	
Table 2.1: Summary of Prior Literature on Pension Funding Determinants	40
Table 2.2: Summary of Prior Literature on Consequences of Pension Funding	54
CHAPTER 3	
Table 3.1: Sample Composition.....	81
Table 3.2: Descriptive Statistics	86
Table 3.3: Pearson Correlations ($N = 2,565$).....	90
Table 3.4: Models for Pension Funding.....	94
Table 3.5: Funded Ratio Cutoffs Sensitivity.....	99
Table 3.6: Increase in Funded Ratio Sensitivity.....	102
Table 3.7: Lagged GAAP Models	108
CHAPTER 4	
Table 4.1: Distribution Choices of Separated Employees Within 6 Months of Termination	151
Table 4.2: Descriptive Statistics for Lump Sum Withdrawals ($N = 46,608$)	155
Table 4.3: Pearson Correlation	158
Table 4.4: Modeling Decision to Take a Lump Sum Withdrawals ($N = 46,608$)	161

LIST OF TABLES (CONT.)

Table	Page
Table 4.5: Lump Sum Withdrawal Sensitivity Models	167
Table 4.6: Descriptive Statistics for Cash-outs	169
Table 4.7: Cash-Out Models	170
Table 4.8: Cash-Out Sensitivity Models	173

LIST OF FIGURES

Figure	Page
CHAPTER 1	
Figure 1.1: Dissertation Theoretical Links	16
CHAPTER 2	
Figure 2.1: Summary of 24 State Pension Protections	34
Figure 2.2: Multiple Employer Plan Pension Asset and Liability Arrangements.....	36
CHAPTER 3	
Figure 3.1: Mean Funded Ratio Grouped by GAAP Versus Non-GAAP	87
Figure 3.2: Histogram of Funded Ratio by GAAP Versus Non-GAAP	88
CHAPTER 4	
Figure 4.1: Lump Sum Withdrawal Decision Tree of Non-Vested Employees	138
Figure 4.2: Conceptual Model of Determinants of Withdrawal Decisions	145
Figure 4.3: Histogram of the Funded Ratio (Dependent Variable)	156

CHAPTER 1: SUMMARY OF RESEARCH

The funded status of public pension defined benefit (DB) plans in the U. S. remains a topic of extensive research and public interest. The attention to this topic is driven in part by the substantial workforce covered by such plans and the 2008 financial crisis that eroded investment returns (Healey, Hess, & Nicholson, 2012). The years leading up to the stock market collapse in 2008 exhibited steady pension asset values close to or sufficient to pay the promised liabilities. The analysis performed by Munnell, Aubry, and Quinby (2010a) showed that in the early 2000's the assets to liabilities ratio was at 103% in the aggregate for the state and local plans they examined across the U. S. In contrast, the years 2009 and forward showed a significant decline in pension assets due to poor investment market returns, thus increasing substantially unfunded liabilities "... such that as of 2013 the average plan was only 71 percent funded" (Biggs, 2015, p. 13).

This funding metric is crucial to assessing the sustainability of a plan and whether its current assets are sufficient to pay future pension obligations (Elder & Wagner, 2015). To date, research has largely concentrated on the appropriateness of the funding measurements (Elder & Wagner, 2015) and the determinants of underfunding at the state systems level and DB plans governance structure (Chaney, Copley, & Stone, 2002; Easterday & Eaton, 2012; Eaton & Nofsinger, 2008; Kozk, 2008; Mitchell & Smith, 1994; Munnell, Aubry, & Quinby, 2011b; Shnitser, 2015; Yang & Mitchell, 2008), as well as their size and severity (Novy-Marx & Rauh, 2011). Direct impact of pension funding status and unfunded pension liabilities on borrowing costs (Munnell, Aubry, & Quinby, 2011a) and budget deficits (Munnell, Aubry, & Quinby, 2010b) are also frequently cited, typically at the state level unit of analysis.

Yet outside the intuitive financial impacts, there has been limited research in other areas where pension funding could be signaling, such as with covered employee benefits. Nor have there been conclusive findings on quality of financial reporting being a determinant of pension funding. Additionally, only a handful of studies to date focused on a specific state or the local unit of government level of analysis to examine variations of the funded status of such agencies within a state pension system. “Most of the heightened attention to government employee pensions has concentrated on state government plans, while local public employee pensions remain relatively unexplored” (Dye & Gordon, 2012, p. 3). Yet recent municipal bankruptcies (i.e. Detroit, Michigan; Central Falls, Rhode Island; and Vallejo, California) have been linked to preceding pension troubles (Faulk, Hicks, & Killian, 2016). Thus, this topic is of a particular interest for this dissertation.

The significance of public-sector pension funding is evidenced by the 9.5 million public pension beneficiaries and a government workforce that comprises more than one-eighth of the U. S. workforce (U. S. Bureau of Labor Statistics, 2015; U. S. Census Bureau, 2015). A typical pension system includes the sponsoring employer or unit of government (or multiple employers) providing retirement benefits to its participating employees. However, research remains lacking on some of the determinants of the funded status of such pension participating agencies and the effects of pension funded status on participating employees’ key decisions in retirement plan leakage (Pratt, 2010).¹ Such associations are less intuitive than the readily observed financial consequences, although these associations are seemingly likely to have implications on sponsoring employers and covered employees’ decisions, as well as the taxpayers.

¹ See Copeland (2009) for trends in retirement leakage from 1980-2006. Other economic studies and reports on this phenomenon include: Amronin & Smith (2003), Butrica, Zedlewski, & Issa (2010), GAO (2009), Holden & Schrass (2010), Hurd & Panis (2006) and Verma & Lichtenstein (2006).

In one way, sponsoring employers with high unfunded pension liabilities and cash basis financial reporting could be misleading citizenry as to the true condition of the pensions that the latter are financing through taxation. In another, lower pension funding could be signaling to terminating employees to take out their contributions when they leave, or the sponsoring employers may be influencing terminating employee distribution decisions in an attempt to improve pension funded status. But in turn, the resulting pension leakage could mean, yet again, a higher tax burden on future generations for these shifted costs since no retirement savings means government assistance to low-income, former employees. Thus, both the quality of financial reporting determinant and the pension leakage consequence are postulated to be associated at least in part with the pension funded ratio and are of a particular interest to be examined. If left unexplored, taxpayers may be kept in the dark on other potentially problematic areas related to pensions, yet the same taxpayers are ultimately left with subsidizing these “unaffordable commitments” of the public service sector (Hylton, 2011, p. 414).

As such, the essays in this dissertation include an examination of determinants of funded status. This is followed by an examination of a consequence—the inclusion of same pension funded status as a determinant of employee key decisions—where the first considers its association with the sponsoring employer’s choice of basis of accounting method (i.e. quality of financial reporting) and the second considers its association with the probability of terminating employees to take a lump sum withdrawal of their contributed dollars on account with the pension (subsequently leading to pension leakage).

This dissertation begins with a review of the pension funding literature, focusing on both determinants and consequences of pension funding (Chapter 2). The review identifies gaps in the literature, two of which are addressed empirically in the subsequent essays of this dissertation

(Chapters 3 and 4). Figure 1.1 depicts the theoretical link between the essays in this dissertation and the central topic of pension funding.

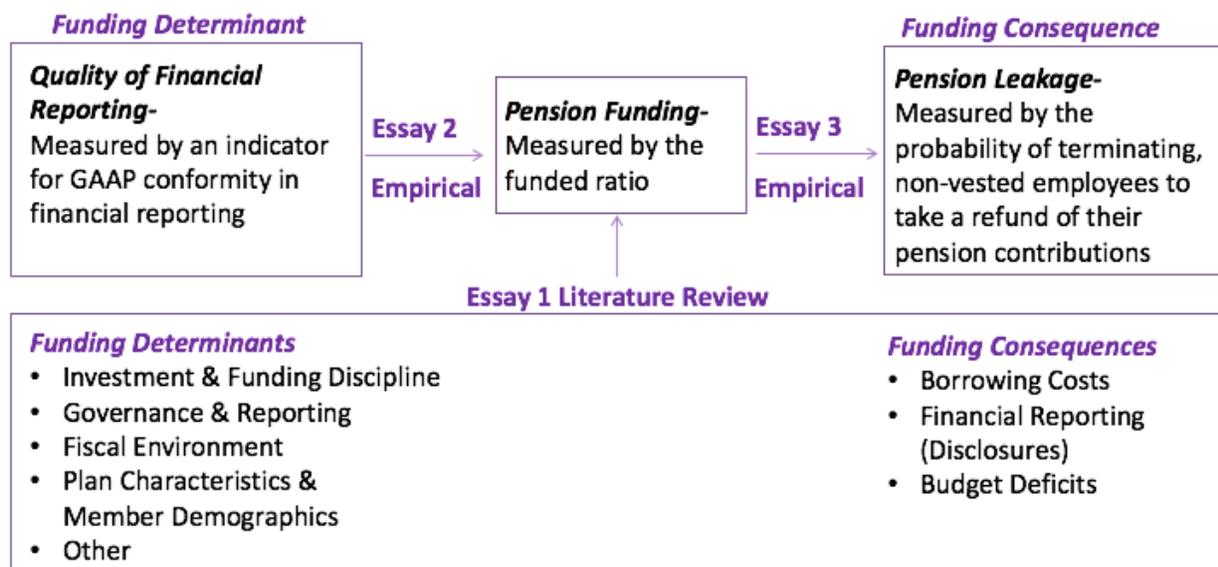


Figure 1.1. Dissertation theoretical links.

The first empirical essay (Chapter 3) examines conformity of local governments with generally accepted accounting principles (GAAP) which follow accrual basis of accounting and the association of this factor with pension funding of same entities. “Accrual accounting has, in fact, become the dominant form of accounting in large part because it overcomes the inherent mismatch between economic benefits and costs that arise due to timing differences in cash flows” (Naughton & Spamann, 2015, p. 582). Additionally, it is believed to improve accountability and transparency (Beechy, 2007). With the cash basis of accounting, events and transactions are only recognized when the actual cash is received or disbursed. This mismatch “enables managers to hide the true results of operations and the true financial position of the organization by manipulating the cash flow” (Beechy, 2007, p. 5).

Yet prior research linking pension funding and financial reporting are limited within the GAAP-conforming entities group at the state pension systems level and non-existent within the non-GAAP conforming entities grouped at the local level. Marks, Raman, and Wilson (1988) examined determinants of pension funding in U. S. state systems (a total sample of 45 states), finding that both increased GAAP conformity and quantity and quality of financial reporting disclosures were associated with lower levels of unfunded pension liabilities. Vermeer, Styles, and Patton (2012) found a significant positive association between receiving the Government Finance Officers Association (GFOA) certificate of excellence in financial reporting award (for quality financial reporting) and the likelihood of a local unit of government to provide complete Government Accounting Standards Board (GASB) Statement 27 pension disclosures.

Furthermore, in a study by Rich and Zhang (2015), who examined the association of local citizen oversight and pension underfunding via a sample of 84 locally administered pension plans (in 47 unique municipalities), the GFOA certificate of excellence award as a measure of superior Comprehensive Annual Financial Report (CAFR) and financial reporting was not found to be significant, contrary to the findings noted by Marks et al. (1988).

Martell, Kioko, and Moldogaziev (2013), who estimated the impact of the funding ratio of U. S. public pensions administered by state governments on credit quality, found that "... credit ratings are sensitive to information disclosed in state CAFRs" (p. 45). The authors further suggested that the measures and requirements provided by new GASB pension standards (67 and 68) should allow stakeholders and analysts to "...assess financial condition of governments as well as assess their impact on credit quality and borrowing costs, both at the state and local levels" (Martell et al. 2013, p. 46). This is an important point as local units of government not

subject to such standards will remain outside of such possible assessment and comparison with peers.

However, research to date has excluded non-GAAP conforming entities (which are less likely to follow all the GASB standards) from an analysis of pension funding. Thus, considering such entities in the sample for this research and proceeding with a re-examination of the association of quality financial reporting (with a more updated measure) was deemed worthwhile given not-so-conclusive findings in previous studies, which also relied on much smaller or state-level samples. In addition, this essay examined panel data across a number of years as compared to single year cross-sectional studies previously conducted, which allowed for capturing trends and assessing both level and change analysis. Sensitivity analyses around the 80% funding cutoff were also conducted.

In light of the newly issued GASB standards for pensions (67 and 68) which attempt to increase pension transparency (by requiring reporting of the net pension liability in the financial statements instead of the footnotes) but will only impact GAAP compliant units of governments, it is deemed to be a meaningful contribution to the literature to examine the quality of financial reporting in the form of GAAP vs. Non-GAAP conformity as a factor associated with unfunded pension liabilities. Thus, the following research question is presented:

- Is better quality of financial reporting through GAAP conformity associated with higher levels of pension funding?

To answer this question, and while drawing from prior studies on quality financial reporting and pensions funding (Marks et al., 1988; Rich & Zhang, 2015; Vermeer et al., 2012;), this essay utilized a sample of 435 local units of government in Illinois who participated in the Illinois Municipal Retirement Fund (IMRF), to examine the factors associated with the pension

underfunding, specifically quality of financial reporting via GAAP conformity during 2009-2014 (a total of 2,565 observations). In the full sample, the results point to non-GAAP conforming local units of government having better-funded pensions. However, given that the funding ratios in the sample varied substantially, further analysis was conducted on a number of subsamples to further investigate these initial results. It was noted that in the subgroup of healthy-funded municipalities (with funding ratios of 80% and higher, but less than full funding of 100%), the hypothesized positive association between quality of financial reporting and pension funding was found. This suggests that once an entity reaches a certain level of pension funding, the added quality of financial reporting, as exhibited by GAAP conformity, proves beneficial. Overall, the results, serving as first evidence of local level pension funding within a non-GAAP conforming group of entities, should be of interest to the GASB, regulators, and policy makers when assessing how to ensure the sustainability of public pensions while relying on financial reporting in both the GAAP-conforming and non-GAAP conforming settings.

The second empirical essay (Chapter 4) shifts the focus to the decisions made by terminating plan employees and whether pension funded status of the sponsoring local units of government is also associated with such decisions. Building on the previously noted concerns surrounding the pension funding status of sponsoring employers, such entities as local units of government may be tempted to reduce their future pension liabilities at the expense of their former employees. The non-vested, terminated employees have the option of leaving their contributions on account upon job separation or taking them as a distribution in the form of cash or, alternatively, a rollover to another qualifying retirement savings account. The respective sponsoring employers are hypothesized to be influencing such distribution options. Or, alternatively, poorly funded pensions act as a signal to employees to move their contributions out

of the pension plan due to concerns about their sustainability in the future. Because a cash distribution decision carries with it the potential for retirement savings *leakage*, it continues to be of a concern, particularly in the post great recession economy.

Prior literature on lump sum withdrawal (LSW) in both private and public sectors is focused on the triggering events that call for withdrawal decisions (Banerjee, 2013; Bryant, Holden, & Sabelhaus, 2011; Burman, Coe, & Gale, 1999; Butler & Teppa, 2007; Chalmers & Reuter, 2012; Clark, Morrill, & Vanderweide, 2014; Hurd & Panis, 2006; Lueken & Podgursky, 2016). The choices that an employee needs to consider during these triggering career or life events include one at the time of job separation (choose cash-out lump-sum or rollover to an Individual Retirement Account (IRA)) and the other at the time of retirement (choose annuity or a lump-sum distribution). Yet both LSW decision triggering events have seen little empirical evidence (due to data source reliability) and were studied in a limited number of papers in the public sector. This state of affairs has been attributed by Butler and Teppa (2007) to the lack of dependable data using survey responses.

An extensive overview of the related literature published by Gough and Niza (2011), combined with my review of more recent studies revealed only two related works, one by Clark et al. (2014) and one by Lueken and Podgursky (2016). Both examined LSW decisions at job separation in the public sector while relying on administrative data. The merits of Clark et al. (2014) include its focus on both vested and non-vested members. However, its limitations relate to the sample setting (the North Carolina systems did not reform to increase pension vesting periods) and to its limiting consideration of employees under the age of 50 (it appears that baby boomers were not studied). Lueken and Podgursky (2016) based their study on the Illinois Teachers Retirement System (whose members do not contribute to Social Security), a setting

which provides the benefits of studying a pension system in Illinois, but is limited in its focus on vested members' decisions and cost-sharing plan structure (explained in detail in Chapter 2).

The second empirical essay in this dissertation is thus an important extension of Clark et al. (2014) and Lueken and Podgursky (2016) models to non-vested employees while covering all age groups and considering a longer vesting period pension system. In addition, I specifically explore the never-before-studied association of pension funded status as a determinant of the probability of employees' distribution decisions within both six months and twelve months of termination date, with the following research questions in mind.

- What is the association between the sponsoring employer pension ratios and separating employees' lump sum withdrawal decisions?
- To what extent are cash-outs of contributions (pension leakage) following the initial withdrawal decision prevalent in this setting?

In an attempt to answer the above questions, an instrumental variable probit regression model was developed drawing on the behavioral economics literature related to the life-cycle model of consumption and individuals' savings heuristics (Benartzi & Thaler, 2007). This essay used a sample of employees who separated employment between 2010 and 2013. The results found that a decrease in the employer's pension funding status was associated with increased probability that the terminated employee would take a refund of their contributions. In a separate model, similar results were noted when examining the probability of a cash-out decision versus maintaining an account with the pension system upon employment termination. The results further showed a high percentage of the terminated employees that took a refund requested to receive it in the form of a cash-out, thus contributing to the pension leakage problem. This

evidence illustrates that policy makers should consider further restrictions to the distribution process.

In summary, the three essays collectively supplement and further extend prior literature on pension funded status and public-sector DB plans, specifically at the local unit of government level. These essays also contribute to a better understanding of the extensively studied determinants of funded status and the less explored consequences of funded status and further provide suggestions for extension by future research.

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CHAPTER 2: ESSAY 1 - PENSION FUNDING DETERMINANTS AND CONSEQUENCES:
A REVIEW OF THE LITERATURE

Abstract

Public pension funding continues to be a topic of interest to both practitioners and researchers. Early works in this area date back to Mumy (1978). However, it wasn't until the mid-nineties that the stream of research on public pension funding resurfaced. The objective of this essay is to provide an overview of the literature on pension funding in the public pensions sector over the approximately past twenty years and to highlight research areas where there may be gaps. Empirical research on pension funding has predominantly focused on the antecedents or determinants of pension funded status, motivated in large part by the magnitude of underfunding. These studies are often concentrated on a subset of larger, state-wide systems, given existing data limitations. Thus, this essay outlines how research has evolved over the years and aggregates the works at the state, local and specific state level to further point to gaps. This review also reveals limited research on the consequences of pension funding. Finally, some opportunities for future empirical research are highlighted.

Keywords: Public pensions, pension funding

“Over 27 million employees and beneficiaries are covered by state and local government pension plans. However, the recent economic downturn and associated budget challenges confronting state and local governments pose some questions as to the sustainability of these plans” (GAO, 2012, p. 1). In a performance audit conducted by the Government Accountability Office (GAO) from December 2010 through March 2012, which included analysis of pension plans using national level data, the GAO further noted that the gap between assets available and pension plan liabilities continues to grow. A report by the American Legislative Exchange Council (ALEC) points to a nationwide problem with this gap of unfunded liabilities of state public plans reaching \$5.6 trillion and Ohio and Illinois holding the highest per capita of such liabilities (Williams, Williams, Lafferty, & Curry, 2016).

In a more recent GAO target audit of the Tennessee Valley Authority (the largest public power provider in the nation), it was noted the utility authority only had a 54% funding level for its pension plan with a steady increase in the unfunded pension liabilities in the past ten years alone (GAO, 2017). The GAO further pointed to the lack of mechanisms in place to ensure achievement of full funding in the future.

These examples of the GAO’s audits targeted at pension funding and plans’ sustainability highlight the commitment of this office to good government and accountability to the employees who were promised these retirement benefits, even though such public pension plans are not subject to most federal laws as in the private sector (GAO, 2008).

Certainly, the GAO is not alone when voicing concerns about unfunded pensions. An analysis of media coverage conducted in the first three months of 2012 by Gordon, Rose, and Fischer (2012) identified over 2,000 news articles across the country covering state and local government pension-related issues, while years ago this topic was hardly mentioned in

mainstream media (Gordon et al., 2012). This increase in media coverage prompted research into the topic of pensions underfunding and the severity of the pension funded status of systems across the nation (Munnell, Aubry, & Quinby, 2011a; Novy-Marx & Rauh, 2011). However, data limitations stemming from the fact that no single repository for all public pensions exists focused research on a subset of (typically) larger, state-wide systems (Thornton, 2012).² As noted by Gordon et al. (2012, p. 1): "...despite heightened attention to state and local government pensions generally, relatively little is known about local pensions specifically."

The purpose of this essay was to critically evaluate the literature on determinants and consequences of pension funding. In particular, the focus was on studies aggregated at the state or local level and was aimed at identifying gaps or opportunities for future research in terms of unanswered research questions that remain.

It was concluded, based on the review of 27 studies and publications, that unlike the well-established body of literature on determinants of pension funding (with 24 studies identified), the area of consequences of pension funding (i.e. with pension funding being the independent variable) has seen limited research (only five studies identified). Some proposed explanations to this phenomena were noted and include the lack of a single data repository to facilitate the analysis of financial data of state and local plans across the nation (especially since pensions data were located in the footnotes prior to the new financial reporting standards), as well as the developing nature of this domain as a whole, which is lacking a comprehensive theoretical model for determinants of pension funding as a starting point to be able to examine its consequences thereafter. Additionally, the long-term nature of the defined benefit plans could mislead one to believe consequences of underfunding are not of an immediate concern and as such may not

² Some common data sets in recent research were obtained from: The Center for Retirement Research at Boston College, The National Association of State Retirement Administrators, and the U. S. Census Bureau (Thornton 2012; Gordon et al., 2012).

warrant research focus since unfunded pension obligations are pushed further out as a burden to future taxpayer generations.

Nonetheless, future research would benefit from developing a comprehensive framework for understanding the determinants of pension underfunding. The review of the literature suggests that the investment funding discipline, governance and reporting, fiscal environment, plan characteristics, and member demographics are determinants of pension funding. However, the results are not consistent with the various levels of plan aggregation, type of data, or methods used. Thus, continuing to develop a robust determinants framework remains a fruitful area for future research. At the same time, there is a need to focus on the implications and consequences of current pension underfunding in the public sector. Because pension reforms and other plan changes take time to implement and get reflected in the funding status, it is important to assess, based on current levels, what pension underfunding may be leading to at the employee level (contributions withdrawal decisions), or at the sponsoring employer level (such as the local government budget constraints) or even for the cost of borrowing ability of the state plans. Greater availability of data via the creation of single repositories of financial reports of such plans is another way in which research in this area could move forward.

The remainder of this essay is organized as follows. In the next section, a brief background on defined benefit plans, structures, and funding is provided. Next, research related to determinants and consequences of pension funding is reviewed. The final section of this chapter is devoted to the discussion of gaps and suggestions for future research.

Background on Defined Benefit Plans

Public-sector DB plans are less common and predominantly different from their

counterparts in the private sector in that the Federal Employee Retirement Income Security Act of 1974 (ERISA) requirements and Pension Benefit Guaranty Corporation insurance oversight do not apply to the former; instead DB plans are legally protected by the statute or the constitution of the respective state, or are contractually-protected (Easterday & Eaton, 2012; GAO, 2008; Monahan, 2010; Perun & Valenti, 2008).³

Monahan (2010) summarized an analysis of 24 U. S. states' public pensions' legal structures by noting that "many states are likely dissatisfied with current approaches to public pension protection because the end result is either an inability to modify future accruals, an inability to recruit and retain valued employees, or an inability to determine what changes can legally be made to public pension plans" (p. 635). The summary of these legal protections is provided in Figure 2.1 (created based on data from Monahan, 2010).

³ In Illinois, for instance, the General Assembly Pension Code 40 ILCS 5/1-101 is the governing statute for all the public pension plans in the state. In 2014, an attempt was made at a reform to change or diminish benefits of existing members (who joined the pension after 1/1/2011) in the five state-contributing pensions by passing Public Act 98-599. It was ruled as unconstitutional by the Supreme Court of Illinois (2015 IL Docket No. 118585). The ruling was based on the terms outlined in the statutes, thus highlighting the power of the governing statutes and the state constitution pension protection clause from 1970. However, such pension statutes are not unique to Illinois. Pensions in states such as New York, Michigan, and Arizona are governed by similarly restrictive constitutions (Monahan, 2010).

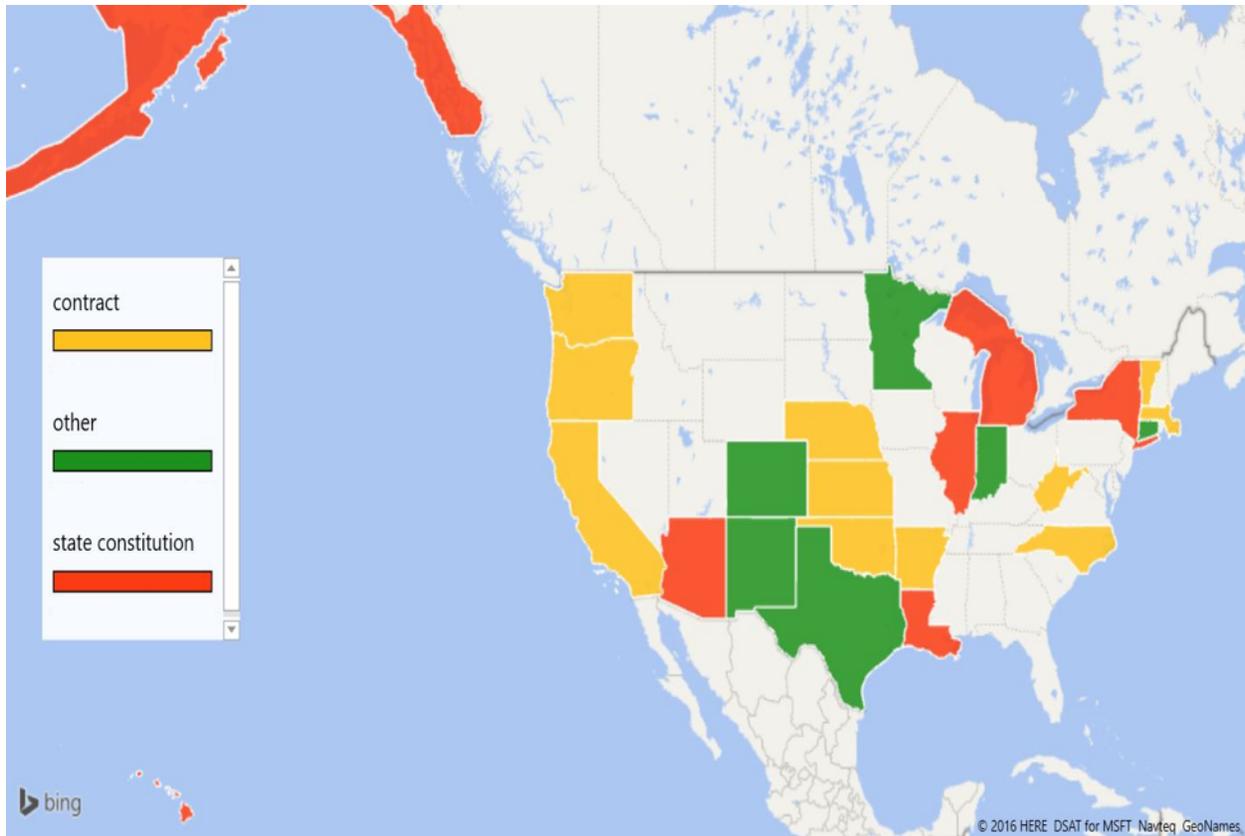


Figure 2.1. Summary of 24 state pension protections.
Based on data from Monahan (2010).

Within each state, a number of DB plans may exist to cover workers in municipalities, libraries, parks, police and fire departments, etc., providing services to the citizens and the community. In a typical public DB plan, the administering employer (single plan)—a state or local government agency—or a group of participating employers or local units of government (each of which is part of an agent or cost sharing multi-employer plan) guarantee the employee a set retirement benefit for life that is defined in advance, based on a pre-determined formula. The common sources of pension funding (i.e. pension assets) include employee contributions, employer contributions (for employees participating in the pension), and any returns on investment. However, at the same time “...public sector [DB] plans allocate the management and investment risk to the employers, thus making the [individual] employers liable for the

promised amounts regardless of investment performance in any given period” (Shnitser, 2015, p. 668). Investment strategy decisions and overall policies for plan administration are established by the plan's governing board of trustees (GAO, 2008). Furthermore, the control over pension assets and liabilities at the participating unit of government level vary between the two types of multi-employer plans as discussed next.

Multi-Employer Agent Versus Cost-Sharing Plans

In addition to DB plans administered by a single employer, the GASB further differentiates between *agent* and *cost-sharing* multiple-employer plans. An agent plan is simply an administration of numerous, legally separate *single* employer plans that come together for purposes of pension asset investment. Each participating employer has a separate account maintained within the agent plan, a structure that facilitates segregation of pension assets available to pay retirement benefits of only that employer's employees (GASB, 2012). In contrast, a cost-sharing plan arrangement facilitates pooling of all participating single employers into one account for both purposes of assets investments and payment of benefits on pension obligations to any employee of an employer participating in this cost-sharing pool (GASB, 2012). The distinction is important because a cost-sharing employer lacks control over both pension assets and pension liabilities as those are impacted by changes occurring with other employers pooled in the cost-sharing plan, whereas an employer participating with an agent plan has considerable control over its pension obligations. For this reason, this study focuses on local units of government participating in an agent multiple-employer plan in order to examine the determinants of funding ratios. Such analysis is not feasible for a cost-sharing employer as the funded status is merely the share of the pie and not a separate account attributable to the

employer’s employees only. Figure 2.2 illustrates this distinction between the two plan structures.

	Assets Pooled	Assets Pooled for Investment (Individual Accounts Maintained)
Multiple Employers	<i>Cost-Sharing Plan</i>	<i>Agent Plan</i>
	Liabilities Pooled	Liabilities Separated (Individual Accounts)

Figure 2.2. Multiple employer plan pension asset and liability arrangements. Adapted from Shnitser (2015).

Level of Defined Benefit Pension Funded Status

Researchers including Easterday and Eaton (2012), Kozk (2008), and Novy-Marx and Rauh (2011) have studied DB plans’ structures and funded status in both the private and public sectors extensively. Yet “economic concerns related to underfunding of DB pensions” remain (Easterday & Eaton, 2012), and thus it is important to consider the determinants and consequences of pension funded status.

References to pension funding in this dissertation follow the traditional definition by comparing the value of the actuarial pension assets with accrued pension liabilities, where an unfunded DB plan has liabilities exceeding its available assets (Brown & Wilcox, 2009; CBO, 2011; Easterday & Eaton, 2012). Rare but possible is a situation where pension assets equal the pension obligation, thus considered fully funded, or overfunded when the assets are higher than

the liabilities (Easterday & Eaton, 2012). The average funded ratio (i.e. assets divided by liabilities) is commonly used for comparison purposes among plans; 80% and above is considered healthy and sound (GAO, 2008). “Low funded ratios would eventually require the government employer to improve funding, for example, by reducing benefits or by increasing contributions” (GAO, 2008, p. 1).

Determinants of Pension Funding

Early Works

“The major problem with the public defined plans is their funding status” (Barth, Hilliard, Jahera, Joo, & Lee, 2016, p. 4). Indeed, the academic and practitioner literature on this topic is quite extensive.⁴ It has also been a topic of interest for the GAO for many years. As early as 1979, the GAO issued early concerns and recommendations to Congress for consideration regarding the funding of state and local government pension plans based on a national study in which they reviewed 72 state and local plans. The GAO concluded by stating that “Congress should closely monitor actions taken by state and local governments to improve the funding of their pension plans to determine whether and at what point congressional action may be necessary for the national interest to prevent fiscal disaster and to protect the rights of employees and their dependents” (GAO, 1979, p. 36).

Early theoretical developments that contribute to our understanding of why pensions are not fully funded are attributed to Epple and Schipper (1981), Inman (1986), Marks, Raman, and Wilson (1988), and Mumy (1978). The first paper developed an analytical model based on a set of assumptions to arrive at an optimum pension size and corresponding funding of local

⁴ See Yang and Mitchell (2008) for a comprehensive review of the literature on pension plan funding and investment behavior.

government pensions (Mumy, 1978). The author concluded by suggesting that generally there are advantages to governments offering pension benefits and that underfunding arises in some states that are inclined to borrow against their pension obligations. Epple and Schipper (1981) questioned whether tax-paying citizens support current levels of municipal services because they are informed about the true costs of pensions (both the immediate and future) or whether they are unaware of possible capitalization of such costs into future property taxes. In a sample of Pennsylvania municipalities, the authors found that underfunding pensions allows for tax smoothing and levels the tax burden on citizenry (Epple & Schipper, 1981). Inman (1986) analyzed the funded status of state and local teacher plans in the U. S. This research concluded that underfunding teacher pensions is common among rural states characterized as being poorer, or in mature cities characterized as being more industrialized (Inman, 1986).

Marks et al. (1988) were the first to comprehensively examine determinants of pension underfunding in U. S. state systems (with a total sample of 45 states from a 1983 study), stating that to their knowledge “there [was] no integrating theory which specifies why governmental pension plans are so significantly underfunded” (p. 157). Thus, the authors proceeded by developing a conceptual model of characteristics associated with pension underfunding (as the dependent variables) and testing 20 hypotheses empirically. The exploratory pension plan determinants examined included citizens’ demands (i.e. post-war baby boomers), participating employee contracts (i.e. employees seen as “bondholders” of pensions), fiscal environment, opportunistic governance or political behavior, and other monitoring (i.e. legislative and financial reporting). Surprisingly, no support was found for an association between citizens’ demands, the degree of fiscal strain, opportunistic governance behavior, and pension underfunding. However, monitoring through financial reporting (in the form of GAAP

compliance, quality, and quantity of financial reporting disclosures) were noted to be associated with lower underfunding (Marks et al., 1988).

More Recent Studies

It wasn't until the mid-nineties that the stream of research on determinants of public pensions funding resurfaced and continues to grow today. "After a decade of neglect by researchers, public employee retirement plans are again coming into the public eye. This new concern is partly due to the public sector of revenue shortfalls that public pension funds have been asked to help meet in some states" (Mitchell & Smith, 1994, p. 1). Additionally, in 1994 the GASB issued its first pension standard—statement 27. For these reasons, the focus of this literature review is on works from this point through 2016.

Table 2.1, Panels A-C summarize the more recent research in the area of pension funding determinants (and related) over approximately the past twenty years. The studies and articles are grouped by level of unit of analysis and aggregation: studies focused on the state level plans (Panel A), local level plans across states (Panel B), and local level plans or single state focus (Panel C). Five conceptual determinants were evaluated broadly for inclusion in each work reviewed: investment and funding discipline, governance and reporting, fiscal environment, plan characteristics and member demographics, and other factors. An overview of these determinants and highlights of key studies in this area are presented next.

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Table 2.1

*Summary of Prior Literature on Pension Funding Determinants
Panel A: Aggregate at the states' plan level*

Authors	Data or Sample; Unit of Analysis and Level of Aggregation	Method	Pension Funding Determinants				Other
			Investment & Funding Discipline	Governance & Reporting	Fiscal Environment	Plan Characteristics & Member Demographics	
Mitchell & Smith (1994)	42 plans across the U. S. NASRA & NCTR survey data used from 1989.	Cross-sectional	x		x		
Chaney et al. (2002)	44 state plans across the U. S. Data obtained from CAFRs collected in 1994-1995.	Cross-sectional	x		x		
Schneider & Damanpour (2002)	PENDAT surveys file (US Public Pension Plans) 1992, 1994, 1996.	Cross-sectional		x	x	x	
Giertz & Papke (2007)	85 plans. Data from 2000, 2002, and 2004 surveys of Wisconsin Retirement Research Committee.	Cross-sectional			x	x	
Yang & Mitchell (2008)	PENDAT surveys file (US Public Pension Plans) 1990-2000.	Longitudinal	x	x			
Cogburn & Kearney (2010)	Pew Center on the States Dataset (50 states). Fiscal 2006 data.	Cross-sectional		x	x		x
Eaton & Nofsinger (2008)	110 pension plans across U. S. 2002-2005 data.	Longitudinal	x			x	
Munnell et al. (2011b)	126 state plans across the U. S. from PPD database. 2008 (single year) data.	Cross-sectional	x	x	x	x	
Kido et al. (2012)	U. S. states (various data sources) from 2000-2008. 345 state-year observations.	Longitudinal	x		x		

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Panel A: Aggregate at the states' plan level - Continued

Authors	Data/Sample; Unit of Analysis and Level of Aggregation	Method	Pension Funding Determinants				
			Investment & Funding Discipline	Governance & Reporting	Fiscal Environment	Plan Characteristics & Member Demographics	Other
Shnitser (2015)	105 state plans across U. S. (from PPD dataset). 2001-2010.	Longitudinal	x	x	x	x	
Barth et al. (2016)	153 state plans across U. S. from PPD database. 2001-2013.	Longitudinal	x	x	x	x	
Kelley (2014)	79 plans across 42 U. S. states (from PPD dataset), 2001-2009 data.	Longitudinal			x	x	x

Note: CAFR stands for Comprehensive Annual Financial Report; NASRA stands for National Association of State Retirement Administrators; NCTR stands for National Council on Teacher Retirement; PENDAT and PPD are names of databases.

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Panel B: Aggregate at the local level across states

Authors	Data or Sample; Unit of Analysis and Level of Aggregation	Method	Investment & Funding Discipline	Pension Funding Determinants			
				Governance & Reporting	Fiscal Environment	Plan Characteristics & Member Demographics	Other
Gorina (2013)	353 cities across U. S. Data for 2003- 2007 based on the GFOA Database.	Longitudinal			x	x	x
Rich & Zhang (2015)	84 local plans in 2009 (ICMA Survey).	Cross- sectional		x		x	x
Munnell & Aubry (2016)	92 cities across the U. S. participating in cost-sharing plans only. 173 cities in full sample. FY 2012 CAFRs.	Cross- sectional				x	x
Brinkman et al. (2016)	168 large cities across the U. S. to test analytical model predictions. FY 2012 (single year) data.	Analytical model – predictive as well as Cross- sectional			x	x	
Maher et al. (2016)	372 municipalities from 29 states (using GFOA award database and ICMA). 2007 (pre) and (post), 2009, 2010, 2011.	Longitudinal			x		

Note: CAFR stands for Comprehensive Annual Financial Report; GFOA stands for Government Finance Officers Association; ICMA stands for International City/County Management Association.

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Panel C: Aggregate at the local level or single state

Authors	Data or Sample; Unit of Analysis and Level of Aggregation	Method	Pension Funding Determinants				Other
			Investment & Funding Discipline	Governance & Reporting	Fiscal Environment	Plan Characteristics & Member Demographics	
Lee & Vonasek (2011)	32 police and fire pension funds in 20 cities in Florida.	Case study					x
Sun (2013)	57 cities in California. Mail survey, 2011.	Descriptive					x
Weber et al. (2014)	Aggregate of municipalities in 67 counties in Pennsylvania. 10-year period, 2001-2011 (every other year). Specifically excluded multi-employer pension plans.	Practitioner paper				x	
Elder & Wagner (2015) WP	2 largest pension systems in Pennsylvania.	Case study					x
Bagchi (2016)	2,000 municipal pension plans in Pennsylvania. Biennial data 1985-2009.	Analytical model – predictive as well as Longitudinal	x		x	x	x
Faulk et al. (2016)	Aggregate of local governments (mainly police and fire) in 75 counties in Indiana. Fiscal Year 2013 (single year) data.	Cross-sectional			x	x	x
Smith & Dove (2016)	Alabama systems.	Case study					x

Aggregate at the states' plan level. It is evident by the review of the literature that plans at the state level have been most heavily studied. The Public Plans Data (PPD) dataset compiled by the Center for Retirement Research at Boston College has been the main source of data for these studies. Prior works analyzed the same states' plans using this dataset across various years and refined models to provide new measures of the determinants previously identified.⁵ Studies analyzing data prior to 2001 resorted to various surveys or hand-collected data from CAFRs, thus exhibiting much smaller sample sizes (except for Yang and Mitchell, 2008, who used a large sample from a survey covering the years of 1990-2000, and Schneider and Damanpour, 2002, who relied on bi-annual survey data from 1992, 1994, and 1996).

In a cross-sectional study of 42 pension plans from 1989, Mitchell and Smith (1994) studied alternative measures of funding, such as the stock funding ratio (assets to present value of vested liabilities) and flow funding (examining actual annual contributions), in their model to assess whether public entities altered their funding discipline as a result of fiscal stress. Their focus was on investment and funding discipline, looking at the varying actuarial assumptions and fiscal environment concepts and considering unemployment and unionization. The authors confirmed no "egregious misuse" of actuarial assumptions (Mitchell and Smith, 1994, p. 288). They further found evidence to suggest that unionization levels are inversely related to pension funding and that funding discipline is impacted by fiscal pressures. The study concluded by calling for further research that is state-specific and longitudinal.

Yang and Mitchell (2008) built on the previous Mitchell study and extended it, focusing on investment performance. In addition, they also considered governance structure (board composition) and reporting in this setting and incorporated past funded ratio into their three

⁵ The PPD dataset contains information on the largest 126 state and local DB plans across the 50 states from 2001 and onward (Thornton, 2012).

empirical models. Chaney, Copley, and Stone (2002) considered funding discipline but also performed an in-depth analysis into the 44 examined state plans' fiscal environment and balanced budget constraints to evaluate their impact on the funded ratio of the same plans. The authors noted that "... fiscally stressed states that are required to balance their budgets both underfund their pensions and select discount rates which obscure underfunding" (Chaney et al., 2002, p. 287). Another interesting finding of their work was that greater unionization is positively related to pension funded status. These results were later also confirmed by Kelley (2014), yet are contrary to the opposing finding by the early work of Mitchell and Smith (1994).

Giertz and Papke (2007) analyzed 85 state systems based on survey data from 2000, 2002, and 2004 to assess plans' funding and state budgets and finances. The authors considered plan and member demographics as well as fiscal environments of the states in their models. They found that actuarial methods which differ among the plans are not significant determinants of pension funding. In addition, when they included year fixed effects only per-capita state tax revenues remained significant, suggesting that states with larger revenues and resources are associated with better funding.

Building on the study of Chaney et al. (2002), Cogburn and Kearney (2010) performed a high-level analysis of the 50 states using 2006 data to study the factors associated with both pension and health care liabilities. The authors focused on determinants of fiscal environment, governance, and specifically political pressures (the "other" determinants category item), and found support for the hypothesized associations such as positive association between level of fiscal constraint and the size of the unfunded liability and legislative professionalism being negatively associated with unfunded pensions.

Schneider and Damanpour (2002) used a large sample of pension plans from the PENDAT surveys file for the years 1992, 1994, and 1996 (administered by the Government Finance Officers Association) to answer the main research question of how governance affects pension funding. Drawing on the public choice theory, the authors also incorporated various measures of plan and member demographic characteristics, as well as a measure of the fiscal environment into their model. The study only found support for a handful of the hypotheses tested, including presence of a board of trustees (governance that improves funding), size of plan benefits (plan characteristics, larger benefits, lesser funding), and state debt (fiscal environment, greater debt, lesser funding) being associated with pension plan funding.

The shift to consider plan demographics began with Eaton and Nofsinger (2008). These authors focused on how the gender of the participating pension members impacts the funded ratio of such plans. They further differentiated between different types of plans (teachers, public employees, police, and fire). The results of their analysis suggest that a higher percentage of female workers is inversely related to pension funded ratio, particularly in the teachers' plans that exhibit such high female population ratios.

Munnell, Aubry, and Quinby (2011b) conducted a comprehensive study of determinants of funded ratio using 2008 data for 126 state plans across the U. S. They incorporated investment and funding discipline, governance, fiscal environment, and certain plan characteristics (plan age, size, and benefit levels) in their model. The authors noted the substantial variation in the funded ratios and concluded that fiscal distress factors are associated with lower funded ratios, in line with prior research. Additionally, funding discipline and plan characteristics were noted to be significantly related to funded ratio, and partial support was noted for their governance structure measures (Munnell et al., 2011b). A recent working paper

by Barth et al. (2016) replicated the cross-sectional analysis done by Munnell et al. (2011b), although with some variation in the explanatory variables. The authors performed a longitudinal analysis of 153 state plans between 2001 and 2013 using a different statistical method and also a lagged funded ratio variable to improve the overall model of determinants of the funded ratio; it also included plan and year fixed effects (Barth et al., 2016). Their results were overall consistent with Munnell et al. (2011b) and other prior literature.

Another recent study by Shnitser (2015) focused on funding discipline, governance, and fiscal environment. Specifically, the author looked at the differentiating institutional designs of single plans versus multi-employer cost sharing and agent plans. The study concluded by suggesting that "...institutions that promote transparency with respect to individual employer liability [such as agent multi-employer plans], limit the discretion of the legislature over pension fund contributions, and hold it accountable for sound funding are associated with more consistent funding of pension promises" (Shnitser, 2015, pp. 708-709).

This literature review continued with other important factors that could potentially determine the funded ratio, such as politics or elections. Kido et al. (2012) performed a state level longitudinal analysis for the years 2000-2008 to examine effects of gubernatorial elections and find evidence in support of their hypothesis of accounting manipulation of unfunded pensions (reducing them) in an election year. The authors utilized an interesting outcome measure of *discretionally* unfunded pension liabilities which they modeled relying on investment assumptions and next modeled the effects of elections on such discretionary residuals while including the interaction of the election indicator with key fiscal measures. In comparison, Kelley (2014) considered political and interest groups' pressures (with mixed results) in addition to plan characteristic, member demographics and the fiscal environment. The author made the

link by relying on the special interest hypothesis and found that the higher ratio of retirees collecting benefits to total state population is significantly related to lower funded ratio of same plans, whereas the younger participants' ratio has the inverse effect (Kelley, 2014).

Aggregate at the local level across states. Munnell and Aubry (2016) shifted the research focus to the local level of aggregation, following the new GASB standards for pension liability reporting that have a substantial impact on the reporting of the participating units of government at the local level. The authors examined 92 cities that participate in cost-sharing plans as well as the full sample of 173 cities across the U. S. by utilizing data from their 2012 CAFRs to re-appropriate assets and liabilities for the unfunded liability determination (an alternative measure to funded ratio of pension funding) based on the new GASB standards. The authors concluded that when applying the new standard approach to the cities in their sample, an increase of 12-20% was noted, based on city size, to the unfunded liability they would have to report in their balance sheets, thus suggesting local governments "...may be more interested in seeing the unfunded liability decline over time and will have a vested interest in ensuring that their contributions are doing just that" (Munnell & Aubry, 2016, p. 5).

Rich and Zhang (2015) also focused on locally administered pension plans in their analysis. The authors used a sample of 84 plans from the 2009 concentrate on determinants of fiscal environment, plan characteristics, and member demographics, and specifically citizen oversight (the "other" determinants category item). They found a negative association between citizen oversight (independent variable) and unfunded pension liabilities (dependent variable), suggesting the former as effective in constraining management behavior (Rich & Zhang, 2015). In addition to citizen oversight, they controlled in their model for various plan characteristics as

well as for financial reporting determinant in the way of an indicator variable for receiving the GFOA award.

Brinkman, Coen-Pirani, and Sieg (2016) pulled data from the Munnell and Aubry (2016) cities' unfunded liability data to combine it with the fiscal environment, as well as plan member demographics for the same year–2012. The authors first built an overlapping generations economic and analytical model and used it to predict the unfunded actuarial accrued liability (UAAL) for the cities in the sample and also considered land price and taxes capitalization (reflection of local debt, inclusive of future pension liabilities) and generational differences between the young and retired cohorts. The results of the analysis suggested that in cities with a higher ratio of younger cohorts there is better pension funding as they favor the full funding goal and that this relationship appears stronger in municipalities with less land available and thus the funding policy is important for real estate pricing and utility of such young households (Brinkman et al., 2016). The authors further stated these results could be driven by the fact that when observing cities that are fiscally and economically distressed, they tend to be populated by older cohorts.

In a related study focusing on the fiscal environment aspect of the funded ratio, Maher, Park, and Harrold (2016) examined the tax and expenditure limits and how they affect pensions and other post-employment benefits funding at the local government level, pre-and-post the great recession. Their findings offered mixed results, specifically as related to the pension funding ratio. Maher et al. (2016) found no evidence that the form of government (having a professional administrator) or tax and expenditure limits (as well as the interaction of the two) directly affect the funded ratio.

The dissertation by Gorina (2013) developed a model for determinants of the pension funding ratio while focusing on the fiscal sustainability of the local unit of government. The author used the GFOA database to obtain longitudinal data from 2003-2007 for 353 cities across the U. S. The study specifically considered the source of city revenue and utility operations in addition to other fiscal environment and plan and member characteristics to examine their association with the funding ratio. The findings suggested an inverse association between the number of full-time employees and pension liability funding, following the rationale that fewer employees (benefit beneficiaries) equate to lower future obligations to fund their benefits.

Aggregate at the local level or single state. The methodology used for the local or single state studies, as summarized in Table 2.1, Panel C, was predominantly cases studies or studies descriptive in nature (58% of studies identified). The working papers by Elder and Wagner (2015) and Smith and Dove (2016) examined public pension systems in Pennsylvania (the two largest) and Alabama (the three main systems), respectively. Both case studies provide overviews of the pension systems, the descriptive changes in their funded ratios based on historical funding and fiscal environment, and analyze whether these systems will be able to make their promised payments in the future. Finally, these case studies provide some suggestions for future reforms and implications for policy changes. Another related published case study by Lee and Vonasek (2011) provides a historical perspective on 32 police and fire pension funds of 20 cities in Florida. The authors noted a deteriorating condition observed in the sampled local units of government and attempted to draw attention to the issue, calling for reforms and long-term solutions to the funding concerns of such plans.

A recent descriptive work by Sun (2013) focused on 57 cities in California (data collected from a mail survey sent in 2011) and the sustainability of their public pensions. The entities in

the sample were compared on the measures of the plan type and benefit formula. The author noted that municipalities are faced with a number of financial and social issues as related to their pensions but have been taking measures to address these concerns (Sun, 2013).

A practitioner article by Weber, Handy, and Nikolic (2014) performed an aggregate analysis on municipalities in 67 counties in Pennsylvania for the period of 2001-2011 (biennial), with those participating in multi-employer plans specifically excluded from their review, but both defined benefit and defined contribution plans were considered. The authors' goal was to examine rural versus urban municipal plans to provide for policy considerations. Several plan characteristics and member demographics were examined. The authors found that rural plans are better funded and that unfunded liabilities of urban plans have increased over time (Weber et al., 2014).

The only two true empirical works noted in this research area are a working paper by Bagchi (2016) and a study by Faulk, Hicks, and Killian (2016). Bagchi (2016) examined political competition and its effects on pension funding in the context of 2,000 municipal pension plans in Pennsylvania, using biennial data between 1985 and 2009. The author first built an economic and analytical model and used the dataset to predict pension funding in these municipalities. He concluded that municipalities that are more politically competitive are associated with lower funded ratios, more generous benefit structures, as well as higher discount rate assumptions for their actuarial liabilities (Bagchi, 2016). The main idea of this study was closely (although indirectly) related to that of Epple and Schipper (1981) discussed earlier, which was also conducted in Pennsylvania, however, the author provided a robust set of statistical tests to address limitations of prior works and was specifically concerned with the concept of political competition not previously studied in the local pension plans setting (Bagchi, 2016).

Finally, Faulk et al. (2016) examined in a cross-sectional study of the fiscal year 2013 data from local units of government in Indiana, aggregated at the 75 Counties level, with the aim of exploring three determinant concepts of funded ratio across these local units of government. The authors considered economic and fiscal environment measures as well as pressures from special interest groups (as previously considered by Kelley, 2014). The authors found limited support for each hypothesis presented (i.e. not all concept measures came out significant or substantially different from prior studies' results). For instance, other than per capita income as a measure of economic distress, the other two measures of unemployment and change in population did not prove significant (Faulk et al., 2016). The authors concluded by stating this was an exploratory study and that "...results need to be further vetted as more data becomes available" (Faulk et al., 2016, p. 117).

Consequences of Pension Funding

Unlike the extensive body of literature noted on the determinants of pension funding, the consequence of pension funding (i.e. it being the explanatory variable) is included in a rather limited number of studies and provides inconsistent results. One likely explanation for the fact there is more emphasis on the determinants of pension funding is the notion that this domain is still trying to explore what causes plans to be where they are in terms of funding, perhaps in response to the needs of practice and the government in studying past highs and lows of pension funding and understanding of the differences and similarities between the various types of plans. As noted in this chapter, lack of a single depository of data for all public pension plans has made it difficult for research in this area to advance quickly. It was also noted that no single comprehensive theoretical model has yet been established for the determinants of pension funding.

Another possible explanation is rooted in the very nature of the design of such DB pensions where the outlook is long term and the plan sponsors (i.e. the government) are deemed too big to fail. If unfunded pension obligations are pushed further out as a burden to future taxpayer generations, perhaps the consequences of such underfunding may not appear as of an immediate concern for research. Pension funding reports and academic literature frequently conclude studies by pointing to the long-term nature of such plans, even when low funding is noted as a result of an economic downturn. This direction of research may not yet be as popular or developed. After all, *pension envy* directed at DB public pension plans (coming from the private sector) could be diminishing the importance of research into the consequences of pension underfunding which could highlight what the current state of affairs may lead to.

Finally, consequences of pension funding may also be less researched given the history of poor years of funding levels where the underlying assumption was that the consequences were unlikely to be good and as such more focus was placed on exploring further the determinants as compared to the outcomes. However, it is important to bring to light consequences of funding, such as the potential for pension leakage, as it could have a multiplier effect on local economies and retirement savings, as well as burden future generations of taxpayers.

The studies reviewed that examined consequences of pension funding were focused on how pension funding impacts budget deficits (Munnell, Aubry, & Quinbry, 2010), the cost of debt (Coggburn & Kearney, 2010; Martell, Kioko, & Moldogaziev, 2013; Munnell, Aubry, & Quinbry, 2011a), financial statements pension disclosures (Vermeer, Styles, & Patton, 2012), and unfunded Other Post-Employment Benefits (Coggburn & Kearney, 2010). Table 2.2 summarizes prior literature in this area.

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Table 2.2

Summary of Prior Literature on Consequences of Pension Funding

Authors	Data or Sample; Unit of Analysis and Level of Aggregation	Method	Consequences of Pension Funding		
			Borrowing Costs	Financial Reporting	Budgets
Munnell et al. (2010)	Case study of 6 states' budget projections for years 2010-2045.	Case study longitudinal			x
Cogburn & Kearney (2010)	2006 data on 50 U. S. states.	Cross-sectional	x		
Munnell et al. (2011a)	Municipal bonds data from 2005-2009 across U. S. states.	Longitudinal	x		
Vermeer et al. (2012)	233 local units of government plans in 2005.	Cross-sectional		x	
Martell et al. (2013)	Credit rating data from 2002-2011 across U. S. states.	Longitudinal	x		

Munnell et al. (2010) performed an analysis of pension funding and its proportion to state budgets in the states of California, Florida, Georgia, Illinois, Massachusetts, and New Jersey. The authors further developed baseline budgets and outlook for the future years of 2010-2043 and tested three scenarios of amortizing the unfunded liabilities in the selected states. The authors concluded that although the pensions studied were considerably underfunded, they did not account for a large percentage of states' local spending, in the aggregate, and for plans having lower discount rates (Munnell et al., 2010). However, the authors acknowledged the limitation that aggregate data certainly hides the variation among different pension plans which could be substantial.

Proceeding to borrowing costs, Munnell et al. (2011a) studied how pension funding affects the cost of debt. Examining in their model municipal bonds data from 2005-2009 across the U. S. states, the authors found that pension underfunding did not have a large effect on borrowing costs in the timeframe tested. However, the authors noted this impact could change as pension liabilities grow. In their analysis, Munnell et al. (2011a) used both the funded ratio and the actuarially required contributions (ARC) as measures of pension funding, with the former producing a statistically insignificant association with borrowing costs.

Martell et al. (2013) also estimated the impact of funding ratio of U. S. public pensions administered by state governments on credit quality (credit rating and credit outlooks) by using data from 2002-2011 (356 observations). Contrary to Munnell et al. (2011a), the authors found that the credit quality measures were affected by the funding ratios of the plans in the sample and that "... credit ratings are sensitive to information disclosed in state CAFRs," (Martell et al., 2013, p. 45). Additionally, an interesting finding was that credit outlooks are quicker to react to changes in plans that are less well funded versus those that are better funded.

Cogburn and Kearney (2010) focused their study on determinants of both pension and healthcare liabilities across the 50 U. S. states in 2006 (discussed in the previous section). However, in their additional analysis, the authors examined borrowing costs and did find a statistically significant association between the unfunded liabilities and bond ratings, thus supporting Martell et al. (2013)'s findings that lower pension funding increases the cost of accessing capital through the bond markets. The same study also modeled separately the determinants of the other post-employment benefits (OPEB) and included pension funding as a determinant (i.e. independent variable), suggesting that it is a good predictor of how the states would handle OPEBs based on the levels of pension funding that provide insight into past obligations. The authors did find that states with lower funding also tend to have higher unfunded OPEBs (Cogburn & Kearney, 2010).

In the area of financial statements disclosures, Vermeer et al. (2012) studied how pension funding (among other factors) affects the propensity to conform with GASB Statement 27 pension disclosures in the financial statements.⁶ Drawing from both agency and public choice theories regarding monitoring mechanisms, the authors examined 2005 data related to financial disclosures of 233 local units of government pension plans in Michigan and Pennsylvania. The authors found that entities with less funded pensions are less likely to have the pension disclosures required under GASB Statement 27 (Vermeer et al., 2012). This finding is consistent with the association noted at the state plans level by Marks et al. (1988) discussed in the previous section, except the model provided for a different directional relationship, having pension funding as the dependent variable (exploring determinants of underfunding) and financial disclosure as the independent one.

⁶ GASB Statement 27—Accounting for Pensions by State and Local Government Employers—was issued 11/94 and is now replaced by the new pension standard GASB 68.

Opportunities for Future Research

As noted previously, most of the studies discussed in this literature review are focused on the large, state-wide plans where data is more easily accessible. At the local level or local across states, centralized databases are non-existent. “While many local CAFRS are available on government websites, the data are not easily amenable to research as the information is presented in the format of PDF files, quite often not even searchable” (Gorina, 2013, p. 59). This study by Gorina (2013) proceeded to note that sweeping changes are needed for comprehensive government research to take place. Thus, there is an opportunity for researchers in this area to create more comprehensive repositories to further advance research capabilities at this government level.

Moreover, reviewing each of the panels in Table 2.1, it is apparent that the investment and funding discipline determinants as well as plan governance and reporting determinants remain unexplored at the level of aggregation of local across the states (Panel B) and local level or single state (Panel C). Since research of state level plans may not easily generalize to smaller pension plans at the local level, it would be worthwhile to examine such determinants in this setting. Accordingly, Chapter 3 explores the association of the quality of financial reporting as a determinant of pension funding in local units of government participating in a multi-employer pension system in a single state—Illinois.

In addition, research of the consequences of pension funding, as summarized in Table 2.2, is limited. This observation is surprising given the magnitude of the unfunded pension liabilities and thus offers fruitful research opportunities. For instance, the impacts of pension funding on the decisions of employees that are part of the same pensions have yet to be explored. Are employee decisions in regard to their continuing employment or decisions at the time they

leave the plan at all influenced by how well the pension with the employer they worked for is funded? Certainly, an association that may not appear trivial, but when it comes to pension contribution withdrawals that could turn into pension leakage it is one that is worthwhile to be explored.⁷ Whether the sponsoring employers have an incentive to see their terminating employees take a refund of the contributions (thus forfeiting possible future pension benefits), or alternatively, whether the employees themselves decide to cash out their contributions due to concerns related to the sustainability of the pension, the issue of the resulting pension leakage is of a growing concern due to the diminishment of assets that could be otherwise available for retirement benefits (GAO, 2009; Purcell, 2009). This issue remains largely unexplored in the public sector. However, from a policy perspective, there could be a number of opportunities to address the issue by either setting timeframe or amount limits on cash-outs or other incentives to encourage continuation of retirement savings via rollovers to qualified retirement accounts in lieu of cash-outs. Accordingly, Chapter 4 explores the association of pension funding as a consequence in terms of terminating employee refund decisions.

More specific observations from the review suggest that small sample sizes and inconsistent findings in the areas already researched call for revisiting the models, measures, or setting for similar research questions. For instance, the association between financial reporting and pension funding warrants revisiting given the findings of Marks et al. (1988) and Vermeer et al. (2012), but no significance of the association was found in the study by Rich and Zhang (2015). In addition, given the changes in financial reporting following the newly issued GASB statements, it is an interesting research question to consider the association with quality financial

⁷ One study by Clark, Morrill and Vanderweide (2014) examined distribution decisions of both vested and non-vested public sector employees in the two North Carolina pension systems. They found that one third of both groups of vested and non-vested terminated employees chose a lump sum withdrawal within one year of termination of employment. Additionally, this study found that close to 90 percent of those taking a distribution received a cash-out, suggesting high levels of pension leakage in this group (Clark et al., 2014).

reporting in this setting.⁸ Specifically, the requirements to recognize the pensions assets (or more likely the liability) on the face of the financial statements of the entity is likely to increase transparency into the true condition of the pensions and as a result bring more scrutiny from the various stakeholders, including credit market participants, the taxpayers, and other interest groups. This means that research in this area is expected to evolve significantly as the demand for answers to the questions on suboptimal funding continues and the widening gap between assets and liabilities grows. For instance, opportunities arising from this implementation including comparative studies with similar plans in the private sector which also recognize pension liabilities (or assets) on the face of the financial statements, as well as studies surrounding the implementation (i.e. early adoption or assumptions changes).

Lastly, there are non-GAAP conforming entities which also offer pension benefits to their employees, but which have yet to be studied in the context of pension funding determinants. This provides for yet another opportunity to conduct research in a setting where a high rate of non-GAAP conforming units of government operate.⁹

In summary, this essay describes a literature review on determinants and consequences of pension funding as the magnitude of unfunded pension liabilities in this setting continues to be of a concern. This paper allows for future research opportunities by adding a meta-analysis based on the results of some of the empirical studies identified to further point to commonalities and differences in measures used in this research area.

⁸ In June of 2012, GASB, which sets GAAP for the U. S. state and local governments, issued Statement 67 *Financial Reporting for Pension Plans* and 68 *Accounting and Financial Reporting for Pensions*. Significant changes included reporting of the funded status of the DB plan that was previously in the footnotes on the face of the financial statements of the participating employer.

⁹ According to a GASB research brief, about two thirds of the states have requirements for certain jurisdictions or based on established thresholds for conformity with GAAP while others leave accounting choice in the hands of the reporting units of government (Mead, 2008).

As noted, extensive research has been conducted on the determinants of pension funding (including investment funding discipline, governance and reporting structures, fiscal environment, plan characteristics, and member demographics), but more remains to be done. A comprehensive model, along with a single data depository to analyze the various state and local plans across the nation is the next step required in pushing this research area forward. The consequences of pension funding were noted to be less developed and explored by prior literature, providing for a wide range of research opportunities. Moreover, research on both the determinants and consequences of pension funding is likely to see additional avenues for exploration given the newly implemented GASB Standards 67 and 68 which changed fundamentally the financial reporting requirements surrounding recognition versus disclosure of the net pension liability (or asset) for pension plans in this setting. These changes allow for comparative research with similar plans in the private sector, comparisons or event studies of pre-and-post implementation, as well as modeling of what-if scenarios with the implications to financial sustainability of said plans.

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CHAPTER 3: ESSAY 2 - UNFUNDED PENSIONS AND FINANCIAL REPORTING OF
LOCAL UNITS OF GOVERNMENT

Abstract

This study examines the association between the quality of financial reporting of local units of government (measured in conformity with GAAP) and relative levels of pension funding. Concerns over pension funding in the U. S. continue to be part of the media and policy makers' agendas, especially given the GASB's recently issued Statements 67 and 68 on this topic, making this research timely and relevant. Using a full sample of 2,565 municipality-year (2009-2014) observations in Illinois, the findings showed that GAAP conformity is negatively associated with pension funding. However, given the variations in pension funding levels, the sample was partitioned into subgroups based on the established 80% funding cut-off. An analysis of these partitions revealed that within the healthy-funded (exhibiting funding levels between 80% and 100%) subgroup, entities that are in conformity with GAAP are better funded, suggesting the quality of financial reporting is associated with higher funding within a given healthy range. In addition, a sensitivity analysis was conducted on the commonly used 80% cutoff on funding when differentiating among entities, which indicated the current cutoff may be lower. This study should be of interest to the GASB, regulators, and policy makers when assessing how to ensure the sustainability of public pensions while relying on financial reporting in both the GAAP-conforming and non-GAAP conforming settings.

Keywords: Public pensions, local government, GAAP reporting

State and local public pension unfunded obligations in the U. S. increased substantially as a result of investment losses caused by the 2008 economic downturn (Healey, Hess, & Nicholson, 2012), and the generous *benefit sweeteners* (Birrer, 2014) that have been added to the pension formulas over the years.¹⁰ Recent research by State Budget Solutions estimated the unfunded liabilities to exceed \$4 trillion at the state level (Luppino-Esposito, 2014), with funding gaps also widening in major cities across the country (Pew Charitable Trusts, 2013). The pension crisis spurred policymakers to take steps and implement reforms to remediate the problem, with solutions varying among the plans and states. Some reforms included increasing employee contributions (Snell, 2012) or vesting periods (CalPERS, 2013), while in other cases taxpayers were left to foot the bill for those promised benefits (Novy-Marx & Rauh, 2014), although arguably, pension unfunded liabilities are “...not readily transparent to most taxpayers” (Healy et al., 2012, p. 24).

Attempting to tackle the issue, the GASB proposed new pension accounting and reporting standards as yet another solution to the long-standing crisis (Birrer, 2014) with the objective to provide users of the financial statements with much needed “pension transparency” (Patton, Patton, & Thomas, 2014, p.1).¹¹ However, those standards are not applicable to local units of government reporting on a cash basis or other special purpose frameworks, none of which are considered GAAP or rise to the same quality of financial reporting requirements set by the GASB in order to be GAAP conforming and to receive an unqualified audit opinion.¹²

¹⁰ Benefit sweeteners are increases or improvements to benefits already promised to members which come with the added costs in the form of increased future liabilities.

¹¹ In June of 2012, the GASB, which sets GAAP for the U. S. state and local governments, issued Statement No. 67, *Financial Reporting for Pension Plans*, and 68, *Accounting and Financial Reporting for Pensions*. Significant changes include reporting of the funded status of the DB plan that was previously in the footnotes on the face of the financial statements of the participating employer.

¹² Special purpose frameworks (previously known as other comprehensive basis of accounting or OCBOA) include cash basis, tax basis, regulatory basis, contractual basis, or other basis. The special purpose frameworks became effective for financial statements’ audits of entities with year-ends on or after December 15, 2012 (AICPA, 2016).

The National Association of State Auditors, Comptrollers, and Treasurers publishes a survey of the states which includes a question regarding whether GAAP is required for financial statements produced by local units of government. The 2016 survey responses suggest less than 50% of states have GAAP conformity requirements for local level entities (National Association of State Auditors, Comptrollers, and Treasurers [NASACT], 2016). In addition, Khumawala, Marlowe, and Neely (2014) found that nearly 30% of surveyed jurisdictions in their study did not follow GAAP, and the number could be higher when examining local units of government serving populations of less than 5,000, which were excluded from their study. Furthermore, no studies to date have included non-GAAP conforming entities in their pension analysis. Accordingly, if a sizable number of non-GAAP following entities are not required to comply with the new GASB statements and the magnitude of their unfunded liabilities remains unknown, these entities will remain hidden from citizen scrutiny as compared to their GAAP-compliant counterparts. What's more, smaller units of government receive limited media coverage as it is, unlike the sensational *Detroits* of our time, such that their financial mismanagement may go undetected for years.¹³

Do local units of government not following GAAP in their financial reporting exhibit similar pension funding issues as compared to their GAAP-conforming counterparts? Is better quality of financial reporting through GAAP conformity associated with higher levels of pension funding? Is it also associated with a decrease in underfunding from prior periods? The objective of this research is to answer those questions. Drawing from prior research in the area of quality financial reporting and pensions funding (Marks et al., 1988; Rich & Zhang, 2015; Vermeer et al., 2012) and utilizing an unbalanced panel sample of 435 local units of government in Illinois

¹³ For instance, the Village of Alorton, Illinois with a population of less than 2,000 filed for bankruptcy in 2005 but the story was not covered by media until recently when the Better Government Association did an analysis on Illinois municipalities, following the distress of the City of Detroit, MI.

participating in the IMRF, this study seeks to examine the factors associated with the pension underfunding, specifically quality of financial reporting via GAAP conformity during 2009-2014 (a total of 2,565 observations).¹⁴ It is motivated by rather limited pension research at the local government level and more specifically the link between financial reporting and pension funding (with some inconsistent results between the earlier study of Marks et al., 1988, and the more recent by Rich and Zhang, 2015).

Martell, Kioko, and Moldogaziev (2013), who estimated the impact of funding ratio of U. S. public pensions administered by state governments on credit quality (credit rating and credit outlook), found that the credit quality measures were affected by the funding ratios of the plans in the sample and that "... credit ratings are sensitive to information disclosed in state CAFRs," (Martell et al., 2013, p. 45). The authors proceeded to suggest in their discussion that the measures and requirements provided by new GASB pension standards (67 and 68) should allow stakeholders and analysts to "... assess [the] financial condition of governments as well as assess their impact on credit quality and borrowing costs, both at the state and local levels" (Martell et al., 2013, p. 46). This is an important point as local units of government not subject to such standards will remain outside of such possible assessment and comparison with peers and research at the local level is limited.

Thus, this paper makes several contributions to the literature. As noted in Chapter 2, research has been conducted to explore determinants of pension funding. More broadly, within the categories of investment and funding discipline, governance and reporting, fiscal environment, plan characteristics and member demographics, and other factors, 27 studies were

¹⁴ The IMRF is a multi-employer retirement system in Illinois which represents close to half of all units of government in the state. As of the end of 2014, IMRF covered 286,730 employees and retired workers (Illinois Municipal Retirement Fund [IMRF], 2014). Employers join IMRF voluntarily (only School Districts are mandated) with approval of their governing body. The decision to participate in the IMRF is irrevocable.

reviewed. As the focus of this study is on municipalities participating in one pension plan in a single state, it contributes to other studies conducted at this level of aggregation (Bagchi, 2016; Elder & Wagner, 2015; Faulk et al., 2016; Lee & Vonasek, 2011; Smith & Dove, 2016; Sun, 2013; Weber et al., 2014).

In addition, this paper is the first to include non-GAAP conforming entities in an analysis of pension funding. It also re-examines the association of quality financial reporting (with a more updated measure) and pension underfunding in a large sample of 435 entities, given that results in previous literature relied on much smaller or state-level samples further extending the existing body of the pension funding literature (Marks et al., 1988; Rich & Zhang, 2015; Vermeer et al., 2012;). A secondary but also worthy contribution is that this study examines panel data across a number of years as compared to single year cross-sectional studies, which allows for capturing trends and assessing both level and change analysis. Lastly, the unique nature of the local units of government in the sample, which are all part of the same pension plans, permits examining the pension funding model while not having to control for variation in certain assumptions across the entities.

The remainder of this essay is organized as follows. In the next section, a brief background and a literature review are provided, followed by hypotheses development. This is followed by the empirical research design and presentation of the data, descriptive statistics, and the results of the analysis. The final section of this chapter is devoted to the discussion and conclusion of this study, including limitations and suggestions for future research.

Literature Review

Financial Reporting

In financial reporting, the basis of accounting refers to the timing of recognition of transactions and economic events and how they are presented in the financial statements. Moving along the timing of recognition spectrum, the basis of accounting can range in its form anywhere from cash to full accrual (Government Finance Officer Association [GFOA], 1999). “[Full] accrual accounting has in fact become the dominant form of accounting in large part because it overcomes the inherent mismatch between economic benefits and costs that arise due to timing differences in cash flows” (Naughton & Spamann, 2015, p. 582). It is thus associated with better quality of financial reporting. Additionally, it is believed to improve accountability and transparency (Beechy, 2007). On the other end of the spectrum—cash basis—events and transactions are only recognized when the actual cash is received or disbursed. This mismatch “enables managers to hide the true results of operations and the true financial position of the organization by manipulating the cash flow” (Beechy, 2007, p. 5). In between the two is the modified accrual basis adapted for government measurement focus, accounting for transactions that are both available and measurable to finance expenditures in the current fiscal period. Although the application of GAAP for state and local governments (which has been established by the GASB since 1984) requires using both the accrual and modified accrual basis (i.e. GASB Statement 34), it is not mandatory for all jurisdictions and the quality of financial reporting also varies.¹⁵

¹⁵ GASB Statement 34 was issued in 1999 and its implementation is considered as the adoption of a new reporting model. Frank and Gianakis (2010) conducted a national survey of finance directors in local units of government during the summer of 2007 to gauge attitudes following GASB 34 implementation. They noted respondents pointed to the complexity of the standards and cost of adoption, while younger directors saw more value-added in the adoption than older ones (Frank & Gianakis 2010). While the current study does not suggest that overall GAAP conformity is simple, after over 10 years since the GASB Statement 34 was issued, it is likely regarded as the new norm.

Each state may choose to mandate GAAP reporting or use state-specific standards (Khumawala et al., 2014). For instance, Michigan is a state requiring GAAP reporting as compared to Pennsylvania where such reporting is not regulated (Gore, 2004). In a study of bond pricing association with GAAP-conformity of municipalities in the two aforementioned states, Gore (2004) found that GAAP conformity in financial reporting was significantly higher in Michigan (regulated state) as compared to Pennsylvania (unregulated state). In an attempt to better understand the extent of state-mandated disclosures as they relate to GAAP conformity, the GASB initiated a research project on the application of GAAP by state and across various types of local units of government (Mead, 2008). According to the GASB research brief, about two-thirds of the states have requirements for certain jurisdictions or based on established thresholds for conformity with GAAP, while others leave accounting choice in the hands of the reporting units of government (Mead, 2008). However, it was noted that "... no enforcement mechanism is available or is not employed" for non-conformity of those units of government that are required to follow GAAP according to their states (Mead, 2008, p. 3). The focus of this study is on pension underfunding and its association with quality of financial reporting in the state of Illinois, which has nearly 7,000 local units of government, the largest number in the nation (U. S. Census Bureau, 2012), and where no requirement or regulation is set by the state for GAAP conformity.

Pension Funding

As mentioned previously, public pension liabilities have increased over the years and have especially become burdensome to local units of government following the 2008 economic crisis. The much needed "pension transparency" (Patton et al., 2014, p.1) is anticipated, at least in part, after implementation of the new GASB 68, requiring recognition of the net pension

obligation (or asset) on the face of the financial statements. However, this recognition requirement will bypass local units of government reporting on a cash basis or other special purpose frameworks as they are not following GAAP.

The literature on public pensions most relevant to the current study includes research related to determinants of and consequences of underfunding (refer to Chapter 2 which summarizes prior literature in these areas) and financial reporting and disclosure requirements (Marks et al., 1988; Rich & Zhang, 2015; Vermeer et al., 2012;). Similar to the standards recently implemented by the GASB, the FASB, which sets standards for non-government entities, implemented SFAS 158. This standard had a major provision to move pension funding information from footnotes to the face of the financial statements to improve understandability of pension accounting (Sun, 2011). This move towards recognition versus disclosure in footnotes to enhance understandability of accounting is rather a debated topic and is not limited to pensions, but which has been observed in standards related to other elements of the financial statements. Yet, a comprehensive body of knowledge, using experimental research in the area of recognition versus disclosure (outside the government sector), suggests that users of the financial statements tend to primarily focus their analysis of an entity's financial position by reviewing the financial statements not the footnote disclosures (Hirst & Hopkins, 1998; Maines & McDaniel, 2000).

In light of the newly issued GASB standards for pensions attempting to increase pension transparency but only impacting GAAP compliant units of governments, it is a worthwhile extension to first examine the pre-new-GASB setting, where no recognition was required, just disclosure. Anecdotal evidence from a review of 65 financial statements of non-GAAP followers revealed only 3% did not disclose any information regarding their pension plans in the

footnotes. The rest provided footnote disclosures similar (albeit not as detailed) to the GASB Statement 27 required for GAAP conforming units of government. As such this study examines whether local units of government that do not follow GAAP in their financial reporting exhibit similar pension funding issues as compared to their GAAP-conforming counterparts and whether better quality of financial reporting through GAAP conformity is associated with lower level pension underfunding.

Martell, Kioko, and Moldogaziev (2013) estimated the impact of funding ratio (as the independent variable) of U. S. public pensions administered by state governments on credit quality (credit rating and credit outlook). They found that the credit quality measures were affected by the funding ratios of the plans in the sample and that "... credit ratings are sensitive to information disclosed in state CAFRs" (Martell et al., 2013, p. 45). The authors proceeded to suggest in their discussion that the measures and requirements provided by new GASB pension standards (No. 67 and 68) should allow stakeholders and analysts to "...assess financial condition of governments as well as assess their impact on credit quality and borrowing costs, both at the state and local levels" (Martell et al., 2013, p. 46). This is an important point as local units of government not subject to such standards will remain outside of such possible assessment and comparison with peers.

IMRF Background

The IMRF pension system began operations in 1941 and currently serves 2,976 units of government (Illinois Municipal Retirement Fund [IMRF], 2014). Employers participating in this agent multi-employer pension plan include municipalities, counties, park districts, libraries, school districts (non-certified staff), and special districts. As of the end of 2014, IMRF covered 286,730 employees and retired workers. Employees participating in the plan contribute a set

percentage of their earnings in addition to their contributions to Social Security and Medicare, and the employer's plan sponsors also contribute (rates vary).

In 2010, the Illinois general assembly passed Senate Bill 1946, which created Tier 2 benefits for newly hired employees of the retirement systems in Illinois, including IMRF. Accordingly, the IMRF vesting period is set at either 8 years (Tier 1—enrolled prior to January 1, 2011) or 10 years (Tier 2—enrolled after January 1, 2011). Such characteristics are common in many public retirement systems across the nation, making the selection of IMRF for the analysis a good fit in terms of generalizability of the results to other agent multiple-employer public DB plans.¹⁶

Hypothesis Development

Marks et al. (1988) examined determinants of pension underfunding in U. S. state systems (total sample of 45 states), finding that both increased GAAP conformity and quantity and quality of financial reporting disclosures were associated with lower levels of unfunded pension liabilities. The authors discussed the difference between the corporate sector where GAAP conformity is a given versus the governmental setting where considerable diversity in the extent of conformity exists. Marks et al. (1988) proceeded to suggest that “greater conformity with GAAP implies fuller disclosure and more comparable financial statements and thus could serve as a source of monitoring information” (p. 171). The measure used for GAAP conformity was a six-point index developed by Ingram (1984) and was based on survey questions related to a limited number of GAAP practices adopted in the respective state financial reports. The measure for quality of financial reporting was conformity with Statement 1 of the National Council on Governmental Accounting, the authoritative standard dealing with certain disclosures

¹⁶ See CanagaRetna (2006) for a detailed comparison of pensions in the 50 states, including plan structure, vesting requirements, legislative changes, and listing of respective state reciprocity provisions.

present on the state plans' financial statements, which preceded later GASBs such as GASB 5. The measures are likely opaque in today's terms (based on 1978 data) and thus no longer hold in light of current authoritative GASB standards. Yet, this was a remarkable first result in linking financial reporting to the magnitude of pension underfunding, further supporting the GASB position on the need for transparency and enhanced monitoring (Marks et al., 1988).

Another empirical study by Vermeer et al. (2012) in the area of conformity with GASB Statement 27 disclosures examined data from 2005 related to 233 local units of government in Michigan and Pennsylvania.¹⁷ Among the monitoring mechanisms of the proper GASB 27 disclosure were: GFOA certificate award, debt, external auditor, and state oversight (Vermeer et al. 2012). By definition, GFOA certificate of excellence award recipients have to follow GAAP in financial reporting, thus the study only focused on a sample of GAAP conforming entities. The authors found a significant positive association between receiving the GFOA certificate of excellence in financial reporting award and the likelihood of a local unit of government to provide complete GASB Statement 27 pension disclosures. In addition, the authors found evidence that supported Marks et al. (1988), although with the dependent and independent variables were switched in the two models with underfunding being the independent variable and financial disclosure the dependent, suggesting local units of government with underfunded pensions are more likely to report incomplete pension disclosures (Vermeer et al., 2012). Rich and Zhang (2015) examined the association of local citizen oversight and pension underfunding using a sample of 84 locally administered pension plans (in 47 unique municipalities) based on data from the 2009 International City/County Management Association (ICMA) governance database and excluding municipalities under 50,000 in population. The

¹⁷ GASB Statement 27—Accounting for Pensions by State and Local Government Employers—was issued 11/94 and is now replaced by the new pension standard GASB 68.

authors found a negative association between unfunded pension liabilities and citizen oversight, suggesting the latter as effective in constraining management behavior (Barber et al., 2013).

More specific to the current study, Rich and Zhang (2015) controlled for the GFOA certificate of excellence Award as a measure of superior CAFRs and financial reporting. The predicted sign was negative (suggesting better financial reporting associated with lower underfunding) but found to be not significant, contrary to the findings noted by Marks et al. (1988). This finding could be attributed to the small sample size of only 47 municipalities, although included in the sample were more than one observation for each plan (such as police, fire, and municipal).

The current study seeks to continue in the line of research of Marks et al. (1988), Vermeer et al. (2012), and Rich and Zhang (2015) by examining the time period from 2009 (after the economic markets' collapse) and through 2014 (the last year before the new GASB standards become effective for some entities). However, given the fact that both GAAP and non-GAAP conforming entities are being examined, using the GFOA certificate of excellence award as a measure of quality financial reporting is not possible, as no GFOA award can be granted to a non-GAAP conforming entity. As such, the measure used is that of following GAAP in financial reporting which would entail complying with all the applicable GASB standards in order to obtain an unqualified audit opinion on the financial statements. Thus, considering prior research discussed above and sample composition, this leads to the following hypothesis:

H: Magnitude of pension funding will vary positively with GAAP conformity.

Research Design

In order to test the hypothesis presented in the previous section, a panel study design was utilized. Archival data for fiscal years 2009-2014 was used and further supplemented by hand collected records. The period of time selected for the sample was based on the first year when

major underfunded pension declines were first brought to light (and after the market collapse in 2008) and through the last year before some entities would be required to implement the new GASB standards related to pensions (depending on fiscal year end and the standard adoption effective date).

Sample and Data Collection

A sample of local units of government in Illinois was selected for the analysis for a number of reasons. Illinois has 6,968 local units of government, the largest number in the nation (U. S. Census Bureau, 2012) and has been previously subject to an empirical study of fiscal 2002 (with a much smaller sample size of 375) related to GAAP conformity (Carroll & Marlowe, 2009). It is an audit-mandated state (with no specific stipulation for GAAP conformity) but does not exhibit substantially different characteristics in terms of financial reporting and regulation (Mead, 2008) that would result in biased analysis. Yet, it was deemed a worthwhile setting particularly due to the fact that state-administered public pensions in Illinois have experienced underfunding over the years and the state-wide plan (IMRF) being examined herein is overall well-funded in comparison to the state-administered plans. Additionally, the topic continues to be of interest to the media and citizenry across the country.

Table 3.1 provides the sample composition details. The final sample includes an unbalanced panel of 435 municipalities (after accounting for missing data or out of scope population size) for the years 2009-2014, for a total of 2,565 entity-year observations. Sample size was deemed appropriate in line with the common convention as suggested by Stevens (2002) of a ratio of at least 15 observations per variable in the model. Power analysis was performed based on Faul, Erdfelder, Buchner, and Lang, (2009).

Table 3.1

Sample Composition

Sample Criteria	Total	2014	2013	2012	2011	2010	2009
Active municipalities - participating in IMRF	3988	669	667	666	665	661	660
Less municipalities with missing data	24	6	6	4	0	2	6
Less small municipalities (population below 2,500) ^a	1399	236	234	234	237	232	226
Final sample (unbalanced panel)	2565	427	427	428	428	427	428

Note: ^aDefinition in selecting municipalities with 2,500 or more inhabitants followed U. S. Census Bureau (2012a). Population boundary excluding small entities is not uncommon in pension funding and GAAP conformity research. For comparison, Rich and Zhang (2015) used municipalities with populations greater than 50,000 in their study of pension underfunding. Khumawala et al. (2014), who based their analysis on the GASB-commissioned GAAP conformity survey-based study, excluded local governments with populations less than 5,000. Finally, Carroll and Marlowe (2009), who studied GAAP conformity in Illinois municipalities, used a sample of 375 local units of government out of roughly 1,200 available in this state, with an overall sample population mean of 15,713. Collectively, in comparison to prior research, the sample selected in this study allows for more comprehensive look at even smaller entities as compared to prior research and based on the mean population size in the sample (see Table 3.2 for Descriptive Statistics).

The 2009-2014 data for the various measures were obtained from the Illinois Controller's Local Government Division warehouse (which collects certain financial data from all units of government in the state). It was further corroborated via the respective local unit of government audited financial reports. Pension funding data were obtained directly from the IMRF. Unemployment data aggregated at the respective county level were obtained from the Bureau of Labor Statistics. Public-sector union membership data at the major metropolitan area were obtained from Unionstats.com and extrapolated to the nearest county aggregation. Election years' data were obtained from the Illinois State Board of Elections. Additional financial and agency-specific information was hand-collected and obtained directly from the respective entity selected, following the guidelines of the freedom of information act, which requires such jurisdictions to provide the data requested. Details of data sources obtained are in the Appendix.

Methodology

For the primary test of the hypothesis, this study used a fixed effects model to examine the association between pension funding and quality of financial reporting (GAAP versus non-GAAP), along with other funding factors previously noted in the literature. The fixed effects model uses each municipality as its own control which allows for examining how changes in GAAP reporting within the given municipality relate to changes in the funded ratio, thus controlling for all unobserved time invariant traits (Allison, 2009).

In addition, the model was re-estimated with clusters at the county level because the data includes repeated measurements over time on the same subjects (municipalities), which are clustered within counties. Because these repeated measurements may not be independent, standard errors may be auto-correlated, thus a fixed effects model is appropriate.

$$\begin{aligned}
 FUNDEDRATIO_{i,t} = & \beta_0 + \beta_1 GAAP_{i,t} + \beta_2 PAYPRCAPITA_{i,t} + \beta_3 LnPOP_{i,t} + \beta_4 GOBOND_{i,t} \\
 & + \beta_5 LnEAV_{i,t} + \beta_6 AUDEXPERTISE_{i,t} + \beta_7 AUDCHANGE_{i,t} + \beta_8 UNMP_{i,t} \\
 & + \beta_9 UNION_{i,t} + \beta_{10} ELECTIONYR_{i,t} + \beta_{11} HOMERULE + \beta_{12} VILLAGE_{i,t} \\
 & + \beta_{13} OVERFUNDED_{i,t} + Year_FE + \mathcal{E}_{i,t}.
 \end{aligned} \tag{1}$$

FUNDEDRATIO, the outcome variable of interest, represents the measure of pension funding; it is calculated as actual ratio of actuarial assets divided by actuarial accrued liabilities, valued closest to the respective calendar year, thus ranging from 0 (not funded at all) to over 100% (instances of overfunded plans).¹⁸

The measure of quality financial reporting (GAAP) takes the values of one or zero, representing the accrual (GAAP) or cash (non-GAAP) basis of accounting respectively. Based on the association postulated in the hypothesis in the previous section, a positive coefficient is predicted for the GAAP reporting variable, which would indicate that GAAP reporting is

¹⁸ The funded ratio is a commonly used measure in pension funding literature (Maher, Park, & Harrold 2016). Specifically, Rich and Zhang (2015) use the “unfunded ratio” that is equal to one minus the funded ratio in their study.

associated with lower pension underfunding. The Appendix further summarizes independent and control variables' definitions discussed next and their respective data sources.

The study further controlled for other factors (some at the municipality and some proxied or aggregated at the county level based on measures availability) which have been noted in prior research models of pension funding to account for municipality characteristics, fiscal environment, and impact on the pension liability.¹⁹ Prior studies control for a measure directly impacting the pension liability, the payroll paid to active members in the pension scaled by population served (*PAYPRCAPITA*). No prediction was made regarding the direction of the association since entities with larger payrolls could be increasing pension liabilities but also receiving larger member contributions which in turn reduce the liabilities (Rich & Zhang, 2015). For municipality characteristics, the study controlled for the local unit of government size by including the log of the population covered or served (*LnPOP*) and the log of total real property equalized assessment valuation (*LnEAV*) for the properties in the area served. In addition, an indicator variable (*GOBOND*) coded as 1 if the entity issued general obligation bond in the respective period was included. In line with Rich and Zhang (2015) no prediction was made regarding the direction of the association with the population size variable since entities serving larger populations may be spending more or may be getting more resources for pension funding. A negative coefficient was expected for the measure of real property assessed value, as higher taxes collected could be used to reduce pension underfunding (Epple & Schipper, 1981; Gorina, 2013; Rich & Zhang, 2015). A positive coefficient was predicted on the general bond indicator variable since debt repayments are another form of a liability which take away resources otherwise available for pension liabilities (Chaney et al., 2002; Rich & Zhang, 2015).

¹⁹ Note that since all the municipalities in the sample are part of the same multi-employer plan there is no need to control for variation in investment assumptions (such as the discount rate) or board governance.

As a monitoring mechanism, auditor expertise measure (*AUDEXPERTISE*) was added to the model as a control for potential variation in municipalities that engage more specialized audit firms. This measure is a continuous variable representing the number of audit clients an auditor has in a given year within the sample of the local governments and was used in a study of audit lag in Illinois (Sohl, Waymire, & Webb, 2017). However, no sign prediction was made for the direction of this control since auditor expertise could be associated with higher or lower funding, depending on the various factors that go into a clients' financial reporting process. In addition, results of prior studies using the auditor control in pension funding models were mixed and remain unexplained (Rich & Zhang, 2015; Vermeer et al., 2012). The study further controlled for any changes in the auditor by including the dichotomous variable of *AUDCHANGE*, coded 1 if the municipality changed auditors and 0 otherwise, predicting a negative coefficient, such that auditor switches are associated with lower pension funding.²⁰

Considering the fiscal health and environment of a local government and given the nature of the entities in the sample being part of one of the many counties in the state (thus sharing commonalities in terms of geographic location, political pressures, and local tax levy practices which vary by county), the unemployment rate (*UNEMP*) aggregated at the county level was included as a measure of local unit of government fiscal health representation proxy. It is expected for entities in counties with a higher level of unemployment to be associated with lower pension funding, thus a negative coefficient was expected for this measure (Faulk et al., 2016; Mitchell & Smith, 1994). In addition, public-sector union membership rate (*UNION*), extrapolated from major metropolitan areas and also aggregated at the county level, was included

²⁰ Although mandatory auditor switches are common in the private sector, they are not as beneficial in the public sector where auditor expertise is limited to a smaller number of specialized auditors. The GFOA's best practice on audit procurement suggests following multi-year contracts. The GFOA director's opinion on this matter is that new auditors pose a special risk in that they might be less qualified to conduct audits in this setting (Gauthier, 2009).

to account for influence by union groups. Although prior research reflects some mixed directional associations with this control, a negative coefficient was predicted, in line with the notion that unions are advocates for benefits, including pensions on behalf of employees, and are likely to be driving increases to the benefits that could be associated with lower levels of pension funding if municipalities agree to benefits they cannot afford (Kelly, 2014; Marks et al., 1988; Mitchell & Smith, 1994;). Citizen voting process during election years is another mechanism that could influence pension funding, so a dichotomous variable indicating if a year is an election year (*ELECTIONYR*) was used. In line with Schneider and Damanpour (2002) and Rich and Zhang (2015), a positive association was predicted between election years and pension funding. The model also included a measure for the existence of a municipality's fiscal *home rule* (*HOMERULE*) status as a dichotomous variable, representing the ability and capacity of an entity to pass legislation independent of the state approval (Gillette, 2009).²¹

An indicator variable was also included to account for the type of municipality and to differentiate between cities and villages (*VILLAGE*). Carroll and Marlowe (2009) point to a jurisdiction's method of incorporation control as they considered each village's form of government more efficient and responsive to citizen needs. Furthermore, since the dependent variable of pension funding is continuous and unrestricted and the sample includes both over- and underfunded plans, an indicator variable was included in the model (*OVERFUNDED*) to control for overfunded plans. Lastly, year indicators were included for the time period of the sample.

²¹ Present in states like Massachusetts, Iowa, Tennessee and Illinois, to name a few, the provisions of such a rule do differ from state to state: "Illinois requires legislative approval for home rule cities to license for revenue or to impose taxes measured by income" (Gillette, 2009, p. 1245). Thus, local units of government having home rule status may differ in pension funding and GAAP conformity.

Endogeneity

Endogeneity was noted as a potential threat to the model validity, specifically in relation to the pension funded ratio measure and its association of reverse causality with the measure of GAAP conformity. As such, a re-estimation was performed of the regression model with a one-year lagged GAAP conformity variable (*LAGGAAP*).

Summary Statistics

Table 3.2 provides descriptive statistics for the variables included in the analysis of the municipalities in the sample over the combined fiscal years of 2009-2014, as well as means for each year individually.

Table 3.2

Descriptive Statistics

Variable	All Years				2009	2010	2011	2012	2013	2014
	Mean	<i>SD</i>	Min	Max	Mean	Mean	Mean	Mean	Mean	Mean
FUNDEDRATIO	74.20	17.58	0	200	75.98	73.85	72.77	71.21	72.99	78.43
GAAP	0.85	0.36	0	1	0.85	0.85	0.84	0.85	0.85	0.86
PAYPRCAP	215.97	150.26	9.28	2310.55	216.63	218.67	214.65	212.51	215.05	218.30
LnPOP	9.32	0.93	7.83	12.20	9.30	9.31	9.31	9.32	9.32	9.33
GOBOND	0.68	0.47	0	1	0.68	0.68	0.67	0.69	0.69	0.69
LnEAV	19.17	1.40	13.09	22.81	19.22	19.24	19.21	19.17	19.08	19.08
AUDEXPERTISE	19.25	21.88	1	63	18.82	17.95	18.84	19.50	19.43	21.00
AUDCHANGE	0.09	0.29	0	1	0.06	0.11	0.09	0.10	0.07	0.13
UNMP	9.15	1.59	4.70	15.40	10.19	10.29	9.54	8.86	9.00	7.01
UNION	51.44	9.69	25.90	83.30	53.18	48.63	52.37	49.34	50.90	54.23
ELECTIONYR	0.50	0.50	0	1	0.00	1.00	0.00	1.00	0.00	1.00
HOMERULE	0.38	0.49	0	1	0.37	0.37	0.38	0.39	0.38	0.39
VILLAGE	0.53	0.50	0	1	0.52	0.53	0.53	0.53	0.53	0.53
OVERFUNDED	0.05	0.21	0	1	0.04	0.04	0.04	0.04	0.05	0.07

Note. The sample covers the period 2009-2014. Refer to the Appendix for variable definitions.

The mean funding ratio for the municipalities in the sample was 74.20%, somewhat (6.8%) lower than the mean funding (underfunding) percentage noted in a prior single-year study (Rich & Zhang, 2015). Figure 3.1 shows the mean funded ratio from 2009 to 2014 among the GAAP versus non-GAAP conforming municipalities in the sample, suggesting both are trending towards higher funding since 2012.

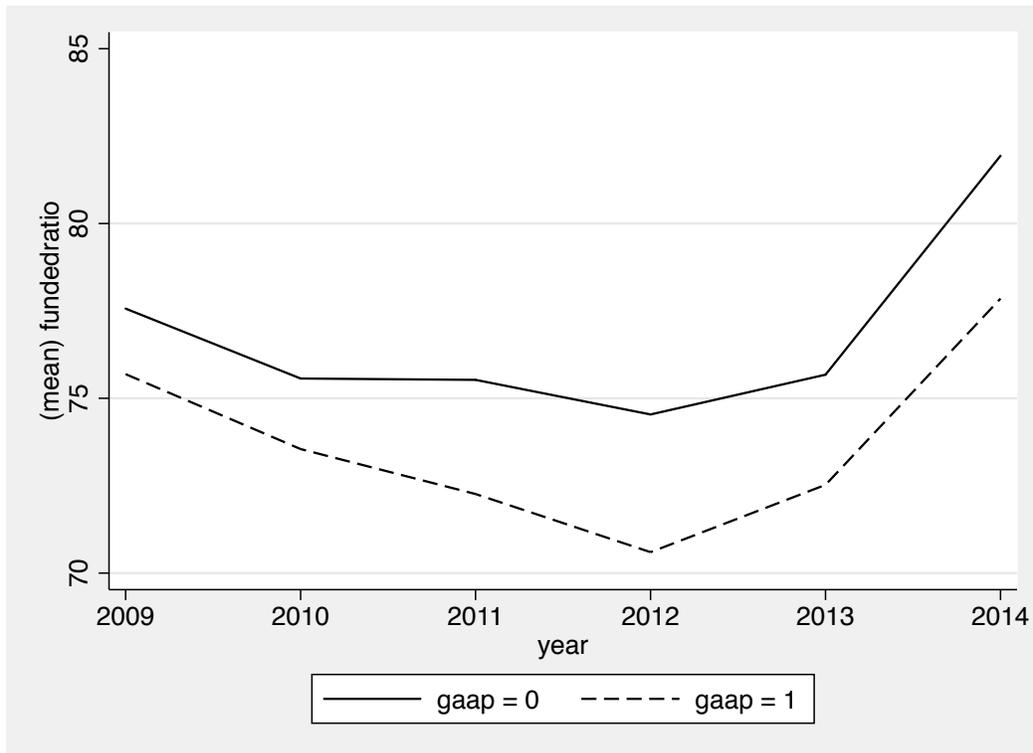


Figure 3.1. Mean funded ratio grouped by GAAP versus non-GAAP conforming municipalities.

In addition, Figure 3.2 shows the funded ratio distribution among all entities that are GAAP conforming or not. Both groups are noted to have normally distributed ratios of pension funding with no significant outliers. As part of the robustness checks, the unfunded ratio was winsorized at 1% on both ends to further mitigate concerns around outliers in the data. The sensitivity analysis section that follows provides more information.

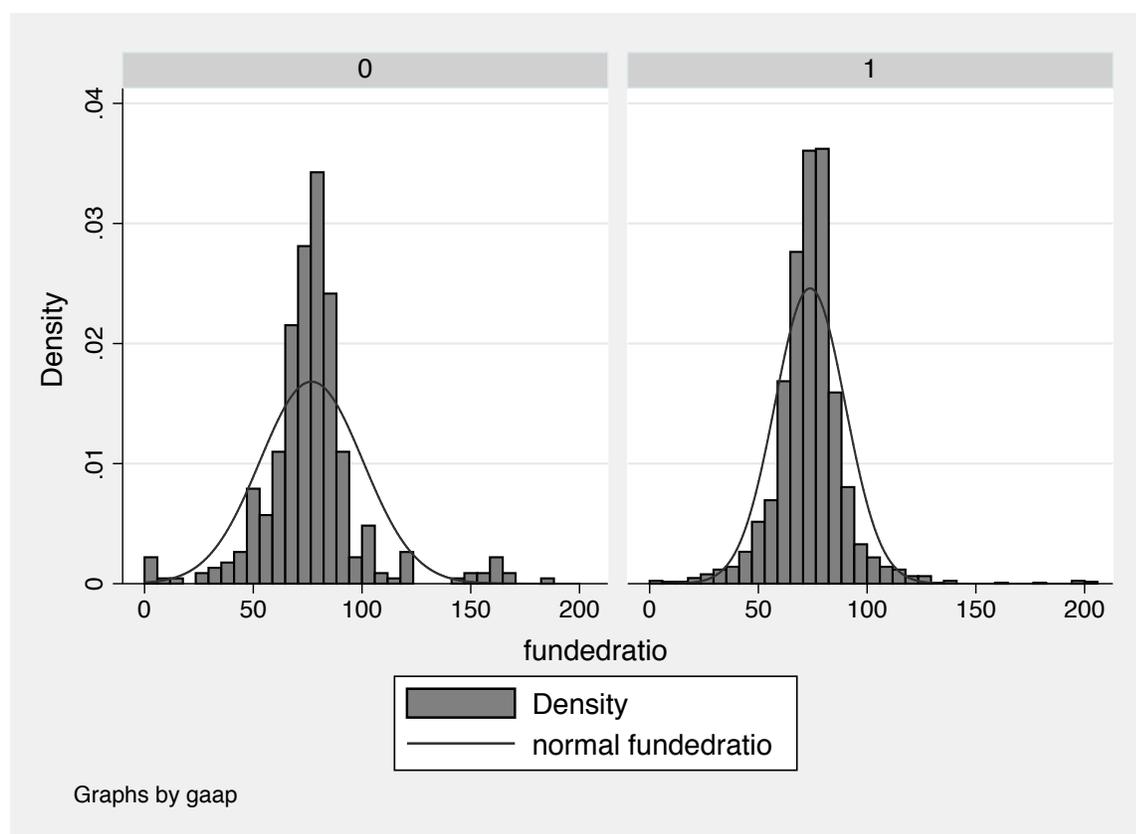


Figure 3.2. Histogram of funded ratio by GAAP versus non-GAAP conforming municipalities.

In terms of sample composition, as shown in Table 3.2, about 15% of the municipalities in the sample are not following GAAP, a modest decrease in non-conformity from the 20% found by Carroll and Marlowe (2009) in an Illinois sample of 2002 data. The average pay per capita was \$215.97, and \ln population and equalized assessed value of property were 9.32 and 19.17, respectively. It was noted that about 68% of the entities issued general obligation bonds. The auditor expertise variable points to an average of 19 clients served from the sample, with approximately 9% of the entities having switched auditors from the prior year. The average unemployment and union membership rates for the municipalities in the sample was 9.15% and 51.44%, respectively. More than half of the entities were incorporated as a village and about

38% of the municipalities in the sample reported to have home rule status. Finally, around 5% of entities had overfunded pensions (i.e. a funding ratio of 100% or higher).

Table 3.3 shows the correlation coefficients between the variables in the model. The Pearson correlations for the full sample show that pension funding is negatively correlated with GAAP conformity ($-0.0610, p = 0.002$), contrary to the positive association hypothesized. Thus, a multivariate analysis is warranted.

The size of covered payroll per capita ($-0.0886, p = 0.00$), the size of population being served ($-0.0385, p = 0.051$), the size of the equalized assessed values of properties under the entity's jurisdiction ($-0.104, p = 0.000$), the number of audit clients in the sample ($-0.0631, p = 0.001$), and having the municipality being incorporated as a village ($-0.0365, p = 0.065$), are all negatively correlated with the funded ratio. Pension funding is positively correlated with issuance of general obligation bonds ($0.0361, p = 0.068$), and being overfunded ($0.595, p = 0.000$).

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Table 3.3

Pearson Correlations (N = 2,565)

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) FUNDED RATIO	1						
(2) GAAP	-0.0610*** (0.002)	1					
(3) PAYPRCAP	-0.0886*** (0.000)	0.0734*** (0.000)	1				
(4) LnPOP	-0.0385* (0.051)	0.368*** (0.000)	-0.0303 (0.126)	1			
(5) GOBOND	0.0361* (0.068)	0.220*** (0.000)	0.0295 (0.135)	0.378*** (0.000)	1		
(6) LnEAV	-0.104*** (0.000)	0.371*** (0.000)	0.103*** (0.000)	0.812*** (0.000)	0.364*** (0.000)	1	
(7) AUDEXPERTISE	-0.0631*** (0.001)	0.230*** (0.000)	0.0785*** (0.000)	0.378*** (0.000)	0.187*** (0.000)	0.507*** (0.000)	1
(8) AUDCHANGE	0.00351 (0.859)	0.000787 (0.968)	-0.00997 (0.614)	0.00833 (0.673)	0.0264 (0.182)	-0.00181 (0.927)	-0.0183 (0.354)
(9) UNMP	-0.0186 (0.348)	0.0214 (0.280)	-0.0760*** (0.000)	0.0359* (0.069)	0.0919*** (0.000)	0.0434** (0.028)	-0.0551*** (0.005)
(10) UNION	-0.0254 (0.199)	0.103*** (0.000)	-0.0591*** (0.003)	0.170*** (0.000)	0.166*** (0.000)	0.272*** (0.000)	0.256*** (0.000)
(11) ELECTIONYR	0.0165 (0.404)	0.00528 (0.789)	0.00349 (0.860)	0.00289 (0.884)	0.00811 (0.681)	-0.00178 (0.928)	0.0103 (0.601)
(12) HOMERULE	-0.0111 (0.573)	0.211*** (0.000)	0.115*** (0.000)	0.529*** (0.000)	0.341*** (0.000)	0.457*** (0.000)	0.188*** (0.000)
(13) VILLAGE	-0.0365* (0.065)	0.150*** (0.000)	-0.0897*** (0.000)	0.00468 (0.813)	0.0645*** (0.001)	0.248*** (0.000)	0.309*** (0.000)
(14) OVERFUNDED	0.595*** (0.000)	-0.0757*** (0.000)	-0.146*** (0.000)	-0.116*** (0.000)	-0.00632 (0.749)	-0.162*** (0.000)	-0.0832*** (0.000)
(15) YEAR	0.0225 (0.255)	0.00901 (0.648)	-0.00151 (0.939)	0.00831 (0.674)	0.00893 (0.651)	-0.0429** (0.030)	0.0356* (0.071)

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Table 3.3

Pearson Correlations (n = 2,565) – Continued

Variable	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(8) AUDCHANGE	1						
(9) UNMP	-0.00259 (0.896)	1					
(10) UNION	0.0417** (0.035)	0.0467** (0.018)	1				
(11) ELECTIONYR	0.0697*** (0.000)	-0.270*** (0.000)	-0.0733*** (0.000)	1			
(12) HOMERULE	0.0159 (0.420)	0.0319 (0.106)	0.0530*** (0.007)	0.00593 (0.764)	1		
(13) VILLAGE	0.0233 (0.238)	0.0698*** (0.000)	0.227*** (0.000)	0.00197 (0.920)	0.0110 (0.577)	1	
(14) OVERFUNDED	0.0169 (0.392)	0.0305 (0.123)	-0.0118 (0.552)	0.00928 (0.638)	-0.0454** (0.021)	0.0306 (0.121)	1
(15) YEAR	0.0394** (0.046)	-0.628*** (0.000)	0.0453** (0.022)	0.293*** (0.000)	0.0115 (0.560)	0.00197 (0.920)	0.0287 (0.147)

Note. *P* values in parentheses. Variables defined in the Appendix. **p* < 0.10. ***p* < 0.05. ****p* < 0.01.

Further review of Table 3.3 reveals high correlation between the size of the population and the property equalized assessed values (0.812, $p = 0.000$), which were both expected given the nature of these measures. To further check for multicollinearity, the variance inflation factors (VIF) diagnostics were run. All variables' VIF (outside of population and EAV) were noted to be under 1.77 and the VIF for population and EAV were 4.16 and 4.35, respectively. The mean of all variables VIF was 1.77. It was concluded that multicollinearity was not a concern.

Results

Main Test

Table 3.4 presents the results of the multivariate analysis of pension funding using Equation 1. Column 1 is the base model with year fixed effects and includes only the control variables previously identified to be associated with pension funding. The full regression model (Column 2) was rerun with the inclusion of the quality of financial reporting measure (*GAAP*) and year fixed effects, as well as the same model clustered by county (in Column 3). This is in line with prior studies that cluster on county or state (Bagchi, 2016; Gorina, 2013; Rich & Zhang, 2015). Overall, the models are all statistically significant. The adjusted R² statistic is 18.35%, suggesting model fit is in line with prior research. For instance, Bagchi (2016) reports 21% for the funded ratio determinants model and 19% for the Unfunded Actuarial Accrued Liability per member determinants model in the study of the effect of political competition on pension funding in Pennsylvania municipalities.

The results of the fixed effects regression estimations (Columns 2 and 3) reflect a significant ($p < 0.05$) but negative association between GAAP conformity and pension funding. Specifically, local units of government that follow GAAP (presumed to exhibit better quality) in

their financial reporting are associated with a 5.93 point decrease in their pension funded ratio as compared to those following non-GAAP conforming methodology in their financial reporting. Such results are contrary to the positive relationship hypothesized between pension funding and GAAP conformity.

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Table 3.4

Models for Pension Funding

Variables	FUNDED RATIO - Full Sample			FUNDED RATIO - Subsamples		
	Base FE (1)	FE (2)	FE + Cluster (3)	Unhealthy (4)	Healthy (5)	Overfunded (6)
GAAP (<i>H</i>)		-5.930** (0.035)	-5.930** (0.041)	-5.266* (0.096)	8.829** (0.016)	-2.205 (0.835)
PAYPRCAP	0.023** (0.044)	0.022* (0.054)	0.022** (0.020)	0.038** (0.019)	-0.007 (0.621)	-0.097 (0.224)
LnPOP	5.957* (0.076)	5.649* (0.078)	5.649 (0.102)	15.047* (0.088)	1.675 (0.862)	3.899 (0.703)
GOBOND	-0.567 (0.622)	-0.584 (0.614)	-0.584 (0.689)	0.089 (0.953)	-0.077 (0.929)	1.450 (0.762)
LnEAV	0.456 (0.448)	0.465 (0.439)	0.465 (0.417)	0.641* (0.066)	-0.763 (0.186)	-5.450 (0.239)
AUDEXPERTISE	-0.023 (0.240)	-0.021 (0.297)	-0.021 (0.214)	-0.025 (0.356)	-0.041*** (0.005)	-0.063 (0.507)
AUDCHANGE	-0.577 (0.285)	-0.558 (0.304)	-0.558 (0.149)	-1.218* (0.058)	-0.135 (0.784)	1.040 (0.786)
UNMP	-1.490** (0.026)	-1.453** (0.030)	-1.453*** (0.004)	-1.470 (0.125)	-0.120 (0.811)	1.782 (0.469)
UNION	-0.009 (0.733)	-0.014 (0.567)	-0.014 (0.563)	-0.022 (0.502)	-0.013 (0.528)	0.279* (0.060)
ELECTIONYR	-1.961 (0.365)	-1.778 (0.412)	-1.957*** (0.000)	-2.196 (0.466)	1.422 (0.419)	15.076* (0.086)
HOMERULE	0.489 (0.666)	0.365 (0.748)	0.365 (0.729)	0.913 (0.432)	-0.253 (0.754)	
OVERFUNDED	15.055*** (0.000)	15.015*** (0.000)	15.015*** (0.000)			
YEAR2010	0.003 (0.999)	-0.179 (0.936)	-0.179 (0.936)	1.009 (0.749)	-2.843* (0.094)	-13.746* (0.076)
YEAR2011	-3.927*** (0.000)	-3.895*** (0.000)	-3.895*** (0.000)	-3.196*** (0.000)	-1.174** (0.031)	2.052 (0.443)
YEAR2012	-4.383*** (0.001)	-4.528*** (0.001)	-4.349*** (0.000)	-3.050 (0.109)	-4.521*** (0.000)	-12.283* (0.056)
YEAR2013	-4.151*** (0.000)	-4.092*** (0.000)	-4.092*** (0.000)	-3.267*** (0.008)	-1.871** (0.046)	4.461 (0.260)
Constant	22.026 (0.506)	29.974 (0.346)	29.974 (0.420)	-73.455 (0.360)	82.197 (0.357)	162.261 (0.212)
<i>N</i>	2565	2565	2565	1816	628	121
Adjusted <i>R</i> ²	0.1796	0.1835	0.1835	0.1005	0.2348	0.3062

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Note. *P* values in parentheses. *FE* stands for fixed effects. The variables are defined in the Appendix. The *VILLAGE* and indicator variables for the YEAR2014 were omitted due to collinearity. Models 1-3 include the full sample: Model 1 is the base with only the control variables, Model 2 is a fixed effects model, and Model 3 includes fixed effects and clusters by county. The unhealthy subsample (Model 4) includes entities with a funded ratio less than 80%. The healthy subsample (Model 5) includes entities with a funded ratio of at least 80% but less than 100%. The overfunded subsample (Model 6) includes entities with a funded ratio of at least 100% and over. The *HOMERULE* variable was excluded due to low variability as it prevented this model from concaving. **p* < 0.10. ***p* < 0.05. ****p* < 0.01.

Given that the full sample included a wide variation in the pension funding, including overfunded, underfunded, and severely underfunded plans, the full sample was partitioned into subsamples to further explore the hypothesized association in *H*. Specifically, three subsamples were examined based on a commonly established cutoff (GAO, 2008): unhealthy funded sample of entities (funded ratio below 80%), healthy funded (ratio between 80% and 100%), and overfunded (ratio of 100% or higher). It is important to note that the healthy subsample is technically still “underfunded” since the funding ratio is not at 100% funded. The results of these subsamples are presented in Columns 4-6. Within the unhealthy subsamples, the association between GAAP conformity and pension funding continues to show a negative (but weaker) significance as compared to the full sample (Columns 2-3). The healthy subsample provides for a positive and significant ($p < 0.05$) association, supporting the hypothesis, such that local units of government that follow GAAP in their financial reporting were associated with an 8.829 point increase in the pension funded ratio as compared to those following non-GAAP reporting methodology. The overfunded plans subsample in Column 6 (the simplest sample size) shows no significance on the explanatory variable of interest.

Proceeding to the results related to the control variables (Column 2), an entity’s funding ratio is certainly associated with other factors as provided by the model controls. Consistent with prior findings of Rich and Zhang (2015), pay per capita was found to be positively associated (0.022, $p = 0.054$) with pension funding, pointing to higher funding in plans where more contributions to the plan are made through participating payrolls. Similar results were noted in the unhealthy funded subsample (Column 4). The size of the population is positive and significant (5.649, $p = 0.078$) in both the full sample (Column 2) and in the unhealthy funded subsample (Column 4). However, the controls measuring general obligation bond issuances, real

property values (except for the unhealthy subsample), public-sector union membership, and home rule status were not significant. These results are in line with prior studies where some of the controls were noted significant but others were not.²² Auditor expertise was noted negative and significant (-0.041 , $p = 0.005$) only in the healthy subsample (Column 5), suggesting specialized auditors act as a monitoring mechanism to identify misreporting or miscalculations feeding into the funding ratio process, reflecting their expert knowledge as compared to non-specialized auditors who may be missing such issues. The change of auditor indicator, although negative as expected (-1.218 , $p = 0.058$), was only significant in the unhealthy subsample (Column 4), suggesting that an auditor switch introduces risks of a less qualified auditor. The unemployment rate was negative and significant (-1.453 , $p = 0.030$) in the full sample (Column 2), implying that local economic conditions such as higher unemployment are associated with lower funding of pensions. The election year indicator was significant (-1.957 , $p = 0.000$) but negatively associated with funding in the full sample (clustered model, Column 3), and a weak positive association (0.279 , $p = 0.060$) was noted in the overfunded subsample (Column 6). The opposite to prediction sign was also mentioned by Schneider and Damanpour (2002) even with local election measure. The authors offered no alternative explanation, although the measure was not significant in their study either. Such results possibly suggest the proxy measure for voter activism should be re-visited in future studies to further examine this relationship. Also, as expected the indicator variable for overfunded plans (added to control for overfunded plans in the sample) was positive and significant given that mathematically overfunded plans will be

²² Maher et al. (2015) did not show significance of these controls. Rich and Zhang (2015) only showed significant and negative coefficients for their debt issuance, which was a continuous measure as compared to the indicator variable used in the current study. Gorina (2013) found significance for the population measure only in county fixed effects. Kelly (2014) found the union measure negative or positive in some of the models tested. Marks et al. (1988) did not provide sign prediction for union membership but found negative and significant association with funding. Rich and Zhang (2015) did not find the auditor control significant, nor did they make a prediction for it, while Vermeer et al. (2012) had both negative and positive (but not significant) coefficient for this measure and its association with pension disclosures across their various models.

positively related to funding.

Sensitivity Tests

The model was assessed for sensitivity to the 80% established cutoff for differentiating healthy and unhealthy plans. Three additional cutoffs were examined at 79%, 78%, and 77%, and were tabulated side-by-side in Table 3.5, Columns 1-6. It was noted that the results of the unhealthy subsample were highly sensitive to even a 1% move in the cutoff from 80% down to 79%, 78%, and 77%. Recall in Table 3.4, Column 4, this subsample has a negative (although weak) and marginally significant result ($-5.266, p = 0.096$). In contrast, Table 3.5, Columns 1, 3, and 5 all show no significance in the association between the GAAP measure of interest and pension funding. Conversely, the healthy subsample continued to show the significance of the GAAP conformity at the 79% and 78% cutoffs (Columns 2 and 4), while it was also positive and significant in Table 3.4, Column 5 ($8.829, p = 0.016$). However, at the 77% cutoff, neither of the subsamples (healthy or unhealthy) were noted to have a significant association between the GAAP measure and pension funding.

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Table 3.5

Funded Ratio Cutoffs Sensitivity

Variables	FUNDED RATIO					
	Ratio < 79%	79% < Ratio < 100%	Ratio < 78%	78% < Ratio < 100%	Ratio < 77%	77% < Ratio < 100%
	(1)	(2)	(3)	(4)	(5)	(6)
GAAP (<i>H</i>)	-2.975 (0.238)	9.103** (0.011)	-2.848 (0.277)	7.487* (0.061)	-3.329 (0.268)	3.104 (0.446)
PAYPRCAP	0.045** (0.011)	-0.008 (0.527)	0.044** (0.012)	-0.006 (0.634)	0.057*** (0.001)	-0.003 (0.704)
LnPOP	18.437** (0.046)	-0.219 (0.982)	18.851* (0.053)	1.129 (0.909)	20.475** (0.047)	-0.037 (0.997)
GOBOND	-0.280 (0.848)	-0.159 (0.841)	-0.106 (0.947)	-1.027 (0.266)	0.362 (0.839)	-0.701 (0.363)
LnEAV	0.721** (0.040)	-0.274 (0.690)	0.730** (0.035)	-0.413 (0.547)	0.650* (0.060)	-0.587 (0.430)
AUDEXPERTISE	-0.017 (0.541)	-0.038*** (0.005)	-0.014 (0.619)	-0.036** (0.013)	-0.010 (0.723)	-0.025* (0.058)
AUDCHANGE	-1.064* (0.098)	-0.102 (0.820)	-1.031 (0.112)	-0.101 (0.819)	-0.945 (0.160)	0.003 (0.995)
UNMP	-1.468 (0.137)	-0.254 (0.614)	-1.848* (0.068)	-0.373 (0.414)	-1.981* (0.067)	-0.447 (0.271)
UNION	-0.022 (0.504)	-0.011 (0.593)	-0.030 (0.385)	-0.012 (0.567)	-0.024 (0.493)	-0.023 (0.261)
ELECTIONYR	-2.017 (0.515)	0.909 (0.608)	-3.068 (0.339)	0.113 (0.945)	-3.415 (0.320)	0.324 (0.827)
HOMERULE	0.948 (0.420)	-1.604 (0.164)	0.904 (0.465)	0.581 (0.729)	0.852 (0.540)	0.255 (0.867)
YEAR2010	1.335 (0.683)	-2.487 (0.147)	2.403 (0.476)	-1.955 (0.228)	2.740 (0.448)	-1.928 (0.186)
YEAR2011	-2.766*** (0.000)	-1.579*** (0.004)	-2.811*** (0.001)	-1.894*** (0.000)	-2.676*** (0.002)	-1.762*** (0.000)
YEAR2012	-2.949 (0.135)	-4.432*** (0.000)	-2.173 (0.290)	-4.208*** (0.000)	-1.745 (0.430)	-4.346*** (0.000)
YEAR2013	-2.888** (0.018)	-2.311** (0.012)	-3.084** (0.018)	-2.771*** (0.001)	-3.083** (0.024)	-2.604*** (0.001)
Constant	-111.221 (0.188)	91.459 (0.299)	-111.823 (0.208)	83.023 (0.368)	-128.454 (0.169)	100.278 (0.240)
<i>N</i>	1733	711	1625	819	1521	923
Adjusted <i>R</i> ²	0.0986	0.2492	0.0966	0.2417	0.1013	0.2373

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Note. *P* values in parentheses. The variables are defined in the Appendix. The *VILLAGE* variable dropped due to lack of within group variation. The indicator variable for the YEAR2014 was omitted due to collinearity. The sensitivity tests in the presented models examine cut-offs lower than the 80% commonly referred to when considering unhealthy and healthy plans. Full sample models are presented in Table 3.4. Models 1 and 2 provide for subsample cut-off at 79%. Models 3 and 4 provide for subsample cut-off at 78%. Models 5 and 6 provide for subsample cut-off at 77%. * $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

Next, the sensitivity of the healthy subgroup results was explored and *INCREASERATIO3* and *INCREASERATIO5* were introduced as two alternative measures to the dependent variable of the funded ratio.²³ They represent dichotomous variables coded as 1 if the funded ratio increased by at least 3% or 5% (respectively) from the prior year and coded as 0 otherwise. Table 3.6, Panels A and B present the results of the logistic regression models of pension funding using Equation 1 and the dichotomous dependent variables of an increase of at least 3% or 5% in the funded ratio from the prior year, respectively. As with the funded ratio continuous measure (Table 3.4), the full sample results, as well as the subsamples (unhealthy and healthy), are presented side-by-side as unconverted coefficients (not odds ratios) for comparability to Table 3.4. Note that the overfunded plans subsample was too small (less than 100) to produce reliable estimates for these models (no F statistic was returned by Stata).

²³ The 3% and 5% cutoff points of reference for indicator variables were selected as follows: 1) the mean increase (excluding zero or decreases) in the funded ratio within the sample was 4.76, thus rounded to 5%, and 2) the median and mode increase (excluding zero or decreases) in the funded ratio within the sample were 3.5 and 2.5, respectively, thus the second cutoff of 3% rounded in between was selected.

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Table 3.6

Increase in Funded Ratio Sensitivity

Panel A: Increase of at Least 3% in Funded Ratio Measure as the Dependent Variable

Variable	INCREASE RATIO 3 - Full Sample			INCREASE RATIO 3 - Subsamples	
	Base FE (1)	FE (2)	FE + Cluster (3)	Unhealthy (4)	Healthy (5)
GAAP (<i>H</i>)		-0.500 (0.461)	-0.500 (0.465)	-1.039 (0.305)	12.724*** (0.000)
PAYPRCAP	0.001 (0.737)	0.001 (0.761)	0.001 (0.815)	0.003 (0.607)	0.004 (0.601)
LnPOP	0.577 (0.492)	0.569 (0.498)	0.569 (0.570)	-4.043 (0.163)	8.494** (0.013)
GOBOND	0.057 (0.866)	0.054 (0.872)	0.054 (0.865)	0.181 (0.661)	0.542 (0.380)
LnEAV	0.017 (0.888)	0.019 (0.880)	0.019 (0.867)	0.001 (0.995)	0.857** (0.020)
AUDEXPERTISE	-0.000 (0.995)	0.000 (0.989)	0.000 (0.989)	-0.006 (0.412)	0.014 (0.435)
AUDCHANGE	0.260 (0.188)	0.258 (0.191)	0.258 (0.230)	0.329 (0.191)	0.910 (0.112)
UNMP	0.194 (0.184)	0.200 (0.173)	0.200 (0.313)	0.331* (0.060)	-0.034 (0.941)
UNION	-0.003 (0.719)	-0.004 (0.660)	-0.004 (0.565)	0.004 (0.733)	-0.004 (0.813)
ELECTIONYR	5.904*** (0.000)	5.927*** (0.000)	5.927*** (0.000)	6.232*** (0.000)	5.439*** (0.006)
HOMERULE	0.844 (0.212)	0.810 (0.213)	0.810 (0.210)	0.466 (0.500)	16.799*** (0.000)
OVERFUNDED	1.960** (0.030)	1.960** (0.031)	1.960** (0.032)		
YEAR2010	-3.357*** (0.000)	-3.382*** (0.000)	-3.382*** (0.000)	-3.698*** (0.000)	-2.660* (0.082)
YEAR2011	2.998*** (0.000)	2.999*** (0.000)	2.999*** (0.000)	3.085*** (0.000)	2.851** (0.014)
YEAR2012	-3.276*** (0.000)	-3.295*** (0.000)	-3.295*** (0.000)	-3.301*** (0.000)	-3.227*** (0.000)
YEAR2013	4.196*** (0.000)	4.204*** (0.000)	4.204*** (0.000)	4.471*** (0.000)	4.294*** (0.001)
<i>N</i>	2281	2281	2281	1388	451
Pseudo <i>R</i> ²	0.4034	0.4036	0.4036	0.3542	0.5079

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Note. *P* values in parentheses. *FE* stands for fixed effects. Variables defined in the Appendix. The *VILLAGE* variable dropped due to lack of within group variation. The indicator variable for the YEAR2014 was omitted due to collinearity. Models 1-3 include the full sample: Model 1 is the base with only the control variables, Model 2 is a fixed effects model, and Model 3 includes fixed effects and clusters by county. The unhealthy subsample (Model 4) includes entities with a funded ratio less than 80%. The healthy subsample (Model 5) includes entities with a funded ratio of at least 80% but less than 100%. The overfunded subsample was too small to produce reliable estimates (no *F* statistic returned by Stata). **p* < 0.10. ***p* < 0.05. ****p* < 0.01.

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Panel B: Increase of at Least 5% in Funded Ratio Measure as the Dependent Variable

Variable	INCREASE RATIO 5 - Full Sample			INCREASE RATIO 5 - Subsamples	
	Base FE (1)	FE (2)	FE + Cluster (3)	Unhealthy (4)	Healthy (5)
GAAP (<i>H</i>)		-0.467 (0.534)	-0.467 (0.541)	-1.199 (0.160)	13.985*** (0.000)
PAYPRCAP	-0.008* (0.071)	-0.008* (0.064)	-0.008* (0.062)	-0.005 (0.346)	-0.018 (0.346)
LnPOP	-0.678 (0.372)	-0.679 (0.370)	-0.679 (0.357)	-6.523** (0.041)	5.074 (0.356)
GOBOND	-0.215 (0.620)	-0.214 (0.620)	-0.214 (0.609)	-0.206 (0.701)	16.458*** (0.000)
LnEAV	-0.193 (0.188)	-0.192 (0.191)	-0.192*** (0.009)	-0.176 (0.305)	-0.265 (0.749)
AUDEXPERTISE	-0.005 (0.548)	-0.005 (0.563)	-0.005 (0.548)	-0.017* (0.052)	0.049*** (0.008)
AUDCHANGE	0.174 (0.518)	0.172 (0.528)	0.172 (0.548)	-0.090 (0.785)	1.088* (0.066)
UNMP	0.191 (0.280)	0.198 (0.263)	0.198 (0.266)	0.067 (0.759)	0.606 (0.429)
UNION	-0.000 (0.998)	-0.001 (0.958)	-0.001 (0.952)	0.003 (0.849)	0.025 (0.311)
ELECTIONYR	5.573*** (0.000)	5.601*** (0.000)	5.601*** (0.000)	5.131*** (0.000)	21.461*** (0.000)
HOMERULE	1.191* (0.053)	1.193* (0.053)	1.193** (0.043)	1.173 (0.121)	26.663*** (0.000)
OVERFUNDED	1.906 (0.111)	1.898 (0.113)	1.898 (0.118)		
YEAR2010	-3.510*** (0.000)	-3.536*** (0.000)	-3.536*** (0.000)	-3.281*** (0.000)	-4.442* (0.097)
YEAR2011	2.115*** (0.000)	2.117*** (0.000)	2.117*** (0.000)	1.952*** (0.000)	16.249*** (0.000)
YEAR2012	-3.203*** (0.000)	-3.224*** (0.000)	-3.224*** (0.000)	-2.877*** (0.000)	-6.814*** (0.000)
YEAR2013	3.555*** (0.000)	3.565*** (0.000)	3.565*** (0.000)	3.568*** (0.000)	17.804*** (0.000)
N	1657	1657	1657	1010	269
Pseudo R^2	0.4381	0.4383	0.4383	0.3937	0.6752

Note. *P* values in parentheses. *FE* stands for fixed effects. The variables are defined in the Appendix. The *VILLAGE* variable was dropped due to lack of within group variation. The indicator variable for the YEAR2014 was omitted due to collinearity. Models 1-3 include the full sample: Model 1 is the base with only the control variables, Model 2 is

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

a fixed effects model, and Model 3 includes fixed effects and clusters by county. The unhealthy subsample (Model 4) includes entities with a funded ratio less than 80%. The healthy subsample (Model 5) includes entities with a funded ratio of at least 80% but less than 100%. The overfunded subsample was too small to produce reliable estimates (no F statistic returned by Stata). * $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

As seen in Table 3.6, Panel A (increase of at least 3% in the funded ratio), although no significance was noted in the full sample (Column 2), the explanatory variable of interest was significant ($p < 0.01$) in the healthy subsample (Column 5) and has the expected positive sign of coefficient (12.724). Size of population ($LnPOP$) and real property values ($LnEAV$) were noted to have positive and significant association with the likelihood of an increase in the funded ratio of at least 3% from prior year (8.494, $p = 0.013$ and 0.857, $p = 0.020$, respectively) in the healthy subsample only (Column 5). Across all the models the *ELECTIONYR* indicator was positive and highly significant (5.927, $p = 0.000$ in Column 2), suggesting a higher increase in the funded ratio is likely to be noted in election years. *HOMERULE* was only positive and significant (16.799, $p = 0.000$) in the healthy subsample.

As noted in Table 3.6, Panel B (increase of at least 5% in the funded ratio), although no significance was noted in the full sample (Column 2), the explanatory variable of interest was significant ($p < 0.01$) in the healthy subsample (Column 5) and had the expected positive sign of coefficient (13.985). Across all the models the *ELECTIONYR* indicator was positive and highly significant (5.601, $p = 0.000$ in Column 2), suggesting a higher increase in funded ratios is likely to be noted in election years. *HOMERULE* was positive and significant (1.193, $p = 0.053$ in Column 2) in all but the unhealthy subsample. Other control variables were either not significant or not consistently holding significance across models to allow for meaningful interpretation.

Finally, to address concerns related to endogeneity, the *GAAP* measure was replaced by its lagged measure. Table 3.7 provides the results of the models estimated using *LAGGAAP* as the explanatory variable in each of the models. In Table 3.7, Panel A, the dependent variable is the continuous funded ratio. In Table 3.7, Panel B, the dependent variable is the dichotomous measure for at least a 3% increase in the funded ratio and at least a 5% increase in the funded

ratio, respectively. Across the panels, only in the healthy subsample (Column 3 or 6) a positive and significant ($p < 0.01$) association between GAAP conformity and pension funding was noted. Results of the control variables were similar to those presented in Table 3.4.

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Table 3.7

Lagged GAAP Models

Panel A: Funded Ratio Continuous Measures as the Dependent Variable

Variables	FUNDED RATIO							
	Full Sample		Unhealthy		Healthy		Overfunded	
	(1)		(2)		(3)		(4)	
LAGGAAP	-4.791	(0.133)	-5.159	(0.127)	7.313***	(0.009)	-3.419	(0.699)
PAYPRCAP	0.022*	(0.055)	0.038**	(0.019)	-0.007	(0.627)	-0.095	(0.246)
LnPOP	5.771*	(0.079)	15.497*	(0.074)	2.331	(0.804)	4.135	(0.686)
GOBOND	-0.519	(0.656)	0.077	(0.960)	-0.438	(0.633)	1.340	(0.776)
LnEAV	0.454	(0.451)	0.631*	(0.070)	-0.764	(0.185)	-5.692	(0.207)
AUDEXPERTISE	-0.022	(0.268)	-0.024	(0.358)	-0.039**	(0.011)	-0.065	(0.390)
AUDCHANGE	-0.591	(0.267)	-1.291**	(0.037)	0.041	(0.932)	1.352	(0.646)
UNMP	-1.478**	(0.027)	-1.473	(0.124)	-0.109	(0.828)	1.723	(0.423)
UNION	-0.010	(0.695)	-0.015	(0.644)	-0.014	(0.502)	0.264*	(0.077)
ELECTIONYR	-1.879	(0.385)	-2.238	(0.457)	1.420	(0.420)	14.772*	(0.068)
HOMERULE	0.351	(0.763)	0.881	(0.460)	-0.196	(0.797)		
OVERFUNDED	15.313***	(0.000)						
YEAR2010	-0.058	(0.979)	1.074	(0.733)	-2.923*	(0.084)	-13.505*	(0.058)
YEAR2011	-3.876***	(0.000)	-3.176***	(0.000)	-1.195**	(0.029)	2.280	(0.425)
YEAR2012	-4.423***	(0.001)	-2.957	(0.118)	-4.554***	(0.000)	-12.199**	(0.044)
YEAR2013	-4.109***	(0.000)	-3.246***	(0.009)	-1.878**	(0.045)	4.295	(0.266)
Constant	28.097	(0.383)	-77.830	(0.320)	77.540	(0.377)	166.736	(0.184)
N	2565		1816		628		121	
Adjusted R ²	0.1823		0.1005		0.2346		0.3091	

Note. P values in parentheses. The variables are defined in the Appendix. The *VILLAGE* variable dropped due to lack of within group variation. The indicator variable for the YEAR2014 was omitted due to collinearity. Model 1 is the full sample fixed effects. The unhealthy subsample (Model2) includes entities with a funded ratio less than 80%. The healthy subsample (Model 3) includes entities with a funded ratio of at least 80% but less than 100%. The overfunded subsample (Model 4) includes entities with a funded ratio of at least 100% and over. *HOMERULE* variable was excluded when running it due to low variability as it prevented this model from concaving. * p<0.10, ** p<0.05, *** p<0.01.

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Panel B: Increase of at Least 3% and 5% in Funded Ratio Measure as the Dependent Variable

Variables	INCREASE RATIO 3% +			INCREASE RATIO 5% +		
	Full Sample (1)	Unhealthy (2)	Healthy (3)	Full Sample (4)	Unhealthy (5)	Healthy (6)
LAGGAAP	-0.193 (0.816)	-0.850 (0.506)	12.724*** (0.000)	-0.447 (0.729)	-2.189 (0.116)	13.985*** (0.000)
PAYPRCAP	0.001 (0.754)	0.002 (0.633)	0.004 (0.601)	-0.008* (0.061)	-0.006 (0.259)	-0.018 (0.346)
LnPOP	0.574 (0.495)	-3.904 (0.181)	8.494** (0.013)	-0.685 (0.365)	-6.541** (0.040)	5.074 (0.356)
GOBOND	0.058 (0.864)	0.181 (0.661)	0.542 (0.380)	-0.209 (0.628)	-0.215 (0.689)	16.458*** (0.000)
LnEAV	0.017 (0.890)	-0.002 (0.985)	0.857** (0.020)	-0.193 (0.188)	-0.177 (0.300)	-0.265 (0.749)
AUDEXPERTISE	-0.000 (0.998)	-0.006 (0.412)	0.014 (0.435)	-0.005 (0.557)	-0.017** (0.045)	0.049*** (0.008)
AUDCHANGE	0.261 (0.185)	0.334 (0.176)	0.910 (0.112)	0.176 (0.511)	-0.075 (0.813)	1.088* (0.066)
UNMP	0.195 (0.182)	0.326* (0.061)	-0.034 (0.941)	0.195 (0.268)	0.085 (0.697)	0.606 (0.429)
UNION	-0.003 (0.705)	0.005 (0.678)	-0.004 (0.813)	-0.000 (0.968)	0.004 (0.759)	0.025 (0.311)
ELECTIONYR	5.909*** (0.000)	6.200*** (0.000)	5.439*** (0.006)	5.591*** (0.000)	5.215*** (0.000)	21.461*** (0.000)
HOMERULE	0.843 (0.212)	0.532 (0.477)	16.799*** (0.000)	1.193* (0.053)	1.184 (0.119)	26.663*** (0.000)
OVERFUNDED	1.964** (0.030)			1.907 (0.110)		
YEAR2010	-3.361*** (0.000)	-3.662*** (0.000)	-2.660* (0.082)	-3.527*** (0.000)	-3.355*** (0.000)	-4.442* (0.097)
YEAR2011	3.001*** (0.000)	3.086*** (0.000)	2.851** (0.014)	2.120*** (0.000)	1.972*** (0.000)	16.249*** (0.000)
YEAR2012	-3.281*** (0.000)	-3.284*** (0.000)	-3.227*** (0.000)	-3.218*** (0.000)	-2.925*** (0.000)	-6.814*** (0.000)
YEAR2013	4.198*** (0.000)	4.457*** (0.000)	4.294*** (0.001)	3.560*** (0.000)	3.604*** (0.000)	17.804*** (0.000)
N	2281	1388	451	1657	1010	269
Pseudo R ²	0.4034	0.3536	0.5071	0.4348	0.3955	0.6752

Note. P values in parentheses. The variables are defined in the Appendix. The *VILLAGE* variable dropped due to lack of within group variation. The indicator variable for the YEAR2014 was omitted due to collinearity. Models 1 and 4 are the full sample fixed effects for the increase in ratio of at least 3% and 5%, respectively. The unhealthy

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

subsample (Models 2 and 5) includes entities with a funded ratio less than 80%. The healthy subsample (Models 3 and 6) includes entities with a funded ratio of at least 80% but less than 100%. The overfunded subsample was too small to produce reliable estimates for the increases measures (no F statistic). $*p < 0.10$. $**p < 0.05$. $***p < 0.01$.

Untabulated Sensitivity Tests

To mitigate concerns around outliers, the funded ratio was winsorized at 1% on both ends. Models used were re-run to test the hypothesis. Untabulated results were qualitatively similar in comparison to those reported in Tables 3.4.

In a separate analysis, additional control variables were included, drawing on a similar approach for robustness checks performed by Rich and Zhang (2015). The main model was re-run for the funded ratio continuous measure (untabulated) while controlling for additional financial and fiscal distress factors of the entity by including a measure of the general fund balance (scaled by population size). This is consistent with Munnell et al. (2011b) and Bath et al. (2016). Inclusion of this continuous measure yielded findings that remain consistent with those presented in Tables 3.4.

Finally, in line with Eaton and Nofsinger (2008) and Rich and Zhang (2015), differentiation between various types of local pension plans was identified and indicator variables for a separate police or fire pension plan that could be established by a municipality in addition to the main IMRF public employee plan were established as a means of controlling for the need to allocate entity resources to a multiple plan, which could impact the results found thus far.²⁴ The inclusion of these additional controls improved the adjusted R^2 , but the results remained qualitatively similar to those presented in Table 3.4.

Discussion & Conclusion

“Cash accounting is an antiquated accounting method. It is simply inappropriate for state and local governments with expanding educational, health, and welfare missions because it does not achieve accounting’s most basic mission of matching revenues and costs” (Nothdurft

²⁴ Data on police and fire plans was obtained from the Illinois Comptroller’s Local Government Division Warehouse data file, which includes this information beginning with the year 2013, thus allowing a re-run of models for the sample of 2013-2014 only.

and Weinberg, 2013, p. 18). Yet such basis of accounting choice, which prevents an entity from being in conformity with GAAP and thus following better quality financial reporting, is assumed to be quite prevalent. Coupled with increasing concerns in the public sector surrounding continuing underfunding of pension plans, the aim of this study was to investigate the association of the quality of financial reporting (in the form of GAAP conformity) with pension funding of public pension plans.

After providing pension specific background and prior literature findings related to the objective of the study, several models and sensitivity analyses were developed and employed on the full sample and several subsamples. The study revealed that in the combined sample (not differentiating among overfunded, healthy funded, or unhealthy funded plans) non-GAAP conforming local units of government are better funded, suggesting that entities opting for better quality in financial reporting (in the form of GAAP conformity) are associated with lower funding. However, given that the funding levels vary rather widely in the sample, relying on this result alone could be misleading. Thus, an additional analysis was performed on the subsamples of the unhealthy plans (funding under 80%), healthy funded (between 80 and 100%), and overfunded plans (having funding levels of 100% and above). Support was found for the predicted sign in the hypothesis in the healthy funded subgroup consistently across all model specifications. This finding suggests that once a certain level of funding or percentage increases in funding is reached, there is a benefit to the added quality of financial reporting as exhibited under GAAP conformity. In addition, the sensitivity of the 80% commonly established cutoff revealed that the subsample results are sensitive to such a cutoff and it is likely that the healthy range is lower than previously established.

One possible explanation for *H* not being supported in the unhealthy subsample is that entities may have weak controls around proper payroll and pension enrollment reporting (inputs that impact the actuarial pension funding calculations) regardless of whether they are GAAP conforming. Such possible limitation, coupled with the negative and significant coefficient of the auditor change variable that was also noted in this subsample, points to the added risk due to less qualified auditors examining the books and records of said local units of government even during the annual audit process. Anecdotal evidence from review of the 2014 IMRF internal audit reports revealed that 93.75% of the unhealthy funded entities that were audited by the pension system were noted to have findings related to accuracy or completeness of the eligible members and their earnings as reported monthly to the IMRF.²⁵ Thus, absent prior research specifically differentiating GAAP versus non-GAAP conforming entities (and based on their subsets of funding), future research into this subset of local units of government may prove beneficial to better understand and examine empirically why GAAP conformance is not positively associated with the magnitude of pension funding.

After an entity switches to GAAP reporting, it is required to follow the various GASB statements and it is plausible that funding remains shy of sizable improvement to be reflected in their funding ratios immediately as it provides for the true condition of the pension funding that now can be comparable to other entities following the same standards. Perhaps the key takeaway is that GAAP conformity is likely holding municipalities to strict guidelines and discipline and is more aligned with the recent years' reality of higher unfunded liabilities. The new requirements of GASB Statements 67 and 68 will possibly reveal a much larger gap in funding among the

²⁵ IMRF has an internal audit function that performs payroll and enrollment compliance audits of the employers participating in this pension. This program was established in 2006 as a pilot and currently provides for the pension system to audit close to 180 employers annually. Close to 90% of these audits have findings. For instance, it is not uncommon for the IMRF auditors to list employees that were omitted from enrollment in the pension although they are eligible according to the plan provisions or incorrect wage amounts being reported.

subgroups (in terms of their funding levels being healthy funded or unhealthy funded) as the GAAP conforming units of government are required to recognize the unfunded liability now on the face of the financial statements. Re-examination of this study using pre-and post-new standards data could shed more light as to the noted results.

In summary, although limited to the boundary of healthy funded subsamples of entities, the results of positive association of GAAP conformity with pension funding should be of interest to the GASB, regulators, and policy makers when assessing how to ensure the sustainability of public pensions while relying on financial reporting in both the GAAP-conforming and non-GAAP conforming settings.

Contribution

Overall, the results of this study contribute to the pension literature in the public pension sector and supplement studies by Marks et al. (1988) and Rich and Zhang (2015) where conflicting results were previously noted in relation to the quality of financial reporting and pension funding and where no differentiation was made among the subgroups of entities in terms of their funding (overfunded, healthy funded, or unhealthy funded). By relying on panel data from a number of years, it further contributes by examining such associations over time, which has not been previously explored. Furthermore, sensitivity analysis on the 80% cutoff allows for future research to examine the commonly used cutoff and its applicability in current times' underfunding levels. Additionally, and as noted in the literature review in Chapter 2, prior studies were concentrated on a subset of (typically) larger, state-wide systems, given existing data limitations, and so the evidence presented in this dissertation allows for a unique focus on the local units of government level which are all part of the same state-wide system, sharing the

same investment and actuarial assumptions. It is also at this level that many policy decisions impacting citizens, their community, and their real estate values are made (Rich & Zhang, 2015).

Limitations

This study is not without limitations, however. First, the focus of this study was on a sample of local units of government in a single state, Illinois, which encourages but does not require conformity with GAAP, and therefore limits generalizability to municipalities in other states. Future research could examine pension funding and quality of financial reporting across multiple states (for instance, Michigan and Pennsylvania, which have been included in previous works), contrasting those that are subject to GAAP with those that are not.

Second, while the methodology presented is deemed appropriate to test the hypothesis presented, a multi-level model could be employed by future research. Such an approach could re-examine the years nested within municipalities, which are nested within counties, given that some fiscal and economic measures of unemployment and public-sector union membership are aggregated at the county level.

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DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Appendix

Variable Name	Definition	Source
<i>FUNDEDRATIO</i>	Ratio number equals actuarial asset divided by actuarial accrued liabilities.	Illinois Municipal Retirement Fund [IMRF] data file for funding ratios of its participating entities.
<i>INCREASERATIO3</i>	Dichotomous variable coded as 1 if the funded ratio increased by more than 3% from prior year, 0 otherwise.	IMRF data file for funding ratios of its participating entities.
<i>INCREASERATIO5</i>	Dichotomous variable coded as 1 if the funded ratio increased by more than 5% from prior year, 0 otherwise.	IMRF data file for funding ratios of its participating entities.
<i>GAAP</i>	Basis of accounting used for quality financial reporting; dichotomous variable coded as 1 or 0 representing accrual (GAAP) or cash (non-GAAP) basis of accounting, respectively.	Illinois Comptroller's Local Government Division Warehouse data file, matched against hand collected audited reports, as needed.
<i>LAGGAAP</i>	Basis of accounting used in the prior period for quality financial reporting; dichotomous variable coded as 1 or 0 representing accrual (GAAP) or cash (non-GAAP) basis of accounting, respectively.	Illinois Comptroller's Local Government Division Warehouse data file, matched against hand collected audited reports, as needed.
<i>PAYPRCAPITA</i>	Annual covered member payroll divided by population being served.	Annual covered member payroll obtained from the IMRF data file. Population obtained from the Illinois Comptroller's Local Government Division Warehouse data file.
<i>LnPOP</i>	The natural log of population being served.	Illinois Comptroller's Local Government Division Warehouse data file, matched against hand collected audited reports, as needed.
<i>GOBOND</i>	Dichotomous variable coded as 1 if the jurisdiction issues general obligation debt in each year, 0 otherwise.	Illinois Comptroller's Local Government Division Warehouse data file, matched against hand-collected audited reports, as needed.
<i>LnEAV</i>	The natural log of total equalized assessment valuation (EAV) or real property.	Illinois Comptroller's Local Government Division Warehouse data file, matched against hand-collected audited reports, as needed.
<i>AUDEXPERTISE</i>	Continues variable representing the number of audit clients an auditor has in a given year within the sample of the local governments in this study.	Illinois Comptroller's Local Government Division Warehouse data file, matched against hand-collected audited reports, as needed.
<i>AUDCHANGE</i>	Dichotomous variable coded as 1 if the local unit of government changed an auditor from the prior year, 0 otherwise.	Illinois Comptroller's Local Government Division Warehouse data file, matched against hand-collected audited reports, as needed.

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Appendix - Continued

Variable Name	Definition	Source
<i>UNEMP</i>	Annual unemployment percentage aggregated at the county level.	U. S. Bureau of Labor Statistics (local area unemployment rates by year).
<i>UNION</i>	Annual public-sector union membership aggregated at the county level (extrapolated from major metropolitan).	Unionstats.com
<i>ELECTIONYR</i>	Dichotomous variable coded as 1 if the year is an election year, 0 otherwise.	Illinois State Board of Elections data on general election years (even years).
<i>HOMERULE</i>	Dichotomous variable coded as 1 if the municipality has a home rule status in a given year, 0 otherwise.	Illinois Comptroller's Local Government Division Warehouse data file, matched against hand-collected audited reports, as needed.
<i>VILLAGE</i>	Dichotomous variable coded as 1 if the municipality is a village, coded 0 if a city.	Illinois Comptroller's Local Government Division Warehouse data file, matched against hand-collected audited reports, as needed.
<i>OVERFUNDED</i>	Dichotomous variable coded as 1 if funded ratio is 100% or higher, suggesting the plan is overfunded, coded 0 otherwise.	IMRF data file for funding ratios of its participating entities.

CHAPTER 4: ESSAY 3 - DETERMINANTS OF DISTRIBUTION DECISIONS BY NON-VESTED EMPLOYEES: DOES EMPLOYER'S PENSION FUNDING MATTER?

Abstract

Given the ongoing attention surrounding public-sector defined benefit pensions, the participating plan sponsors such as local units of government may be tempted to reduce their future pension liabilities, possibly at the expense of their former employees. Alternatively, public-sector employees may act to withdraw their pension contributions if they have concerns related to the sustainability of their employer's pension plan. Non-vested, terminated employees have the option of leaving their contributions on account or taking them as a distribution in the form of cash or a rollover to a qualifying retirement account. Because a cash distribution decision carries with it the potential for retirement savings leakage, it continues to be of public concern.

This essay contributes to the literature by examining determinants of the distribution decisions of terminated employees and is the first to specifically explore the association of pension funding levels as a determinant of such decisions. Decisions of 46,608 employees who separated employment between 2010 and 2013 were examined. The results suggested that a decrease in the employer's pension funding is associated with increased probability that the terminated employee will take a refund of their contributions. These results were subject to a sensitivity analysis and were further confirmed by the additional analysis where the cash-out decision was assumed to be made simultaneously with the decision to take a lump sum withdrawal (main analysis). Additionally, the descriptive statistics revealed that 88% of the terminating employees who took a refund requested to receive it in the form of a cash-out, totaling about \$38 million dollars of cash distributions. Furthermore, about 1,000 of those

employees cashed out more than \$8,000, on an individual basis, thus suggesting the pension leakage problem warrants further research and perhaps policy changes.

Keywords: defined benefit pension, public employees, distribution choices, pension funding, agent multiple-employer plan.

Public sector DB plans across the U. S. have been in the spotlight for years due to inadequate past contributions and slow recovery from investment losses due to the 2008 recession, resulting in persisting large unfunded liabilities. The 2014 *Blinken Report* from the Rockefeller Institute of Government suggested that “the threatened inability of some state and local governments to keep the core promise to their employees to provide reliable retirement security has national significance” (Boyd & Kiernan, 2014, p. 1). Reforms have been enacted at the state and local DB plans levels in most states in an attempt to address the pension crisis as low investment returns slowly rebound. Not surprisingly, participating entities within state plans are also looking for ways to improve their funding positions, a trend that is likely to continue given the newly implemented GASB Statement 68, which requires the disclosure of the net pension liabilities on the face of the financial statements. In particular, entities participating in an agent multi-employer DB plan with no control over the returns on their invested pension assets may be tempted to reduce what they can control—their future pension liabilities—by shifting, in part, the pension risk. However, this could be at the expense of former, non-vested employees.

This research postulates that such entities or sponsoring employers may influence distribution decisions of job-separating employees because non-vested terminated employees have the option of leaving their contributions on account with the employer’s pension plan upon job separation or taking them as a distribution in the form of cash or, alternatively, a rollover to another qualifying retirement savings account. By selecting either type of distribution the employee forfeits future claims for retirement benefits. Of the two distribution alternatives, cash-outs, commonly referred to as retirement savings leakage, are of a growing concern as they diminish assets that otherwise would be available for retirement benefits (GAO, 2009; Purcell, 2009).

Considerable attention has been dedicated to research of the retirement savings movement decisions in the form of lump sum withdrawals (LSW) within private sector DB plans, whether at job separation or retirement (Banerjee, 2013; Burman, Coe, & Gale, 1999; Hurd & Panis, 2006). Less attention has been given to this problem in the public-sector DB plans (Butler & Teppa, 2007; Chalmers & Reuter, 2012; Clark, Morrill, & Vanderweide, 2014; Lueken & Podgursky, 2016). Further research is warranted within the public-sector environment given that more and more states have enacted significant changes to their retirement plans (Snell, 2012), baby boomers (born between 1946 and 1965) have postponed their retirements (Harter & Agrawal, 2014), and DB plans' participation in the public sector has remained relatively constant while participation in the private sector has declined significantly over the years (Perun & Valenti, 2008). Additionally, state and local DB systems' employees amount for over one-eighth of the U. S. workforce and benefits are paid to over 9.5 million beneficiaries across the nation (U. S. Bureau of Labor Statistics, 2015; U. S. Census Bureau, 2015).²⁶ Given the size of the population, understanding trends in LSW out of public-sector DB plans (employer sponsored) remains an important topic for research. Furthermore, within public sector research, only a handful of studies have utilized administrative data from the respective pension system to examine terminating employee distribution decisions (Bryant, Holden, & Sabelhaus, 2011; Clark et al., 2014; Lueken & Podgursky, 2016), with the vast majority of prior studies relying on survey responses (Clark et al., 2014; Lueken & Podgursky, 2016). Finally, no study to date has taken into consideration the impact of employer levels of pension funding, as well as

²⁶ A trend analysis performed by the Pension Review Board (2013) examined the participation in DB plans in 1975 and 2005. It found a 37% decline in participation in the private sector compared to only a 6% decline in the public sector (Pension Review Board, 2013). It was further observed by the Bureau of Labor and Statistics in 2011 that 78% of state and local government employees were covered by DB plans, while only 18% of private-sector employees had similar coverage (Wiatrowski, 2012).

employment and plan determinants such as intrastate reciprocity and online access accounts creation on employee distributions decisions.

As such, the primary objective of this paper is to address the aforementioned gaps by answering the following research question: Do employer pension funding levels influence separating employee LSW and cash-out decisions? Secondary, but nonetheless important objectives are to further understand which employee and DB employment determinants influence LSW decisions and what is the pension leakage allocation in this setting.

Using employment separation observations that occurred from 2010-2013 at the IMRF, this research examined the impact of employee determinants and plan and employment determinants, some of which were previously noted in the literature, on the non-vested terminated (assumed either voluntarily or involuntarily hereafter) employees' LSW decisions.²⁷ Furthermore, the association of pension funding levels as a determinant of the probability of employees' distribution decisions within six months of termination date was explored.²⁸ The results suggested about one-third of separating workers pursue the LSW option within six months of termination. This is consistent with the 35% to 36% noted in prior research (Clark et al., 2014; Lueken & Podgursky, 2016) for LSW taken within twelve months of termination. A significant association was found between the employer's pension funded ratio and the probability of terminated employees subsequently taking a refund. Specifically, a decrease in the employer's pension funded status was associated with increased probability the terminated employee would take a refund of their contributions, a decision that may contribute to the

²⁷ Non-vesting means such employees have not worked the minimum required number of years in order to earn a DB at retirement.

²⁸ The stipulation for using six months as the distribution timeframe in this study stems from the income and savings literature, where such a timeframe has been used as a measurement period (refer to summary provided in Karlan, Ratan, & Zinman, 2014). In addition, initial examination of the data set (which was obtained for up to the twelve months timeframe, in line with a prior study by Clark et al., 2014), revealed that of all LSW decisions made within the twelve months period, 78% were actually made within the first six months, thus further motivating this research to consider factors associated with the decisions made within such period.

pension leakage problem if it leads to a subsequent cash refund as opposed to a rollover. In the additional analysis, these results were further confirmed when assuming cash-out decisions were made at the time of the LSW decision (simultaneously) and comparing such decisions to the default option of maintaining the account with the pension system (keeping the contributions where they are). Based on the descriptive statistics, 88% of the terminating employees who took a refund requested to receive it in the form of a cash-out, totaling about \$38 million dollars of cash distributions, and a little over 1,000 of the 11,820 total LSWs cashed-out more than \$8,000 each, on an individual basis.

This paper makes several contributions to the literature. As noted in Chapter 2, limited research has been conducted to explore the consequences of pension funding. The studies addressing pension funding as a consequence were predominantly focused on how pension funding impacted budget deficits (Munnell, Aubry, & Quinbry, 2010), the cost of debt (Coggburn & Kearney, 2010; Martell, Kioko, & Moldogaziev, 2013; Munnell, Aubry, & Quinbry, 2011a), unfunded other post-employment benefits (Coggburn & Kearney, 2010), and financial statements' pension disclosures (Vermeer, Styles, & Patton, 2012).

Thus, this paper adds to this list of prior works as the first to explore how pension funding is associated with terminating employees' decisions to take their contributions out of their pension. It further extends the existing body of the LSW decisions literature to the public-sector DB plans domain, which has been subject to limited research thus far, by examining the association with participating employers' pension funding levels through the analysis of an administrative dataset provided by the IMRF in the post-pension reform timeframe of four years (2010-2013). Unlike Clark et al. (2014), the LSW behavior of the terminated members was tracked within a shorter time frame of six months (vs. twelve months) from termination and intrastate reciprocity and online access account creation as decision determinants was

considered. Additionally, unlike Lueken and Podgursky (2016), the focus of this essay is on the non-vested members and their LSW behavior, including the existence of previous reciprocal service and online access accounts to view their contributions balance.

The results of the study are intended for policy makers considering future changes to existing LSW policies to subsequently reduce the retirement savings leakage, as it continues to be an area of significant concern in the retirement research community (Munnell & Webb, 2015). In addition, it is aimed at drawing attention to the matter in public interest research.

The remainder of this paper is organized as follows. The next section provides a brief institutional background for the study, reviews previous literature, and develops hypotheses. This is followed by the empirical research design and presentation of the data and the results. The final section is devoted to the discussion of the results and conclusion of the study, including limitations and suggestions for future research.

Background

Defined Benefit Pensions

DB pension plans in the public sector are nothing like their counterparts in private companies. In such plans, typically both the actively working members and the sponsoring employer (or employers) are contributing, and the assets are invested to generate returns in order to pay future retirement and other benefits. In addition, within the DB pensions grouping, there are several plan structures that determine how assets and liabilities of the participating entities are managed. Refer to Chapter 2, for a detailed comparison and discussion of DB pensions structure and types. Further refer to same chapter for review of related literature on the level of DB pension funded status.

Pension Reforms

Significant unfunded liabilities in the public pension systems across the nation (Healey, Hess, & Nicholson, 2012; Mohan & Zhang, 2012) have led many systems to enact reforms that are meant to improve their ability to pay out the future benefits promised to their participants. Between 2009 and 2011, 43 states passed legislation to reform certain aspects of their benefits (mainly for employees who were new to the system), either by increasing employee contributions or increasing vesting requirements (Snell, 2012). In 2011 alone, 17 states increased the age and vesting requirements for new members (Snell, 2012). Moreover, effective January 1, 2013, even California Public Employees' Retirement System (CalPERS), which is the largest system in the nation, changed its second-tier benefits, where newly hired employees will need to have ten years of service to be eligible for retirement (CalPERS, 2013).

Defined Benefit Pension Participant Vesting

In order to establish one's right to the DB, the employee needs to earn the minimum number of years of service as established by the plan provisions, also called vesting. Otherwise, non-vested employees have the option to take an LSW of their contributions following termination of employment. Upon requesting the LSW, the member has to decide whether to have their account balance rolled over to a qualifying (from a tax perspective) retirement account (most commonly an individual retirement account, or an IRA), or take a cash distribution, paying the required tax penalty (due to the fact that the pre-tax pension contributions become taxable upon distribution). Because rollovers to qualifying accounts continue the path of saving for retirement, cash-outs are presumed to create a leakage of the funds otherwise available for retirement. Conversely, employees may keep the contribution on account with the pension plan (default option), and continue to earn service credit upon landing a subsequent job with a pension-participating employer.

Institutional Background: IMRF

This study examined plan members who separated employment between 2010 and 2013 with LSW decisions made within six months of termination from employers that are participants in a public DB plan—the IMRF. This pension system began operations in 1941 and currently serves 2,976 units of government in the state of Illinois (IMRF, 2014), which as a state has nearly 6,968 local units of government, the largest number in the nation (U. S. Census Bureau, 2012). Employers participating in this agent multi-employer pension plan include a wide range of entities such as cities, villages, towns, counties, park districts, libraries, school districts (non-certified staff), and special districts. As of the end of 2014, IMRF covered 286,730 employees and retired workers, as well as 105,758 terminated, non-vested members (IMRF, 2014). Employees participating in the plan contribute a set 4.5% in addition to their contributions to Social Security and Medicare. In 2010, the Illinois General Assembly passed Senate Bill 1946, which created Tier 2 benefits for newly hired employees of the retirement systems in Illinois, including IMRF. Accordingly, IMRF vesting period is set at either 8 years (Tier 1—enrolled prior to January 1, 2011) or 10 years (Tier 2—enrolled after January 1, 2011). Such characteristics are fairly common in many public retirement systems across the nation, making the selection of IMRF for the analysis a good fit in terms of generalizability of the results to other agent multiple-employer public DB plans.²⁹ In addition, the selection of Illinois was motivated by the need to examine a state that permits *intrastate reciprocity* (CanagaRetna, 2006), as described in a later section, for purposes of testing the postulated association of the existence of prior reciprocal service and the LSW decision of the separating employees.

²⁹ According to Schmidt (2013), the Comparative Study of Major Public Employee Retirement Systems, which surveyed 87 national plans, indicated upward changes in vesting requirements to exceed five years of service (somewhere between 5 and 10 years). Employee contribution rates (of those also contributing to Social Security and Medicare) remain steady around 5% (Schmidt, 2013).

Lump Sum Withdrawal Choices of Non-Vested Employees

Employees who stop contributing into the IMRF due to termination of employment with one of the participating employers in the plan and who at the time of termination have fewer than 8 (10) years of service (based on their initial enrollment date with the plan) are not considered vested according to the Illinois pension code (IMRF, 2014). Without meeting the vesting requirements at the time of termination, these employees are not eligible for retirement benefits. Nonetheless, there is no immediate requirement for such employees to withdraw their contributions. IMRF members may keep the contributions in their member account until they either re-establish employment with a participating employer in this pension (or one of the reciprocal systems) or decide to take an LSW of their contributions.^{30,31} In fact, the default option is to leave existing employee contributions on account. Even though interest is accruing on these contributions, it is not paid out to an employee taking an LSW before being vested. Conversely, an employee wishing to take an LSW needs to submit a signed form, requesting the IMRF to process such distribution (IMRF, 2014). Such separation refunds are processed for all non-vested members, irrespective of their age (IMRF, 2014).

The Application for Separation Refund form is available online, but in practice is provided to the employee by their IMRF Authorized Agent (AA), or the designee assigned to every participating employer. This AA is typically part of the management team or the benefits and Human Resources department and is appointed via a governing body resolution at the

³⁰ To continue vesting, the employee does not have to be re-hired by their previous employer. There is a high probability that a member will obtain a new position with an employer participating either with the IMRF (close to 3,000 employers participate in this plan) or any one of the twelve pension systems in Illinois that have reciprocity agreements with IMRF. Under the Illinois Retirement Systems Reciprocal Act members having service in one pension system may combine service with other systems that are part of this act, thus increasing the likelihood of receiving a retirement benefit based on combined years of service (Illinois Pensions Code 40 ILCS 5).

³¹ According to an analysis performed by IMRF staff of this system's vested (inactive or terminated) and retirees-receiving-a-benefit populations as of October 2015, 29% of the population either worked for at least two participating employers or returned to work for the same employer after a break in service before reaching their minimum vesting requirement of 8 years.

respective participating employer in order to centralize the local administration of the plan benefits (IMRF, 2014). Every participating employer must have an AA, and according to the IMRF guidelines the qualifications of such individual include:

- 1) A close working knowledge of all personnel employed by the unit of government, including new and terminated employees.
- 2) Access to personnel records, payrolls, and other employee compensation records.
- 3) An adequate channel of communication with the local governing body of chief executive officer.
- 4) Sufficient time to perform local administrative IMRF functions. ((IMRF, 2014, Section 2.20)

The LSW amount available to members is an amount equal to the sum of their own contributions during their employment period. No interest is payable with such LSWs (IMRF, 2014). Once an employee decides to take an LSW, they must also decide what to do with such funds. In accordance with federal law regulations, IMRF is required to withhold the tax penalty (20%) on cash distributions (IMRF, 2014). Employees under the age of 59.5 (in the year when the refund is paid) are subject to additional penalties (10%) under the IRS rules. To avoid such tax penalties, employees can rollover their contributions to a qualifying retirement plan (such as an IRA).

Literature Review

According to the 2013 Household Economics and Decision-Making Survey published by the Board of Governors of the Federal Reserve System (BGFRS), nearly one-third of U. S. residents have no retirement savings or pension. A sizable percentage of respondents that have savings or a pension maintain a DB pension account or an IRA (Board of Governors of the Federal Reserve System [BGFRS], 2014). Yet, the results of the survey further revealed that “5

percent of those with such accounts reported that they had cashed out some of their retirement savings in the prior 12 months” (BGFRS, 2014, p. 28). Retirement savings cash-outs (regardless of plan type) for present consumption may take the form of loans, distributions at job separation, or pre-retirement withdrawals. Cash-outs are commonly referred to as retirement savings leakage and are a growing concern. In a recent analysis, Munnell and Webb (2015) found that over 20% of retirement wealth is eroding due to such leakage.

Lump Sum Withdrawals Literature

Prior literature on LSW in both private and public sectors is focused on the triggering events that call for distribution decisions between two main choices; one is a decision that employees need to make at time of job separation (choose cash-out lump sum or rollover to an IRA) and the other one is at time of retirement (choose annuity or a lump sum distribution). Because job separations may happen several times throughout one’s working career as compared to a single occurrence of retirement (for most employees), one would expect to find greater emphasis placed on research related to the LSW decision at the time of job separation. Conversely, due to the high dollar value of account balances available to an employee at the time of retirement and their relative present value, an argument could also be made to the importance of this life event in terms of research.

Surprisingly, these assumptions do not appear to be accurate, especially in the public sector. Both LSW decisions’ triggering events have seen little empirical evidence (due to data source reliability) and have been studied in a limited number of papers. This state of affairs has been attributed by Butler and Teppa (2007) to the lack of dependable data. Because surveys administered in this context, such as the commonly used U. S. Health and Retirement Survey (HRS), rely on individuals voluntarily responding to questions to recall their LSW decisions, which may have been made some years ago, their results are less reliable than data directly

obtained from administrative records of the pensions systems providing the retirement benefits (Butler & Teppa, 2007).

As such, in their study, Butler and Teppa (2007) used administrative records of 4,544 public-sector employees from organizations in Switzerland for purposes of examining the determinants of their decisions of annuitization versus lump sum cash-out at retirement (Butler & Teppa, 2007). Their results suggested that contrary to the concept of *annuity puzzle* (discussed in detail in the next section), only one-third of the retirees in their study chose not to annuitize their retirement benefit (i.e. taking a lump sum instead) and that annuitization as the default option for employees is a significant driver against such a choice (Butler & Teppa, 2007).

In the U. S., Chalmers and Reuter (2012) noted a similar tendency towards annuity choices at retirement when examining a sample of 32,060 public-sector employees of the Oregon state retirement system between 1990 and 2002, which had both DB and defined contribution (DC) plan options.

Lump Sum Withdrawals in the Public Sector

An extensive overview of the related literature published by Gough and Niza (2011), combined with my review of more recent studies revealed only two related works, one by Clark et al. (2014) and one by Lueken and Podgursky (2016). Both examined LSW decisions at job separation in the public sector while relying on administrative data. All other papers identified utilized HRS survey data, without differentiating between the private-sector and public-sector employee groups (Engelhardt, 2002; Hurd & Panis, 2006;) or focused solely on the private sector (Banerjee, 2013). Yet, there are considerable differences between the private- and public-sector DB plans in terms of characteristics and coverage, and accordingly, decisions of employees in these sectors are presumed to be different, especially due to levels of risk preference of such employees (Clark et al., 2014; Lueken & Podgursky, 2016).

Using administrative data, Clark et al. (2014) examined LSW decisions of both vested and non-vested public-sector employees in the two North Carolina pension systems (one cost-sharing and one agent multiple-employers), who separated employment during 2007 and 2008. The vesting requirement in these plans is five years and the eligibility age for retirement is 50 years. An interesting result was a comparable percentage of retirees choosing to take a lump sum rather than an annuity. One-third of both groups of vested and non-vested terminating employees chose an LSW within one year of termination of employment. Additionally, this study considered the distributional choices of the non-vested terminated employees (cash-out vs. rollover) and found that close to 90% of those taking a distribution received a cash-out, suggesting high levels of pension leakage in this group (Clark et al., 2014).

However, the Clark et al. (2014) research is subject to several limitations. First, the study was limited to employees under the age of 50 in order to capture the population that is not yet eligible for retirement based on the requirements of the respective pension systems the authors examined. Thus, it appears that baby boomers were not studied. Furthermore, pension reciprocity (defined later in this section) was not included as a determinant in the Clark et al. (2014) model, although the pension system in North Carolina has provisions for pension reciprocity between local and state plans (CanagaRetna, 2006). Lastly, North Carolina systems have not reformed to increase the vesting requirements, remaining at five years, unlike longer vesting requirements common in other U. S. plans.

Lueken and Podgursky (2016) used administrative data from the Illinois Teachers Retirement System to analyze annuitization versus cash-out rates of 6,072 vested classroom teachers. They used internal rates of return and pension wealth to cash ratio of the vested employees as a reference point to assess the propensity to take contributions out of the plan. The authors found that over one-third of the teachers in their sample opted to take a lump sum

withdrawal of their account balances (Lueken and Podgursky, 2016). Additionally, the authors estimated an alternative measure of aggregate leakage (in their analysis defined as contributions with a present value that exceeds net pension wealth calculated amount) and noted about \$9,000 of leakage per annuitant. An interesting aspect of this pension system is that if the separating members opt to take a refund of their contributions, they receive less than what was initially paid into their account, since the system withholds 1% (Lueken & Podgursky, 2016). Lastly, although the Illinois Teachers Retirement System has the provisions for reciprocal service as does the IMRF, this study excludes *movers* (i.e. teachers with reciprocal service).

The current study expands research in this environment to pension plans with longer vesting requirements and the plan reciprocity option, while also accounting for employees' age groups, including baby boomers. Figure 4.1 summarizes the LSW decision tree emphasized in the current study.

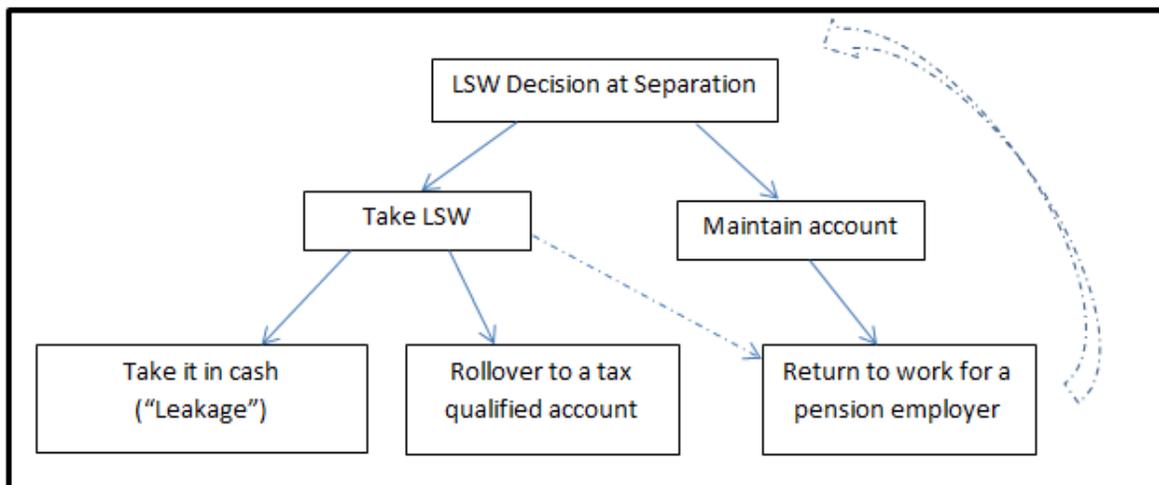


Figure 4.1. Lump Sum Withdrawal decision tree of non-vested employees. Adapted from Clark et al. (2014). Note: LSW stands for Lump Sum Withdrawals.

Retirement Savings Leakage

“There is growing concern in the United States about low levels of savings for retirement,” (Duflo & Saez, 2003, p. 1). As noted in the previous section, at a theoretical level, the concepts of the annuity puzzle (Benartzi, Previtro, & Thaler, 2011) and the life-cycle model of consumption are used to explain employee decisions to take a cash distribution (subsequent to the LSW decision) for consumption as opposed to a rollover to a qualified account (IRA) which will end up as a retirement annuity. An annuity puzzle is created when contrary to an economic theory of maximizing lifetime utility through the purchase of an annuity (Yaari, 1965), an individual forgoes such a path and opts to cash-out their distribution for immediate consumption (Clark et al., 2014; Lueken & Podgursky, 2016). Similarly, under the “...standard life-cycle model, life annuities increase expected utility by making the individual’s consumption between retirement and death both higher and less uncertain” (Chalmers & Reuter, 2012, p. 7). Thus, forgoing the annuity route and cashing out the account creates retirement savings leakage.

Research to date in the area of retirement savings leakage is somewhat inconclusive. A study by Hurd and Panis (2006), contrary to earlier studies, found only limited leakage from job separation cash-outs when examining HRS data from the years 1992-2000 (for both DB and DC plans). Additionally, the authors found that employee accounts with smaller amounts were associated with higher cash-out rates as compared to accounts that were rolled over to an IRA (Hurd & Panis, 2006). Similar results were noted by Bryant et al. (2011), who examined tax returns, administrative data, and survey results of DC plans, and by Lueken & Podgursky (2016), who analyzed vested teachers data from administrative records obtained from the Illinois TRS. Contrary to Bryant et al. (2011), Hurd and Panis (2006), and Lueken and Podgursky (2016), Clark et al. (2014) found a much higher probability of leakage when examining terminations of employees from 2007 to 2008, with subsequent LSW decisions in 2009. Their study noted a

cash-out rate of nearly 90% in the sample of North Carolina retirement systems employees who decided to take an LSW at employment separation (Clark et al., 2014). However, it is possible that at least part of the cash distributions was transferred to an IRA account (back in the retirement annuity route) instead of consumed.

Hypothesis Development

Pension Funding. Researchers in the field of economic psychology have suggested that LSW decisions at job separations are based on rationality or the lack thereof (Reyers, Van Schalkwyk, & Gouws, 2015). The predictors of the life-cycle model of consumption (Modigliani & Brumberg, 1954) are widely cited when examining rational reasons individuals follow when making consumption and liquidity decisions (Amronin & Smith, 2003; Reyers et al., 2015), while irrational decision making is linked to the behavioral life-cycle hypothesis (Shefrin & Thaler, 1988), with predictors such as *bounded willpower* or self-control problems (Reyers et al., 2015). Yet, whether acting rationally or irrationally, individuals are assumed to be maximizing their expected utility based on their current characteristic (Hurd & Panis, 2006), as well as plan-specific parameters (Clark et al., 2014).

Since the population of interest in this study is non-vested employees, a rational decision making approach would suggest that all such terminated employees should choose to take an LSW if they were not anticipating working for a public pension again, because they will not earn interest on their contributions and will not be vested and get a retirement benefit at a later point. Yet that is not the case as noted in prior research (Clark et al., 2014; Hurd & Panis, 2006) due to the various factors influencing the LSW decision.

Prior research further points to the fact that “deciding how much to save for retirement and how to invest requires solving a complicated intertemporal optimization problem and to have information about the rules governing different instruments” (Duflo & Saez, 2003, p. 1).

Therefore, due to the difficulty of such a decision, chances are others may affect employees' actions through social interactions (Duflo & Saez, 2003) or peer effects (Benartzi & Thaler, 2007). Employees who lack the sophistication needed to decide on their own may learn from others who they consider experts (Benartzi & Thaler, 2007), for instance, their co-workers, spouses, or friends (Benartzi & Thaler, 2007; Duflo & Saez, 2003).

In their study, Duflo and Saez (2002) examined employee enrollment in tax deferred account plans in a system of libraries. They found that although the employees shared similar demographics across the participating library locations, the ultimate decision to participate in the offered plan varied significantly, further suggesting support for presence of peer effects in the sense that employees take into consideration or follow similar decisions made by those around them in the workplace and do not appear to decide in isolation from their peers.

In a related choice process, Benartzi and Thaler (2007) suggested that employees participating in DC plans spend a limited amount of time (in some cases less than an hour) when deciding on their contribution rate, a key decision for their retirement planning. Benartzi and Thaler (2007) posit that *saving heuristics* is the source of such behavior. Saving heuristics is the process of a trial-and-error decisions or explorations not based on an organized or methodical approach.

Applying similar logic to LSW decisions of terminated employees, if given the options by their employer's benefits or payroll department (or the AA), there is a reasonable possibility that a terminated employee will not spend a considerable amount of time weighing their options and may be easily influenced by the messenger (i.e. the employer's representative), to take a refund shortly after their termination.³² The separating employee may also deem such an entity

³² I do not posit the same association between employer funding level and the decision to take a distribution in cash as a rollover to a qualifying IRA (for those employees who already chose to take an LSW) because the form of refund is irrelevant to the employer and provides no incentive one way or another.

representative to be an expert when it comes to the pension benefits administration as they would be providing the LSW options to the departing employee as part of their next steps. Thus, at the end of the day a simple statement such as “Here is the form, you can get your money back” may be all it takes to influence a decision to take a refund, encouraging employees to select the cash-out choice as opposed to a rollover. Ultimately, this contributes to the retirement pension leakage problem, while on the employer’s end, improves the pension funded ratio and reduces pension risk, as there is no longer a claim for a potential future benefit.

In the case of IMRF, this potential expert, the AA, is an individual possessing working knowledge of the entity, both its current and terminated employees, and is able to access the needed records within the entity and establish a communication mechanism with those in charge of governance (IMRF, 2014). The AA is also in a position to have adequate access to the chief executive officer or the governing body (IMRF, 2014), presumably executing management directives. Thus, anecdotally speaking, if the AA is acting in the interest of the employer given their position within the entity and knowledge of both the entity and pension structure, they may be inclined to suggest to the separating employee that they should take a refund.³³

When a separating employee takes a refund, there is no immediate benefit to the employer in the form of returned contributions, or such amounts on an individual basis could be viewed as immaterial (Lueken & Podgursky, 2016). But for long-term planning, the pension liability is ultimately reduced since such an employee forfeits claims for a future retirement benefit. In addition, a liability reducing incentive is likely at units of government with low

³³ IMRF has an internal audit function that performs payroll and enrollment compliance audits of the employers participating in this pension. This program was established in 2006 as a pilot which currently provides for the pension system to audit close to 180 employers annually. Close to 90% of these audits have findings. Review of the audit reports of such compliance audits revealed repeating findings across various employers participating in the system, with some pointing to the opportunistic behavior on the part of employers and their benefit representatives. For instance, it is not uncommon for the IMRF auditors to list employees that were omitted from enrollment in the pension although they were eligible according to the plan provisions.

funded ratios, given the attention drawn to the underfunding problem in the past and anticipated future focus on unfunded pension liabilities following the implementation of the GASB Statement 68.^{34, 35} Furthermore, as previously noted, in an agent multiple-employer plan structure each employer has a separate liability account and as such has a direct incentive to reduce future pension obligation.

Alternatively, it is plausible that poor pension funding signals to terminating, non-vested employees to pull their contributions out of the pension system due to concerns over sustainability of the plan in the long run. With this perspective, one would still expect higher rates of refunds taken at employers with lower funded ratios.

Thus, regardless of whether one assumes the employer or employee position, an inverse association is postulated between the employer's pension funding ratio and the odds of LSWs taken by their separating employees as follows:

HI: Employers with lower pension funding ratios are associated with higher probability of LSWs taken by their terminated employees.

Reciprocal Service. As previously mentioned, some pension systems have reciprocity agreements, allowing for essentially one-way of interstate or intrastate pension portability (CanagaRetna, 2006) with other systems that provide members the option to combine service across pensions. Such service-in-more-than-one-retirement-plan provisions exist in 36 of the 50

³⁴ An alternative argument could be made that the employee has an incentive to take out a lump sum distribution if the employee possesses the financial expertise needed to assess whether their employer is one that is facing a very low pension funded status, thus rationalizing that the employee would be better off taking the retirement money elsewhere and not risking the poor funded status of the former employer. This alternative explanation does not change the hypothesis and will be further discussed in the methodology section where the model will be re-estimated with a measure to proxy for terminating employee financial expertise via the position they held for the employer (senior management vs. staff).

³⁵ The liability or cost-reducing behavior on the part of the employer is not a new concept or limited to the pension benefits domain. The healthcare literature specific to employer-offered health insurance suggests employers raise contribution amounts to be paid by their employees in order to encourage the latter to seek health coverage elsewhere (i.e. with a spouse) and by doing so reduce the employer's healthcare costs (Dranove, Spier, & Baker, 2000).

states in the U. S., for instance, California, Minnesota, and Illinois, to name a few.³⁶ However, to date, research on LSW and cash-out decisions has not considered this DB pension plan element as a factor in terminated workers' choices, although North Carolina, an intrastate agreement state, has been examined previously (Clark et al., 2014). Absent prior empirical evidence, conventional wisdom would suggest that an employee having prior service with a reciprocal pension may not want to take an LSW, even if the length of service was short, as long as the combined service of all systems results in vesting status. Prior reciprocal service in the employment history of an employee terminating or leaving another pension system also suggests that returning to a pension participating employer is feasible in the course of one's career. It is postulated that the probability of taking an LSW will be lower for employees who are known to have had service with other pension systems. Thus, the following relationships are hypothesized:

H2: The probability of terminating employees choosing an LSW is decreased in the presence of prior reciprocal service in their employment history as compared to those with no prior reciprocal service.

The study further controls for other determinates of the LSW decision, including employee and employment or plan characteristics, identified through the literature (Butler & Teppa, 2007; Clark et al., 2014; Hurd & Panis, 2006; Purcell, 2009; Reyers et al., 2015). Figure 4.2 summarizes the conceptual models for this study.

³⁶ See CanagaRetna (2006) for a detailed listing of respective state reciprocity provisions.

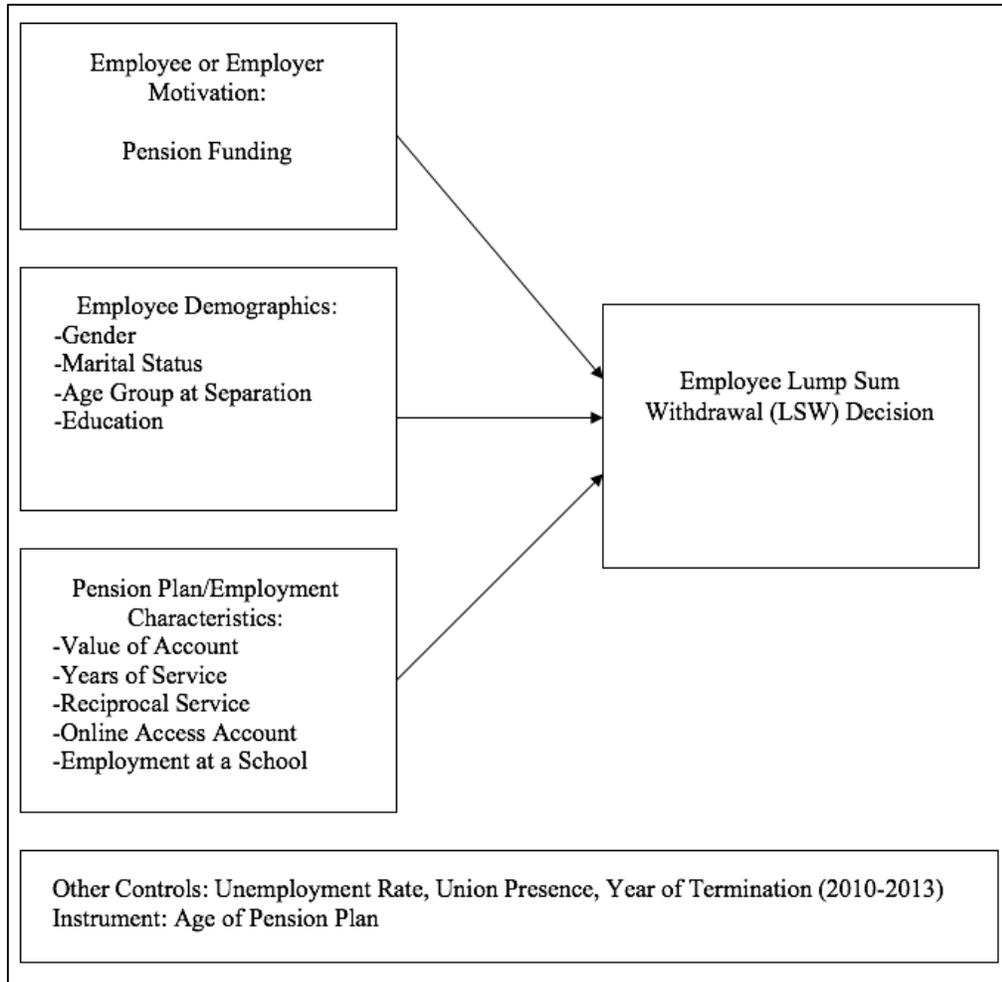


Figure 4.2. Conceptual model of determinants of withdrawal decisions.

Controls: Employee Determinants. Employees' gender, marital status, age at employer separation, and financial literacy have been noted previously to be significant factors in LSW decisions, holding value of the amount in question constant (Clark et al., 2014; Lueken & Podgursky, 2016; Purcell, 2009; Reyers et al., 2015;), and as such will be controlled for in the model of this study.

Prior findings have suggested that females tend to accept default options (i.e. maintaining an account open with the pension system) while males are greater offenders than females in terms of taking LSW, thus contributing to the pension leakage problem (AonHewitt, 2011; Butler & Teppa, 2007; Clark et al., 2014; Lueken & Podgursky, 2016; Purcell, 2009). Individuals who are not married are also less likely to preserve funds for retirement and exhibit a higher likelihood of taking an LSW than their married counterparts (Butler & Teppa, 2007, Hurd & Panis, 2006; Reyers et al., 2015).

In terms of age, the youngest and oldest (up to 50 years of age) employees have been noted to have a lower likelihood of taking an LSW (Clark et al., 2014).³⁷ Clark et al. (2014) stipulated the reason for such distribution of age could be due to younger employees anticipating a return to work for the pension system and the oldest possibly lacking the financial knowledge to make the LSW decision. Butrica, Zedlewski, & Issa (2010) in their discussion paper of early withdrawals from DC plans, or 401(k)s, in a sample of individuals ages 25-58, further found that younger employees are less likely to save for retirement and are more inclined toward spending. The hypothesized effects presented herein are in line with prior research, postulating higher probability for the very young or very old, males, and non-married individuals in taking LSWs.

³⁷ Clark et al. (2014) used a continuous measure for age as well as its quadratic term in their LSW model (age ranged from 18-49). They noted an inverted u-shaped relationship between age and the dependent variable. The age of 35 was the cut-off point at which the effect of age changed from positive to negative (Clark et al., 2014).

The measure of age is not continuous but rather defined by six age groups following Moore and Muller (2002): under 25, 25-29, 30-39, 40-49, 50-59, and 60 plus.

Financial literacy is another employee characteristic that plays a role in retirement planning and thus LSW decisions. Lusardi and Mitchell (2011), who fielded a financial literacy specific survey to the 2004 HRS, found that financial literacy was highly correlated with educational level. Given that this study relied on administrative records and did not access the information on surveyed individuals directly, educational level (indicator for a college degree or above) was utilized as a proxy for financial literacy in the LSW model. Prior research employing the education proxy in a similar manner posits that higher levels of education are associated with lower likelihood of benefit refunds (Clark, Morrill, & Allen, 2012; Lueken & Podgursky, 2016). The prediction of this control is in line with prior research.

Controls: Plan & Employment Determinants. Non-vested employees are only entitled to their contributions on account, without any interest.³⁸ Because the contributions are a fixed percentage of wages, the value of the account will vary with employee's tenure and salary levels; as such, the study controlled for this determinant. Prior studies have found that employee accounts with smaller balances are associated with higher likelihood of taking an LSW (Boreland, 2013; Butrica et al., 2010; Hurd & Panis, 2006). However, taking into account nonlinearity (a quadratic term for the account value), Clark et al. (2014) found a positive association between account value and the probability of an LSW, with a negative quadratic term of same measure, suggesting this relationship becomes negative once account value reaches a certain amount.

³⁸ Interest is accruing on the contributions from day one but it is not paid out to an employee taking a refund before reaching vesting.

Years of service are a related determinant that was also included for control purposes. It was further correlated with how much the value of the account would be since the longer an employee works and earns service credit towards the future pension, the higher their contribution balance with the amounts they have to pay as they work. As such, similar to the account value measure, a positive coefficient was predicted (Clark et al., 2014; Lueken & Podgursky, 2016).

Another plan determinant in the LSW model is direct employee access to pension account information through the online tools. At IMRF, employees are encouraged to create an online account to be able to monitor the accuracy of their information, length of service, contributions account balance, and future benefit estimates. No sign prediction was made for this determinant as research to date within the DB plans has not directly examined such association of an employee having an online access account with subsequent retirement management decisions, and arguments could be made for both positive and negative association.³⁹

Research Design

Sample and Data

Administrative plan data from an agent multi-employer DB plan in the state of Illinois was used for the analysis. Data on 48,578 unique employees who terminated employment between January 1, 2010 and December 31, 2013 with one of IMRFs participating units of government (i.e. cities, schools, parks, libraries, etc.) and their LSW decisions (within the first six months of termination), along with their subsequent decision to either take a refund in the

³⁹ Creating and accessing an online benefits account may be viewed as component of one's education in terms of pension benefits and retirement planning. Thus, it could be argued that the existence of an online member access account would reduce the odds of one's choice to take a LSW within such a short period (six months after termination) due to the ability to monitor benefits on demand. Alternatively, it could also be the case that having created an account, terminating workers do not continuously monitor it or perhaps use it for one-time access to make an LSW decision on the spot and as such the odds may increase or not be impacted at all. To describe the observed pattern, Burns (2005) noted, "despite widespread adoption of Internet tools by plan sponsors, only a small fraction of participants uses the Internet advice tools available to them," in their examination of DC plans.

form of cash-out or rollover, were obtained directly from the IMRF pension administrator. Corresponding employer pension funded ratio measures were also obtained from the pension system and matched for each employer and year in the LSW dataset. The sample was reduced for employee termination instances where employers were missing the pension funded ratio data ($n = 233$).⁴⁰ Thus the sample included 48,345 observations prior to additional observations being dropped by the statistical analysis, to the final sample of 46,608.⁴¹

The demographic composition of the full sample ($N = 46,608$) is described in Table 4.1, which provides the departing employees' characteristics as well as the employee and plan determinants. The sample was almost split in terms of marital status between married and non-married employees. Females comprised nearly two-thirds of the sample. The age distribution was consistent with the labor market. In terms of the value of contributions on account, 25.1% of account balances were less than \$500; however, nearly one-third of accounts exceeded \$2,490. Only 7.81% of the employees in the sample had a college degree or above. The years of service distribution was heavy during the initial three years, amounting for close to two-thirds of the sample. Additionally, one-third of terminated employees were noted to have reciprocal service with another pension system in Illinois, and 24.57% of the separating employees had created an online access account with IMRF.

Employee and plan or employment determinants composition is further provided in Table 4.1 for the subset of the terminated employees. Specifically, data is presented for LSWs taken within six months of termination ($n = 13,432$). This is the group that opted for either a rollover or a cash-out of contributions. Next, within this LSW group, the demographics of the same

⁴⁰ The pension funded ratio for the period tested was not available for employers who just joined IMRF or dissolved operations and as such these were removed from the sample.

⁴¹ During the IV Probit regression analysis, additional observations were dropped by Stata where the employers were associated with either all refunds or all keeping contributions on account observations, thus perfectly predicting one of the LSW choices.

employees who chose to take the refund in the form of a cash-out as opposed to rollover to a qualifying account are also represented ($n = 11,820$). It was noted based on this sample composition that close to one-quarter of the cash-outs exceeded \$4,500 and almost one-fifth of the terminating employees had over five years of service (out of the eight years needed for vesting in total), further suggesting that pension leakage is not a minor or hypothetical phenomena, but rather an issue warranting attention.

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Table 4.1:
Distribution Choices of Separated Employees within 6 Months of Termination

Variables	Categories	All Separated Employees		Lump Sum Withdrawal (LSW) Taken within 6 Months		Cash-Out Taken within 6 Months (following LSW Decision)	
		N = 46,608	100%	n = 13,432	28.82% (of sample)	n = 11,820	88.00% (of LSW)
<i>Employee Determinants</i>							
Gender	Male	14,611	31.35	4,948	36.84	4,386	37.11
	Female	31,997	68.65	8,484	63.16	7,434	62.89
Marital status	Married	22,518	48.31	6,798	50.61	5,753	48.67
	Not Married	24,090	51.69	6,634	49.39	6,067	51.33
Age at Separation	Group 1: < 25	7,891	16.93	1,441	10.73	1,363	11.53
	Group 2: 25 - 29	9,868	21.17	2,007	14.94	1,784	15.09
	Group 3: 30 - 39	10,124	21.72	3,177	23.65	2,885	24.41
	Group 4: 40 - 49	9,185	19.71	2,805	20.88	2,474	20.93
	Group 5: 50 - 59	6,139	13.17	2,149	16.00	1,767	14.95
	Group 6: 60+	3,401	7.30	1,853	13.80	1,547	13.09
Education	College and above	3,639	7.81	1,042	7.76	820	6.94
	Below College	42,969	92.19	12,390	92.24	11,000	93.06
<i>Plan or Employment Determinants</i>							
Value of Account (\$)	< 500	11,684	25.1	1,692	12.6	1,590	13.5
	500 - 2,490	20,556	44.1	5,378	40.0	4,872	41.2
	2,500 - 4,490	7,129	15.3	2,933	21.8	2,557	21.6
	4,500 - 6,490	3,168	6.8	1,488	11.1	1,238	10.5
	6,500 - 8,490	1,652	3.5	804	6.0	664	5.6
	8,500+	2,419	5.2	1,137	8.5	899	7.6
	Years of Service	<1.00	15,684	33.7	2,817	21.0	2,616
1.00 - 1.99		9,963	21.4	2,636	19.6	2,371	20.1
2.00 - 2.99		6,487	13.9	2,136	15.9	1,857	15.7
3.00 - 3.99		4,706	10.1	1,712	12.7	1,471	12.4
4.00 - 4.99		3,662	7.9	1,498	11.2	1,260	10.7
5.00 - 5.99		2,903	6.2	1,232	9.2	1,081	9.1
6.00 - 6.99		1,959	4.2	887	6.6	720	6.1
7.00 - 7.99		1,244	2.7	514	3.8	444	3.8
Reciprocal Service	Reciprocal Service	15,820	33.94	1,981	14.75	1,706	14.43
	No Reciprocal Service	30,788	66.06	11,451	85.25	10,114	85.57
Online Account	Created	11,452	24.57	3,913	29.13	3,338	28.24
	Not Created	35,156	75.43	9,519	70.87	8,482	71.76
School	Worked for school	28,129	60.35	5,752	42.82	5,111	43.24
	Non-school employer	18,479	39.65	7,680	57.18	6,709	56.76

Methodology

For purposes of addressing hypotheses *H1* and *H2*, a model was created to explore the decision to take an LSW (binary variable) as a function of the predictor variables using a probit regression with employee refund observations clustered by employer ID. The same decision was repeated to take the LSW as a function of an instrumental variable for the pension funding ratio predictor variable, along with the other predictors using instrumental variable (IV) probit regression:⁴²

$$Pr(LSW)_{i,t} = \beta_0 + \beta_1 FUNDED RATIO_{i,t} + \beta_2 RECIP SERVICE_{i,t} + \beta_3 Controls_{i,t} + \epsilon_{i,t} \quad (1)$$

where $LSW_{i,t}$ was measured within a 6 month period and separately within a 12 month window.⁴³ The variable was assigned the value of 1 if a decision to take the LSW was made within six or twelve months of termination and a value of 0 for the default option to maintain an account with the pension system for each terminated employee (*i*). $FUNDED RATIO_{i,t}$ is the measure of pension funded status of the corresponding year of the employer where the terminating employee making the LSW decision worked. Based on the inverse relationship postulated in *H1* in the previous section, a negative sign was predicted for β_1 . $RECIP SERVICE_{i,t}$ was assigned the value of 1 if the employee had previous reciprocal service with another pension system and a value of 0 otherwise. Following the associations presented for *H2*, a negative sign was predicted for β_2 .

In addition to controlling for employee characteristics (gender, marital status, age at separation of employment, and financial literacy), as well as plan and employment determinants (years of service, contributions on account, and having created an online access account), the study further controlled for

⁴² The *IV Probit* command in Stata with the instrumental variable was introduced to address endogeneity concerns, described in detail later on in this section of the paper.

⁴³ Using six months as the distribution timeframe in this study draws from the income and savings literature, where such a timeframe has been used as a measurement period (refer to the summary provided in Karlan et al., 2014). Furthermore, the preliminary analysis of the data set suggested that of all LSW decisions made within the twelve months' period, 78% were actually made within a shorter timeframe than twelve months, or within the first six months, thus further motivating this research to consider factors associated with the decisions made within such a period. However, the alternative timeframe of 12 months was also used to enable comparison with Clark et al. (2014) and to show the LSW decision is not sensitive to both measures.

economic conditions (proxied by unemployment rate and public-sector union membership aggregated at the county level), a dummy variable to control for whether the employee worked for a school or school-instrumentality, and year of termination.⁴⁴ The complete list of independent and control variables definitions are in the Appendix.

High unemployment rates would be indicative of adverse economic conditions that could influence LSW decisions in terms of increased probability of LSWs (Clark et al., 2014). Contrary to this expectation, Clark et al. (2014) found that increased unemployment was associated with a decline in the probability of an LSW, suggesting that when there are fewer job opportunities the demand for LSW also declines. Thus, no prediction was made for this control variable.

Lueken and Podgursky (2016) noted that unions acting as benefits advocates on behalf of employees are another resource for information and education for members in how retirement-related choices made today might affect such employees in the future. Since the Lueken and Podgursky (2016) study was specific to teachers, the authors noted that “teachers, backed by strong unions, may leave their contributions in the pension fund with the expectation that they may easily re-enter the teaching force several years later” (p. 37). However, Lueken and Podgursky (2016) did not control for unions in their model. Absent other literature supporting the opposite, and along the same logic noted for teachers, an inverse association was predicted between public-sector union membership presence and the likelihood of LSWs.

Lastly, as noted previously, a control was included for the employer being a school or a school-related entity (i.e. special education district or regional office of education), as such employers would have employees (certificated) participate in another statewide pension system, the TRS. Thus, to account for variation in decisions made by employees who work in school and possibly transition into

⁴⁴ Following Clark et al. (2014) the quadratic term for account value was included as a control in the model to examine nonlinearity. Note that due to data release limitations (by IMRF) the age variable was not continuous, and as such no quadratic term was added for age.

a certificated position covered under another pension system, or simply having the presence of another pension system at such entities, the proper control measure for included in the model. As such, terminating employees from schools were expected to have a lower probability of taking a refund as compared to employees from non-schools.

Summary Statistics

Descriptive statistics for the LSW decision are presented in Table 4.2. Employer's pension funding measure, along with the reciprocal service determinant of interest and the control variables, are also presented. The mean for the dependent variable of the LSW taken within 6 months was 29% ($SD = 0.45$) and within 12 months was 36% ($SD = 0.48$). For the six months LSW decision, the main hypothesis of interest employs the explanatory variable of employer's pension funding, which is measured as the actual pension funded ratio over the respective year of employee termination. According to Table 4.2, the mean of this ratio was 75.32% funded ($SD = 12.73$), ranging from 0% to 200%.⁴⁵

⁴⁵ As shown in Figure 4.3, the distribution of the funded ratio of the employers in the sample ranges from 0 to 200 (indicating overfunded plan). Of the 1,577 unique employers in the sample, only 7 were 200% funded, or less than 0.5%. To mitigate concerns of outliers, the top and bottom 1% were winsorized during the sensitivity analysis.

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Table 4.2

Descriptive Statistics for Lump Sum Withdrawals (N=46,608)

Variable	Mean	SD	Min	Max
LSW_6M	0.29	0.45	0	1
LSW_12M	0.36	0.48	0	1
FUNDEDRATIO	75.32	12.73	0.00	200.00
RECIPSERVICE	0.34	0.47	0	1
MARRIED	0.48	0.50	0	1
AGEGROUP	3.13	1.50	1	6
MALE	0.31	0.46	0	1
EDUCATION	0.08	0.27	0	1
SERVICEYEARS	2.33	1.97	0.08	7.92
ACCOUNTVALUE	2.41	3.23	0.01	114.84
Q_ACCOUNTVALUE	16.27	89.26	0.01	13188.84
ONLINEACCOUNT	0.25	0.43	0	1
UNEMP	9.30	1.40	6.00	14.00
UNION	50.65	10.32	25.90	83.30
SCHOOL	.60	.49	0	1
PLANAGE	56.16	14.28	2	72

Note. The sample covers employment terminations during the period of 2010-2013. See the Appendix for variable definitions.

Figure 4.3 further confirms that the funded ratio is normally distributed based on the density in the sample.

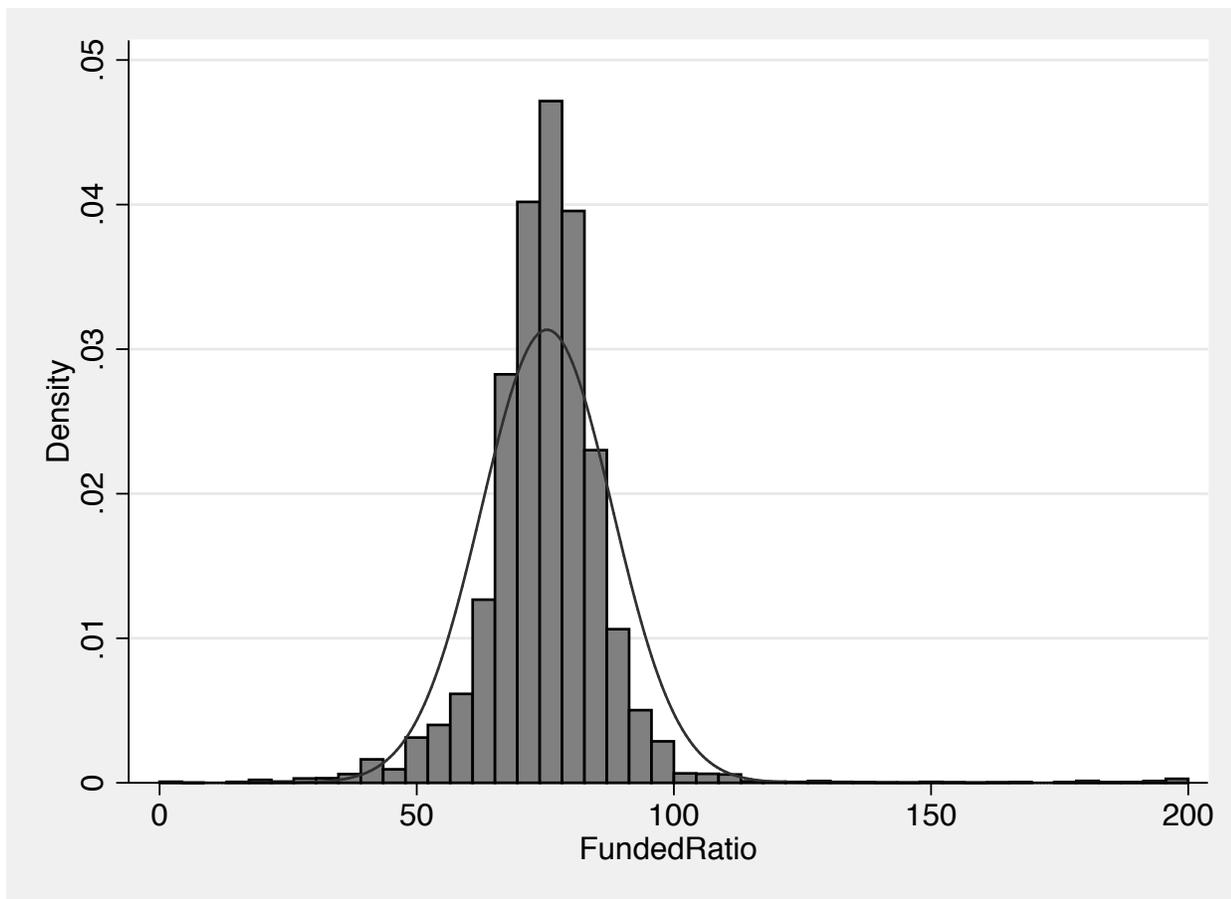


Figure 4.3. Histogram of the funded ratio (dependent variable).

As Table 4.2 further describes, of the terminated employees in the full sample ($N = 46,608$), 31% were males and 48% were married. The mean age group was 3.31 (ages 30-39). Age groups were used as a measure in the model due to data release limitations imposed by IMRF. Given that several other identifying data points are provided (where someone worked, their gender, marital status, when they terminated, etc.) for each terminating member, their actual age was omitted by IMRF for anonymity reasons and only age groups are available.

In terms of the plan and employment determinants, the value of a terminated member account ranged from \$5 to \$114,840, with the mean of \$2,413. Years of service ranged from one month to almost eight years (after which the employee would have been considered vested and eligible for a future pension benefit) with a mean of 2.33 years for all employees in the sample. However, based on the objective of the study, only non-vested, terminated employees were included in the sample. Terminated employees who had some service with another pension system in Illinois (per the reciprocal agreement) amounted to 34% of all terminated employees in the period tested. In addition, 24.6% of employees created an online access account in the full sample.

Table 4.3 presents Pearson correlations for the variables in the model. There is no evidence of high (above 0.50) correlations in a review of the correlation coefficients (outside the account value, its quadratic term, and years of service). These findings were expected given the structure of the pension benefit formula, thus the statistics suggest that multicollinearity is not a problem (refer to Draper & Smith, 1998, p. 375-382). To further check for multicollinearity, the VIF diagnostics were run. All variables' VIF (outside of years of service, account value, and its quadratic term) were noted to be less than 1.35. The VIF for the years of service was 2.42. The account value and its quadratic term had a VIF of 4.20 and 2.26, respectively.

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Table 4.3

Pearson Correlation

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) LSW_6M	1						
(2) FUNDEDRATIO	0.0459*** (0.000)	1					
(3) RECIPSERVICE	-0.258*** (0.000)	-0.0545*** (0.000)	1				
(4) MARRIED	0.0292*** (0.000)	-0.0337*** (0.000)	-0.0143*** (0.002)	1			
(5) AGEGROUP	0.191*** (0.000)	-0.0146*** (0.002)	-0.0885*** (0.000)	0.421*** (0.000)	1		
(6) MALE	0.0753*** (0.000)	-0.0216*** (0.000)	-0.0859*** (0.000)	-0.0565*** (0.000)	0.00678 (0.143)	1	
(7) EDUCATION	-0.00119 (0.798)	0.0324*** (0.000)	-0.0196*** (0.000)	0.0328*** (0.000)	0.0211*** (0.000)	-0.00668 (0.149)	1
(8) SERVICEYEARS	0.195*** (0.000)	-0.0119*** (0.010)	-0.0861*** (0.000)	0.168*** (0.000)	0.305*** (0.000)	-0.00383 (0.409)	-0.0853*** (0.000)
(9) ACCOUNTVALUE	0.197*** (0.000)	0.0205*** (0.000)	-0.0961*** (0.000)	0.110*** (0.000)	0.209*** (0.000)	0.110*** (0.000)	0.0432*** (0.000)
(10) Q_ACCOUNTVALUE	0.0643*** (0.000)	0.0108** (0.019)	-0.0316*** (0.000)	0.0448*** (0.000)	0.0828*** (0.000)	0.0640*** (0.000)	0.0241*** (0.000)
(11) ONLINEACCOUNT	0.0674*** (0.000)	-0.00632 (0.172)	-0.0418*** (0.000)	0.0785*** (0.000)	0.0263*** (0.000)	0.0169*** (0.000)	0.0316*** (0.000)
(12) UNEMP	0.00688 (0.138)	0.0382*** (0.000)	-0.0130*** (0.005)	0.00746 (0.107)	0.0278*** (0.000)	0.00646 (0.163)	-0.0206*** (0.000)
(13) UNION	-0.0425*** (0.000)	0.0344*** (0.000)	0.0301*** (0.000)	-0.00596 (0.198)	-0.000743 (0.872)	0.00768* (0.097)	0.0197*** (0.000)
(14) SCHOOL	-0.228*** (0.000)	-0.139*** (0.000)	0.342*** (0.000)	0.0721*** (0.000)	0.0258*** (0.000)	-0.124*** (0.000)	-0.134*** (0.000)
(15) TERMYEAR	-0.0220*** (0.000)	0.0908*** (0.000)	0.0231*** (0.000)	-0.0250*** (0.000)	-0.00873* (0.059)	0.00193 (0.678)	0.0409*** (0.000)

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Table 4.3 – *Continued*

Variable	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(8) SERVICEYEARS	1						
(9) ACCOUNTVALUE	0.671*** (0.000)	1					
(10) Q_ACCOUNTVALUE	0.252*** (0.000)	0.685*** (0.000)	1				
(11) ONLINEACCOUNT	0.156*** (0.000)	0.172*** (0.000)	0.0780*** (0.000)	1			
(12) UNEMP	0.00766* (0.098)	0.00408 (0.379)	-0.00421 (0.364)	-0.0218*** (0.000)	1		
(13) UNION	0.0296*** (0.000)	0.0232*** (0.000)	0.00827* (0.074)	0.0242*** (0.000)	0.147*** (0.000)	1	
(14) SCHOOL	-0.0228*** (0.000)	-0.202*** (0.000)	-0.102*** (0.000)	-0.0384*** (0.000)	0.0495*** (0.000)	0.0483*** (0.000)	1
(15) TERMYEAR	0.0354*** (0.000)	0.0156*** (0.001)	0.0124*** (0.007)	0.0637*** (0.000)	-0.376*** (0.000)	0.0869*** (0.000)	0.00377 (0.416)

Note. *P* values in parentheses. The variables are defined in the Appendix.

p* < 0.10. *p* < 0.05. ****p* < 0.01.

Results

Endogeneity and Instrumental Variable Approach

A potential threat to probit regression model validity is the concern around endogeneity of the pension funded ratio variable since high levels of refunds taken could reduce the funded ratio, thus raising the question of which came first, the LSW or the level of the funded ratio. Thus, the IV probit regression estimation was used throughout the analysis as the empirical approach to address the problem of the possible loop of a causal relationship between the explanatory variable of pension funded status (measured through the funded ratio) and the dependent variable of the LSW decision. In the IV probit regression, the respective employer funded ratio variable was replaced with the predicted value of the same variable that was derived from a supplementary estimation of funded ratios on all the variables in the LSW decision regression plus one more identifying instrument (Wooldridge, 2002). As part of this procedure, the Wald exogeneity statistic was generated (see Table 4.4), which tested for presence or absence of endogeneity (Wooldridge, 2002). The pension plan age (PLANAGE) IV was implemented (i.e. how many years the unit of government has been participating in the IMRF pension system). Pension plan age has been previously noted as a determinant of funding, with older plans expected to have lower funded ratios (Munnell et al., 2011b). Furthermore, plan age is a good identifying instrument as it is unlikely to be correlated with one's decision to take an LSW merely due to how long ago the pension plan was established. This was confirmed via the *PLANAGE* having a negative coefficient of -0.082 ($p < 0.01$).

Results of the first stage regression explaining the funded ratio are presented in Table 4.4, Panel A. The table regresses *FUNDED RATIO* on all exogenous repressors to show the impact of *PLANAGE* (instrument) on the funded ratio. The instrument was negative and significant as predicted. Additionally, Table 4.4, Panel A provides the first stage model statistics, to test the relevance and overall fit of the instrument. The *F* statistic was above the conventional threshold of 10, thus the use

of this instrument was concluded to be appropriate. Furthermore, the Wald exogeneity statistic is presented with the estimation results in Table 4.4, Panel B to show the instrumented model fails to reject the null of no exogeneity, thus further supporting this IV satisfied the identification criteria for the model (vs. uninstrumented probit).

Table 4.4

Modeling Decision to Take a Lump Sum Withdrawals (N=46,608)

Panel A: IV Probit First Stage

Variables	FUNDED RATIO	
Instrument: PLANAGE	-0.082***	(0.009)
RECIPSERVICE	-0.366	(0.336)
MARRIED	-0.615**	(0.049)
AGEGROUP 2: 25-29	-0.152	(0.584)
AGEGROUP 3: 30-39	0.233	(0.524)
AGEGROUP 4: 40-49	-0.080	(0.845)
AGEGROUP 5: 50-59	0.152	(0.720)
AGEGROUP 6: 60+	-0.240	(0.692)
MALE	-1.299***	(0.000)
EDUCATION	0.371	(0.433)
SERVICEYEARS	-0.218**	(0.013)
ACCOUNTVALUE	0.125	(0.167)
Q_ACCOUNTVALUE	-0.002	(0.197)
ONLINEACCOUNT	-0.568***	(0.001)
UNEMP	0.718*	(0.070)
UNION	0.029	(0.525)
SCHOOL	-3.632***	(0.001)
TERMYEAR 2011	-0.260	(0.647)
TERMYEAR 2012	0.864	(0.270)
TERMYEAR 2013	4.330***	(0.000)
Constant	73.817***	(0.000)
Adjusted R^2	0.0525	
Robust F Statistic (20, 1573)	16.54	
Probability > F	0.0000	

Note. P values in parentheses. Instrumental variable: PLANAGE.

Variables are defined in the Appendix.

* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Panel B: *IV Probit Main Models*

Variables	Predicted Sign	LSW within 6 Months						LSW within 12 Months			
		(1)	(2)	(3)	(4)	(5)					
FUNDED RATIO (H1)	-		-0.027** (0.029)	-0.025** (0.035)			-0.0011 (0.038)	-0.021* (0.054)			
RECIP SERVICE (H2)	-			-0.618*** (0.000)				-0.666*** (0.000)			
MARRIED	-	-0.042*** (0.000)	-0.143*** (0.000)	-0.146*** (0.000)			-0.127*** (0.000)	-0.129*** (0.000)			
AGE GROUP 2: 25-29	-/+	0.013** (0.037)	0.037 (0.148)	0.090*** (0.001)			0.048** (0.045)	0.110*** (0.000)			
AGE GROUP 3: 30-39	-/+	0.107*** (0.000)	0.343*** (0.000)	0.365*** (0.000)			0.349*** (0.000)	0.369*** (0.000)			
AGE GROUP 4: 40-49	-/+	0.120*** (0.000)	0.378*** (0.000)	0.385*** (0.000)			0.412*** (0.000)	0.415*** (0.000)			
AGE GROUP 5: 50-59	-/+	0.150*** (0.000)	0.465*** (0.000)	0.474*** (0.000)			0.531*** (0.000)	0.535*** (0.000)			
AGE GROUP 6: 60+	-/+	0.320*** (0.000)	0.900*** (0.000)	0.921*** (0.000)			0.996*** (0.000)	1.012*** (0.000)			
MALE	+	0.036*** (0.000)	0.074* (0.059)	0.058 (0.110)			0.075** (0.028)	0.054* (0.083)			
EDUCATION	-	-0.028*** (0.001)	-0.089*** (0.006)	-0.065** (0.034)			-0.079*** (0.008)	-0.057* (0.051)			
SERVICE YEARS	+	0.026*** (0.000)	0.062*** (0.000)	0.053*** (0.000)			0.054*** (0.000)	0.043*** (0.000)			
ACCOUNT VALUE	+	0.003*** (0.005)	0.031*** (0.001)	0.036*** (0.000)			0.030*** (0.002)	0.035*** (0.000)			
Q_ACCOUNT VALUE	-	-0.000 (0.197)	-0.001* (0.093)	-0.001* (0.097)			-0.001* (0.088)	-0.001* (0.091)			
ONLINE ACCOUNT	-/+	0.040*** (0.000)	0.108*** (0.000)	0.106*** (0.000)			0.233*** (0.000)	0.234*** (0.000)			
UNEMP	-/+	0.003 (0.506)	0.028 (0.222)	0.023 (0.285)			0.025 (0.226)	0.020 (0.308)			
UNION	-	-0.002*** (0.009)	-0.004 (0.113)	-0.004* (0.095)			-0.004* (0.083)	-0.004* (0.073)			
SCHOOL	-	-0.188*** (0.000)	-0.670*** (0.000)	-0.512*** (0.000)			-0.604*** (0.000)	-0.420*** (0.000)			
TERM YEAR 2011		-0.005 (0.562)	-0.026 (0.402)	-0.023 (0.450)			-0.034 (0.244)	-0.029 (0.301)			
TERM YEAR 2012		-0.013 (0.256)	-0.022 (0.634)	-0.017 (0.698)			-0.035 (0.406)	-0.028 (0.473)			
TERM YEAR 2013		-0.023* (0.078)	0.039 (0.634)	0.036 (0.644)			0.021 (0.770)	0.022 (0.745)			
Pseudo R ²		0.1053									
AIC		50118.31	416930.3	415231.2	421983.5	419807.3					
BIC		50275.8	417297.8	415616.2	422351.0	420192.3					
Wald test of exogeneity (p)			0.0247	0.0273	0.0364	0.0372					

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Note. *P* values in parentheses. *LSW* stands for lump sum withdrawals. For continues variables, marginal effects are dy/dx . For dummy variables, marginal effect is for change from 0 to 1. FUNDED RATIO is instrumented in the model. Instrumental variable: PLANAGE. Variables are defined in the Appendix. * $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

Multivariate Analysis

Table 4.4, Panel B presents the average marginal effects of the IV probit (Columns 1-5). Column 1 is the base probit model which includes only the control variables. Columns 2 and 3 include the instrumented probit estimations which incrementally introduce the explanatory variables hypothesized in *H1* and *H2* for LSWs taken within 6 months of termination, repeated for LSWs taken within 12 months of termination in Columns 4 and 5. The pseudo R^2 statistic of the base probit (Table 4.4, Panel B, Column 1) is consistent with prior research (Clark et al., 2014).

The IV probit estimations, which confirmed endogeneity between the LSW decisions and employers' funded ratio by rejecting the null of exogeneity (significant Wald statistic at $p < 0.05$), include the instrumental variable (*PLANAGE*). The Akaike information criterion (AIC) and the Bayesian information criterion (BIC) decreased from Column 2 to 3 in the six month estimation to suggest the inclusion of the two explanatory variables of interest (funded ratio and reciprocal service) improved the power of the model to explain LSW decisions. Similar improvement was noted in the LSW taken within 12 months (Table 4.4, Panel B, Columns 4 and 5). Note the AIC and BIC measures change between Model 1 and the other models is not comparable given that Model 1 is a probit estimation and Models 2-5 are IV probit.

The results of the IV probit in Table 4.4, Panel B, Column 3 support the inverse relationship hypothesized in *H1* ($p < 0.05$), such that a marginal decrease (increase) in employer's *FUNDED RATIO* raises (lowers) the probability of taking a refund within six months of termination by an average of 2.5%. Next, it was noted that the probability of taking an LSW was decreased by an average of 61.8% when the terminated employee had reciprocal service rather than not; thus, *H2* is supported ($p < 0.01$). Table 4.4, Panel B, Column 5 (LSW taken within 12 months) provides practically identical results.

In terms of the control variables (employee determinants) in Table 4.4, Panel B, Column 3, the probability of a decision to take a refund of the contributions compared to leaving them on account with the pension system was decreased by an average of 14.6% when the terminated employee was married rather than not ($p < 0.01$), consistent with prior research. Employee groups over 25 years of age exhibited a higher probability of taking a refund as compared to those under age 25 (as the reference group). Rerunning the estimations with Group 5 as a reference (ages 50-59), it was noted that groups of age under 50 were less likely to take a refund in comparison to the reference group. In addition, the 60 and older group was more likely to request a refund, same as was noted for Group 5. The gender measure was only significant in Table 4.4, Panel B, Column 2 (0.074, $p = 0.059$) and became not significant when both the funded ratio and the reciprocal service measures were estimated together (Table 4.4, Panel B, Column 3), suggesting males are no different than females in their decisions to take LSW. Having a college degree decreased the probability of taking out a refund by on average 6.5% ($p = 0.034$). When reviewing the results of the same control variables in the longer LSW timeframe of 12 months (Table 4.4, Panel B, Column 5), similar results were noted.

In examining the employment and plan determinants (the remaining control variables) in Table 4.4, Panel B, Column 3, it was noted that the years of service measure was positive and significant (0.053, $p < 0.01$). The probability of taking a refund increased by an average of 3.6% ($p = 0.000$) for every \$1,000 (one unit) increase in terminated employee's account balance, and the significant and negative quadratic term (-0.001, $p = 0.097$) of the account value pointed to the decreasing effect after a certain value. These results align with previous findings noted by Clark et al. (2014). Table 4.4, Panel B, Column 5 (LSW taken within 12 months) illustrates qualitatively similar results. Additional restrictions on the account value in the sensitivity analysis were further examined.

Additionally, the results presented in Table 4.4, Panel B, Column 3 illustrate a significant average marginal effect of 10.6% ($p = 0.000$) increase in the probability of taking an LSW while

having an online access account created. However, these results should be interpreted with caution given the possibility of an endogenous relationship between this variable and the dependent variable of LSW. As predicted, having worked for a school or school-related district reduced the probability of taking an LSW by 51.2% on average ($p = 0.000$). When reviewing the signs and coefficients of the same control variables in the longer LSW timeframe of 12 months (Table 4.4, Panel B, Column 5), similar results were noted.

Lastly, the unemployment variable was not significant at the conventional level in any of the models and union membership was only marginally significant ($-0.004, p < 0.10$) in Table 4.4, Panel B, Columns 3 and 5, supporting the prediction that higher union membership is associated with lower probability of taking a refund.

Sensitivity Tests

To mitigate concerns around outliers, the *FUNDED RATIO* (main IV of interest) was winsorized at 1% on both ends (default approach) and models used were re-run to test *H1* and *H2*. Untabulated results were qualitatively similar in comparison to those reported in Table 4.4 Panel B.⁴⁶

An analysis of the materiality of the *ACCOUNT VALUE* variable was performed to mitigate concerns that all observations were treated the same in the model while some high value accounts taken out as an LSW could be biasing the results. Results are presented in Table 4.5. The *ACCOUNT VALUE* variable and the *FUNDED RATIO* variable were converted to ten deciles and excluded the top and bottom 10% before rerunning the IV probit estimation in Columns 1 and 2, respectively. Overall the results of these sensitivity models were largely unchanged and the sign and

⁴⁶ Note the winsorization procedure did not trim or exclude the top and bottom 1%. Instead, this procedure replaced them (values smaller than the 1th percentile were replaced by the 1th percentile and similar for the 99th percentile).

magnitude of the variables still supported *H1* and *H2* as presented in the main analysis.⁴⁷

Table 4.5

Lump Sum Withdrawal Sensitivity Models

Variables	Predicted Sign	IV Probit Sensitivity			
		(1)		(2)	
FUNDEDRATIO (H1)	-	-0.022**	(0.050)	-0.048**	(0.040)
RECIPSERVICE (H2)	-	-0.667***	(0.000)	-0.626***	(0.000)
MARRIED	-	-0.155***	(0.000)	-0.167***	(0.000)
AGEGROUP 2: 25-29	-/+	-0.022	(0.423)	0.095***	(0.001)
AGEGROUP 3: 30-39	-/+	0.361***	(0.000)	0.364***	(0.000)
AGEGROUP 4: 40-49	-/+	0.365***	(0.000)	0.387***	(0.000)
AGEGROUP 5: 50-59	-/+	0.447***	(0.000)	0.443***	(0.000)
AGEGROUP 6: 60+	-/+	0.946***	(0.000)	0.924***	(0.000)
MALE	+	0.026	(0.455)	0.071**	(0.040)
EDUCATION	-	-0.242***	(0.000)	-0.064*	(0.092)
SERVICEYEARS	+	-0.050***	(0.000)	0.056***	(0.000)
ACCOUNTVALUE	+	0.403***	(0.000)	0.032***	(0.001)
Q_ACCOUNTVALUE	-	-0.043***	(0.000)	-0.001	(0.131)
ONLINEACCOUNT	-/+	0.080***	(0.006)	0.114***	(0.000)
UNEMP	-/+	0.018	(0.388)	0.012	(0.587)
UNION	-	-0.005*	(0.053)	-0.003	(0.148)
SCHOOL	-	-0.541***	(0.000)	-0.544***	(0.000)
TERMYEAR 2011		-0.003	(0.922)	-0.042	(0.192)
TERMYEAR 2012		0.004	(0.933)	-0.046	(0.326)
TERMYEAR 2013		0.038	(0.612)	-0.036	(0.594)
Observations			37286		37282
Employer Clusters			1560		1264
AIC			330601.1		272676.9
BIC			330976.3		273052
Wald test of exogeneity (<i>p</i>)			0.0331		0.0281

Note. *P* values in parentheses. *IV* stands for instrumented variable. For continues variables, marginal effects are dy/dx .

For dummy variables, marginal effect is for change from 0 to 1. *FUNDEDRATIO* is instrumented in all models.

Instrumental variable: *PLANAGE*. Variables are defined in the Appendix. Sensitivity for LSW_6M: Model 1 excludes top and bottom 10% of *ACCOUNTVALUE*; Model 2 excludes top and bottom 10% of *FUNDEDRATIO*.

* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

⁴⁷ Differences in results related to some of the control variables including: gender (*MALE*), which was significant only in the 12 months LSW (Table 4.4 Panel B, Column 5), was not significant in the *ACCOUNTVALUE* sensitivity (Table 4.5, Column 1) but was positive and significant (0.071, $p = 0.040$) in the *FUNDEDRATIO* sensitivity (Table 4.5, Column 2). Years of service had a negative and significant coefficient (-0.050, $p = 0.000$) in the *ACCOUNTVALUE* sensitivity (Table 4.5, Column 1) as compared to the *FUNDEDRATIO* sensitivity in Column 2 and the results in Table 4.4 Panel B, where this variable had a positive and significant coefficient. The quadratic term of the account value and union membership were not significant in the *FUNDEDRATIO* sensitivity (Table 4.5, Column 2).

Additional Analysis

In a separate estimation, the cash-out decision was further modeled, following a similar modeling done by Clark et al. (2014), to better understand the decision of terminating employees to take out their LSW in cash. The underlying assumption in performing this analysis was that the cash-out decision was made at the time of the LSW decision. Thus, all the independent variables from the main analysis model were still utilized with the dependent variable being the decision to take a cash-out or maintain the contributions on account with the pensions system (default option). As with the LSW dependent measure, the cash-out measure was taken at 6 months and 12 months after termination. Descriptive statistics for the cash-out decision are presented in Table 4.6 and probability estimation models are presented in Table 4.7, with variable definitions in the Appendix.

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Table 4.6

Descriptive Statistics for Cash-Outs

Variable	Mean	SD	Min	Max
CASHOUT_6M	0.26	0.44	0	1
CASHOUT_12M	0.33	0.47	0	1
FUNDEDRATIO	75.32	12.73	0.00	200.00
RECIPSERVICE	0.34	0.47	0	1
MARRIED	0.48	0.50	0	1
AGEGROUP 1: UNDER 25	0.17	0.38	0	1
AGEGROUP 2: 25-29	0.21	0.41	0	1
AGEGROUP 3: 30-39	0.22	0.41	0	1
AGEGROUP 4: 40-49	0.20	0.40	0	1
AGEGROUP 5: 50-59	0.13	0.34	0	1
AGEGROUP 6: 60+	0.07	0.26	0	1
MALE	0.31	0.46	0	1
EDUCATION	0.08	0.27	0	1
SERVICEYEARS	2.33	1.97	0.08	7.92
ACCOUNTVALUE	2.41	3.23	0.01	114.84
Q_ACCOUNTVALUE	25.29	134.60	0.01	13188.84
ONLINEACCOUNT	0.25	0.43	0.00	1.00
UNEMP	9.30	1.40	6.00	14.00
UNION	50.65	10.32	25.90	83.30
SCHOOL	0.60	0.49	0.00	1.00

Note. The sample covers employment terminations that opted for cash-out versus maintaining contributions on account with the pension system during the period of 2010-2013. For cash-out within 6 months of termination, $n = 44,996$. For cash-out within 12 months of termination, $n = 44,486$. The difference is attributed to employees who were included in the first sample (6 months) if they were maintaining an account with the pension but if before the 12 months mark they took a refund (rollover, not cash); those cases were excluded from this analysis of cash versus maintaining an account. See the Appendix for variable definitions.

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Table 4.7

Cash-out Models

Variables	Predicted Sign	Cash-Out versus Maintain Account					
		Base	Within 6 Months		Within 12 Months		
FUNDED RATIO (<i>H1</i>)	-		-0.025**	(0.036)	-0.021*	(0.057)	
RECIP SERVICE (<i>H2</i>)	-		-0.625***	(0.000)	-0.676***	(0.000)	
MARRIED	-	-0.050***	(0.000)	-0.176***	(0.000)	-0.162***	(0.000)
AGE GROUP 2: 25-29	-/+	0.008	(0.190)	0.081***	(0.002)	0.101***	(0.000)
AGE GROUP 3: 30-39	-/+	0.105***	(0.000)	0.375***	(0.000)	0.382***	(0.000)
AGE GROUP 4: 40-49	-/+	0.113***	(0.000)	0.378***	(0.000)	0.404***	(0.000)
AGE GROUP 5: 50-59	-/+	0.127***	(0.000)	0.430***	(0.000)	0.491***	(0.000)
AGE GROUP 6: 60+	-/+	0.299***	(0.000)	0.880***	(0.000)	0.976***	(0.000)
MALE	+	0.035***	(0.000)	0.066*	(0.084)	0.063*	(0.057)
EDUCATION	-	-0.048***	(0.000)	-0.118***	(0.000)	-0.115***	(0.000)
SERVICE YEARS	+	0.021***	(0.000)	0.055***	(0.000)	0.043***	(0.000)
ACCOUNT VALUE	+	0.006**	(0.021)	0.027***	(0.003)	0.025***	(0.005)
Q_ACCOUNT VALUE	-	-0.000	(0.153)	-0.001	(0.135)	-0.001	(0.134)
ONLINE ACCOUNT	-/+	0.034***	(0.000)	0.093***	(0.002)	0.225***	(0.000)
UNEMP	-/+	0.003	(0.552)	0.022	(0.326)	0.019	(0.335)
UNION	-	-0.002**	(0.012)	-0.004	(0.111)	-0.004*	(0.071)
SCHOOL	-	-0.176***	(0.000)	-0.503***	(0.000)	-0.413***	(0.000)
TERM YEAR 2011		-0.003	(0.752)	-0.018	(0.579)	-0.025	(0.384)
TERM YEAR 2012		-0.008	(0.510)	-0.003	(0.942)	-0.019	(0.647)
TERM YEAR 2013		-0.020	(0.139)	0.039	(0.623)	0.024	(0.737)
Observations		44996		44996		44486	
Pseudo R ²		0.0977					
AIC		46795.8		398881.3		399344.4	
BIC		46961.38		399264.8		399727.3	
Wald test of exogeneity (<i>p</i>)				0.0289		0.0388	

Note. *P* values in parentheses. *IV* stands for instrumented variable. For continuous variables, marginal effects are dy/dx . For dummy variables, marginal effect is for change from 0 to 1. This table presents results of the probit (base) and IV-probit (with the hypothesized variables of interest) models for the decision to take cash-out versus maintaining an account with the pension system within 6 months and 12 months of termination, respectively. Variables are defined in the Appendix. * $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

Review of the descriptive statistics in Table 4.6 suggested the terminated employees who took a cash-out exhibit similar characteristics to those in the full sample ($N = 46,608$). Overall, 26% ($SD = 0.44$) and 33% ($SD = 0.47$) of terminated employees chose to cash out their contributions within 6 months and 12 months, respectively, as compared to the default option of maintaining the account with the pension system. To make the connection to the LSW refunds' descriptive statistics presented in Table 4.2, the cash-out within the same timeframe constituted 88% of such LSWs, suggesting rollovers of contributions are rather rare and the cashing-out problem is observed.

Table 4.7 presents the average marginal effects of the IV probit estimations for the decision to cash-out contributions within 6 months and 12 months. Within each timeframe, the models with the independent variables of interest (*FUNDED RATIO* and *RECIP SERVICE*) are provided, along with the base probit estimation including control variables only for the six months cash-out decision (for brevity). The results of the estimations were consistent with the main analysis of the LSW presented in Table 4.4, Panel B and continue to support the inverse relationship hypothesized in *H1*, such that a marginal decrease (increase) in employer's *FUNDED RATIO* raises (lowers) the probability of taking a cash-out within six months of termination by an average of 2.5% ($p = 0.036$), and by an average of 2.1% ($p = 0.057$) for the 12-month timeframe. Next, it was also noted that the probability of taking a cash-out was decreased by an average of 62.5% ($p = 0.000$), and by an average of 67.6% ($p = 0.000$) for the 12-month timeframe, when the terminated employee has reciprocal service rather than not, thus *H2* is still supported. Comparing the coefficients of the control variables for the same periods to the LSW models in Table 4.4, Panel B, it was noted that the gender (*MALE*) measure was positive and significant in both the 6 months and 12 months cash-out estimations (Table 4.7), while only significant in the LSW 12 months estimation (Table 4.4, Panel B, Column 5). Additionally, the quadratic term of the account value was not significant in either of the cash-out estimations in Table 4.7, suggesting there was not presence of nonlinearity in the *ACCOUNT VALUE* measure in the cash-out decision.

Lastly, union membership was only significant in the 12 months cash-out estimation (Table 4.7) as compared to being significant in both timeframes in the LSW estimations (Table 4.4, Panel B, Columns 3 and 5).

A sensitivity analysis was performed of the materiality of the *ACCOUNTVALUE* variable. Results are presented in Table 4.8. Similar to the main analysis, the *ACCOUNTVALUE* variable and the *FUNDED RATIO* variable were converted to ten deciles and excluded the top and bottom 10% before rerunning the IV probit estimations presented in Columns 1 and 2, respectively. Overall the results of sensitivity models 1 and 2 were qualitatively similar to Table 4.7, and the sign and magnitude of the variables still support *H1* and *H2* as presented in the unrestricted sample analysis (Table 4.6).⁴⁸ No qualitative differences were noted between the sensitivity analysis of the LSW (Table 4.5) and the sensitivity analysis on the cash-out decisions (Table 4.8).

⁴⁸ Differences in results related to some of the control variables including: gender (*MALE*), which was significant in both cash-out estimations in Table 4.7, was not significant in the *ACCOUNTVALUE* sensitivity (Table 4.8, Column 1) but was positive and significant (0.079, $p = 0.028$) in the *FUNDED RATIO* sensitivity (Table 4.8, Column 2). Years of service had a negative and significant coefficient (-0.049, $p = 0.000$) in the *ACCOUNTVALUE* sensitivity (Table 4.8, Column 1) as compared to the *FUNDED RATIO* sensitivity in Column 2 and the results in Table 4.7 estimations, where this variable had a positive and significant coefficient. The quadratic term of the account value (which was not significant in the estimations of the cash-out for 6 and 12 months in Table 4.7), was negative and significant (-0.042, $p = 0.000$) in the *ACCOUNTVALUE* sensitivity (Table 4.8, Column 1). Union membership was not significant in the *FUNDED RATIO* sensitivity (Table 4.8, Column 2).

DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Table 4.8

Cash-out Sensitivity Models

Variables	Predicted Sign	Sensitivity			
		(1)		(2)	
FUNDED RATIO (<i>H1</i>)	-	-0.022**	(0.050)	-0.046**	(0.047)
RECIPIENT SERVICE (<i>H2</i>)	-	-0.676***	(0.000)	-0.639***	(0.000)
MARRIED	-	-0.186***	(0.000)	-0.195***	(0.000)
AGE GROUP 2: 25-29	-/+	-0.025	(0.369)	0.082***	(0.007)
AGE GROUP 3: 30-39	-/+	0.376***	(0.000)	0.373***	(0.000)
AGE GROUP 4: 40-49	-/+	0.354***	(0.000)	0.375***	(0.000)
AGE GROUP 5: 50-59	-/+	0.401***	(0.000)	0.391***	(0.000)
AGE GROUP 6: 60+	-/+	0.915***	(0.000)	0.887***	(0.000)
MALE	+	0.029	(0.428)	0.079**	(0.028)
EDUCATION	-	-0.286***	(0.000)	-0.129***	(0.001)
SERVICE YEARS	+	-0.049***	(0.000)	0.058***	(0.000)
ACCOUNT VALUE	+	0.386***	(0.000)	0.022**	(0.013)
Q_ACCOUNT VALUE	-	-0.042***	(0.000)	-0.000	(0.192)
ONLINE ACCOUNT	-/+	0.068**	(0.024)	0.103***	(0.000)
UNEMP	-/+	0.017	(0.429)	0.008	(0.739)
UNION	-	-0.004*	(0.074)	-0.003	(0.191)
SCHOOL	-	-0.536***	(0.000)	-0.530***	(0.000)
TERMYEAR 2011		0.001	(0.986)	-0.044	(0.152)
TERMYEAR 2012		0.014	(0.761)	-0.036	(0.442)
TERMYEAR 2013		0.039	(0.614)	-0.048	(0.476)
Observations			36124		35972
AIC			318684.6		261713.3
BIC			319058.4		262086.9
Wald test of exogeneity (<i>p</i>)			0.0338		0.0308

Note: *P* values in parentheses. For continuous variables, marginal effects are dy/dx . For dummy variables, marginal effect is for change from 0 to 1. *FUNDED RATIO* is instrumented in all models. Instrumental variable: *PLANAGE*. Variables are defined in the Appendix. Sensitivity for cash-out within 6 months: Model 1 excludes top and bottom 10% of *ACCOUNT VALUE*; Model 2 excludes top and bottom 10% of *FUNDED RATIO*.

p* < 0.10. *p* < 0.05. ****p* < 0.01.

Discussion and Conclusion

Retirement planning and saving (in their various forms) is a process every individual will have to go through at one point in their lives. For employees of units of government participating in DB plans, such decisions are sometimes made at the time of job separation. As such, this analysis considered the determinants of LSW and cash-out decisions of non-vested employees, while considering their respective former employer pension funding levels, argued to be one of the factors influencing such a decision. After providing pension specific background and prior literature findings related to the objective of the study, probit and IV probit regression models of determinants of the LSW and cash-out decisions were developed.

The most important result points to the inverse association between employer's pension funded ratio and the probability of separating workers taking an LSW (or cash-out as per the additional analyses) within both the 6 months and the 12 months of termination, thus supporting *H1*. This finding demonstrates the potential signaling effect of the condition of the pension plan to terminating employees. The alternative possibility is that employers participating in an agent multiple-employer DB plan have future pension liability reduction incentives and seek improvements to their funded ratios via the influence of separating workers' LSW decisions towards taking a refund from the plan and thus forfeiting future benefit claims. Alternatively, the terminating employees may opt for such decisions if they are concerned about the sustainability of the pension. Of the terminated employees in the sample, 28.8% requested an LSW within six months of termination, and as the descriptive analysis shows, 88% of those taking an LSW chose the form of a cash-out in lieu of a rollover into another qualifying plan. This observation was supported by similar behavior also noted by Clark et al. (2014) in their sample of the North Carolina DB plans' terminations (from 2007 to 2008), suggesting that subsequent to the LSW decision, the retirement leakage problem persists and warrants further research. It is also important to note that although on average the cash-out amount was not high, 1,058

employees (or 8.9% of the cashing-out population in the sample) took over \$8,000 in cash, on an individual basis, amounts that otherwise could have been untouched until retirement. Collectively, these results further support the need to highlight the costly retirement leakage to both the research and practitioner communities.

In addition, the result of this inquiry signals a need to restrict LSW (and especially cash-outs) over certain amounts to be rolled over to qualifying IRAs, given the association of lower pension funded employers with the increase in the probability of terminating employees taking the first step towards the cash-out choice, via the initial LSW decision. Furthermore, the results supported *H2*, suggesting that the probability of taking an LSW is decreased when the terminated employee has prior reciprocal service from another pension system rather than not.

Contribution

Collectively, the results of this study supplement prior literature on pension distribution decisions and especially extend the understanding in the public-sector DB plans, which have been subject to limited research to date, and specifically focus on the non-vested members' population. Furthermore, the findings extend research in this area by considering additional important LSW decision determinants, using a large sample of entities and not limiting the sample to certain age groups (i.e. up to age 50 as seen in the Clark et al. 2014 study). Specifically, this study was the first to incorporate into the LSW decision the association with the pension funded ratio, whether as an incentive for employers to reduce liabilities or a signal for employees of sustainability concerns of the pension plan.

The practical implications of this study's results include future considerations for policy-setters, regulators, and the pension-sponsoring employers themselves given the fact that 88% of the terminated employees that took an LSW requested to receive it in the form of a cash-out, thus possibly contributing to the pension leakage problem. The results would also be of interest to the public or

similar sector employees who are considering comparable decisions in their retirement planning.

Overall, the study evidence illustrates areas in which policy makers should consider further restrictions to the distribution process such as mandatory rollover requirements above a certain threshold or a waiting period for LSW requests, while at the same time not limiting the funded ratio improvement opportunities for the sponsoring employers.

Limitations

This study does have limitations, particularly in terms of the sample dataset, which included only one pension system; the results might not be well generalizable to the population of all DB pension plans. Thus, for greater generalizability, a national sample could be drawn from DB plans across the US, which could be used to examine the reciprocal service determinant (introduced in the model of the current study). Additionally, this paper does not empirically test in one linked model the determinants of the decision subsequent to the LSW (i.e. cash-out) as the focus was on explaining first the association of the pension-funded status with the initial LSW decision, followed by an additional analysis assuming modeling of cash-out decisions that takes place at the same time as the LSW. Thus, future research should also examine LSW and cash-out decisions in combination. Lastly, given the reliance on secondary data (administrative pension records), the analysis did not capture other determinants that may influence LSW decisions of employees which could be included by a future study by implementing a survey to be used in conjunction with the administrative records.

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DETERMINANTS AND CONSEQUENCES OF PENSION FUNDED STATUS IN LOCAL GOVERNMENT

Appendix

Variables	Definition
<i>LSW</i> ¹	Dichotomous variable coded as 1 if Lump sum withdrawals (LSW) is taken by terminated employee within 6 months of termination, 0 otherwise. Repeated with 12-month timeframe.
<i>FUNDED RATIO</i> ¹	Actual pension funded ratio over the respective year of termination.
<i>RECIP SERVICE</i> ¹	Dichotomous variable coded as 1 if terminated employee has prior reciprocal service, 0 otherwise.
<i>CASHOUT</i> ¹	Dichotomous variable coded as 1 if cash-out is taken by terminated employee within 6 months of termination and 0 if accounting continued to be maintained with the pension system. Repeated with 12-month timeframe.
Controls	
<i>MARRIED</i> ¹	Dichotomous variable coded as 1 if terminated employee is married, 0 otherwise.
<i>AGE GROUP</i> ¹	Categorical variable.
<i>MALE</i> ¹	Dichotomous variable coded as 1 if terminated employee is a male, 0 otherwise.
<i>EDUCATION</i> ^{1, 2}	Dichotomous variable coded as 1 if terminated employee has a college degree or above, 0 otherwise.
<i>SERVICE YEARS</i> ¹	Natural log of years of service.
<i>ACCOUNT VALUE</i> ¹	The value of an employee's LSW (i.e. account balance of their contributions), in \$1,000s.
<i>Q_ACCOUNT VALUE</i> ¹	Quadratic term for the value of an employee's LSW (i.e. account balance of their contributions), in \$1,000s.
<i>ONLINE ACCOUNT</i> ¹	Dichotomous variable coded as 1 if terminated employee created an online member access account with the pension system, 0 otherwise.
<i>UNEMP</i> ³	Annual unemployment percentage aggregated at the county level.
<i>UNION</i> ⁴	Annual public-sector union membership aggregated at the county level (extrapolated from major metropolitan).
<i>SCHOOL</i> ¹	Dichotomous variable coded as 1 if the employer where the terminating employee worked is a school or school-instrumental entity, 0 otherwise.
Instrumental Variable	
<i>PLAN AGE</i> ¹	Instrumental variable used in the Instrumented Variable (IV) probit regression. Continuous age of the plan at the respective (<i>i</i>) employer.

¹ Data for these measures was obtained from the Illinois Municipal Retirement Fund (IMRF) administrative records.

² To construct the education measure (proxy for financial literacy), position title was obtained from the IMRF administrative records for the respective employee. These job titles were matched against the *Education and Training Assignments by Detailed Occupation 2014* Table 1.12 from the U. S. Bureau of Labor Statistics (https://www.bls.gov/emp/ep_table_112.htm), which provides for the typical education level needed for entry to respective occupation. ³ Data for this measure was obtained from the U. S. Bureau of Labor Statistics (local area unemployment rates by year). ⁴ Data for this measure was obtained from Unionstats.com.

VITA

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