
Public Pension Funds and Assumed Rates of Return: An Empirical Examination of Public Sector Defined Benefit Pension Plans

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Abstract

This research adds to an existing body of research that suggests that the adoption of investment return assumptions associated with public sector defined benefit (DB) pension plans may partly be explained by political opportunism. This research adds to this literature by examining how oversight and monitoring efforts and investment boards' relative independence from the political process influence adopted investment return assumptions. Based on a multivariate regression analysis of data on 88 state DB pension plans in the United States, the results of this study suggest that adopted investment return assumptions are partly determined by investment boards' affiliation with the political process. The results also indicate that the adopted assumptions are influenced by asset allocations and the fiscal condition of pension plans. The findings of the study are important in part because they draw attention to possible linkages between the quality of financial information that is reported about the financial condition of public pension funds and their surrounding governance structure. Reliable information about the actual size of unfunded pension liabilities is critical in political environments, where there tend to be a bias toward shifting pension obligations to future constituents.

Keyword

public sector; pension funds; accounting

Introduction

In contrast to their counterpart in the private sector, state and local governments in the United States are not required to use “mark-to-market accounting” (also referred to as “fair-value accounting”) when reporting on their unfunded pension liabilities. In practice, this has resulted in the adoption of actuarial assumptions about the expected rates of return on pension investments that, on average, far exceeds the rates adopted by private sector pension plans. Novy-Marx and Rauh (2008) report that state governments, on average, assume that they will earn

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annual rates of return of close to 8% on their pension investments (Novy-Marx & Rauh, 2008). By comparison, private sector entities typically assume a rate between 4% and 5% (Guerrera & Bullock, 2010).

The goal of this research is to add to an emerging body of literature that suggests that the adoption of these relatively high investment return assumptions may partly be explained by political incentives aimed at reducing the amount of annual plan contributions and obscuring the magnitude of unfunded pension liabilities (Chaney, Copley, & Stone, 2002; Hess, 2005; Marks, Raman, & Wilson, 1988; Mitchell & Smith, 1991; Vermeer, Styles, & Patton, 2010). This research adds to this literature by offering insights into the influence that monitoring and oversight efforts and investment boards' relative independence from the political process has on adopted investment return assumptions.

The examination is conducted by way of a multivariate analysis, using data on state government defined benefit (DB) pension plans. The data used in the study are partly drawn from Comprehensive Annual Financial Reports (CAFRs) published by the individual retirement systems and partly from the Boston College Public Plans Database (2010). The Public Plans database is published by the Center for Retirement Research at Boston College and includes a range of data for 107 state DB pension plans in the United States, including data on assumed rates of return, current and historical investment performance of the plans, and a range of data that may be used to capture various governance characteristics.

The results of the analysis suggest that investment boards' affiliation with the political process is an important determinant of adopted investment return assumptions. Specifically, the analysis provides support for the hypothesis that these assumptions are partly determined by the proportion of politically appointed members who serve on investment boards. The results also confirm previous empirical findings, which suggest that investment boards that govern fiscally unhealthy pension plans are more likely to engage in these practices. However, no statistically significant support was found in support of a relationship between adopted investment return assumptions and oversight and monitoring efforts.

These findings are important, in part, because they draw attention to possible linkages between the quality of financial information that is reported about the financial condition of public pension funds and their surrounding governance structure. Reliable information about the actual size of unfunded pension liabilities is critical in political environments, where there tends to be a bias toward shifting pension obligations to future constituents (Inman, 1981, 1982). The findings of this study also offer important insights into potential measures that may be undertaken to reduce the political vulnerability of investment board decisions. The findings suggest that a reduction of the proportion of politically appointed members serving on the boards may reduce this vulnerability.

The article is organized into seven sections. The first section provides an overview of the issue at hand. The second section provides a review of the relevant literature. The third and fourth sections outline the research objective and the hypotheses explored in this research. The fifth section describes the data and the methodology. The sixth section presents the analysis and the results and the final section offers some concluding remarks.

Background

As noted above, an important difference between the accounting rules that govern state and local government DB pension plans and those that govern plans of publicly traded corporations is that state and local governments are not required to use "mark-to-market" accounting to account for and report on their pension assets and liabilities (i.e., their pension obligations). In practice, this has allowed retirement systems to adopt relatively high discount rates when discounting their

future pension obligations. Novy-Marx and Rauh (2008) report that state governments, on average, use a 7.97% discount rate when discounting these (Novy-Marx & Rauh, 2008). The data analyzed as part of this research confirms this finding. It indicates that state pension plans on average assume that their assets will earn a rate of 7.965% on their investments. By comparison, publicly traded corporations typically use a rate between 4% and 5% (Guerrera & Bullock, 2010).

The aggregate value of unfunded liabilities held by states has been estimated to be US\$3.2 trillion, under mark-to-market accounting principles (Biggs, 2010; Norcross & Biggs, 2010; Novy-Marx & Rauh, 2009, 2010). By comparison, a Pew Charitable Trusts' Center report (Pew Center on the States, 2010) indicates that as of June 30, 2008, the aggregate reported value of unfunded liabilities reported in state government external financial reports amounted to less than US\$1 trillion (Pew Center on the States, 2010), suggesting that the actual value of unfunded pension liabilities held by state governments is, on average, more than three times the value of the unfunded liabilities presented in their annual external financial reports.

A common explanation for the discrepancy between the discount rates assumed by public sector DB pension systems and those adopted by publicly traded corporations is that obligations associated with the former type of plans typically are guaranteed by law and therefore considered virtually risk free (Novy-Marx & Rauh, 2009, 2010). In other words, the obligations are considered risk free because they are backed by the full faith and credit of a general-purpose government. This explanation, however, has been subject to substantial critique among academics, where many argue that this practice is counter to some of the most basic principles of financial economics. As noted by Novy-Marx and Rauh (2010), ignoring risk when valuing assets run counter to "... the entire logic of financial economics: financial streams of payment should be at a rate that reflects their risk." Similarly, Norcross and Biggs (2010) state that current public sector pension accounting rules "... effectively violate well-accepted economic precepts such as the Modigliani-Miller results in corporate finance, the Black-Scholes formula for options pricing, and the general 'law of one price'."

A number of professional associations have taken issue with the assertion that rates adopted by public pension plans are artificially high. According to the Governmental Accounting Standards Board (GASB)'s Statement No. 25, the adopted discount rate should be based on the estimated long-term investment yield for the plan. A recent fact sheet issued on behalf of 11 national associations illustrates that estimated public pension investment returns exceed adopted investment return assumptions (National Governors Association, 2011). Specifically, it illustrates that investment returns over the last 25 years have averaged 9.25%, which exceeds the 8% average assumed rate of return adopted by state pension plans. Similarly, in a publication issued by the National Association of State Retirement Administrators (NASRA), Brainard (2010) illustrates that investment rate assumptions adopted by state public pension funds, on average, are lower than the median rate of return earned by pension funds over the past 20- and 25-year period.

The use of shorter time horizons (i.e., less than 20 years) when calculating the average investment returns earned by state pension funds offers a different picture. For example, the data reported in the Boston College Public Plans Database (2010), which are used as part of this research, indicate that state pension plans earned, on average, a 3.06 rate of return on their invested assets during the years 2001 to 2009. This suggests that the average assumed rate of return adopted by state pension plans exceeds the average actual rate during this 9-year time period by almost 5%.

It should be noted that GASB recently voted to approve Statement No. 68, Accounting and Financial Reporting for Pensions. Effective in accounting periods beginning after June 15, 2014, this statement revises existing rules for selecting the discount rate in a way that is likely to reduce

the average discount rate mentioned above. More specifically, it will require state and local governments to use a separate discount rate for any portion of the pension liability that is not funded. This rate needs to be based on the index rate on a tax-exempt 20-year AA or higher-rated municipal bond; a rate that will be significantly lower than the 8% average discount rate mentioned above. Pension systems will be allowed to continue the existing practice of adopting a discount rate based on the long-term expected rate of return of plan investments for the portion of the obligations that are fully funded (i.e., where sufficient plan assets are available to meet payment obligations of current employees and retirees).

Regardless of what the average discount rate used is or which investment horizon that is selected, empirical studies (Chaney et al., 2002; Hess, 2006; Marks et al., 1988; Mitchell & Smith, 1991; Vermeer et al., 2010) and anecdotal evidence (Walsh, 2012) suggest that the adopted investment return assumptions may partly be driven by political opportunism. More specifically, the evidence suggests that governments and retirement systems, under certain conditions, adopt actuarial assumptions for purposes of reducing the annual required contributions to a pension plan (ARC) and/or for purposes of obscuring the magnitude of unfunded pension liabilities. From a political perspective, the reduction of the ARC is advantageous because it is typically funded via general funds. Such contributions therefore compete directly for funds with other programs. Furthermore, since the majority of pension obligations that accrue during an accounting year are not due for payment until the beneficiary retires, it is politically convenient to push these payments into the future. Peng (2004) describes this problem as follows:

Because pension contributions come out of the general fund, they directly compete with other government programs for the limited resources in the general fund. Pension contributions, however, do not have the same immediacy and urgency as other government programs. When a budget deficit occurs, it is likely governments will rely on pension contributions to solve budget problems, such as delaying pension payments.

As noted earlier, the goal of this research is to add to this body of literature by examining how oversight and monitoring efforts and investment boards' affiliation with the political process influences the adoption of investment return assumptions. The relevant studies are reviewed in the next section.

Literature Review

Several studies may be identified that have directly or indirectly generated evidence suggesting that DB pension plans under certain conditions have a tendency to adopt actuarial assumptions opportunistically. The most prominent of these is a study by Eaton and Nofsinger (2004). Using nationwide survey data on state and local government pension plans for the years 1991 to 1997, collected by the Public Pension Coordinating Council (PPCC), this study provides evidence in support of the hypothesis that fiscal stress and political pressure increases governments' propensity to adopt "optimistic" actuarial assumptions not only for purposes of reducing required payments to pension plans but also to make plans appear better funded.

In a similar, but more recent study, Vermeer et al. (2010) provides evidence that is consistent with Eaton and Nofsinger's findings. Using a regression model, the study provides evidence in support of the hypothesis that the presence of underfunding and fiscal constraints increase DB pension plans' propensity to adopt "optimistic" actuarial assumptions. In addition, the study provides support for the hypothesis that DB plans that are subject of greater monitoring from credit rating agencies are less likely to adopt actuarial assumptions for purposes of reducing required pension plan payments. Contrary to their expectations, however, they also found that

governments with specialized auditors are more likely to adopt optimistic actuarial assumptions for purposes of reducing required payments to their pension plans. The authors suggest that this may indicate that “. . . specialized auditors know how to follow the rules but may ‘help’ their clients at the same time.”

Beyond these two studies, several related studies have been conducted for purposes of examining determinants of DB pension plan funding practices. Similar to the studies by Eaton and Nofsinger (2004) and Vermeer et al. (2010), these suggest that political considerations play a role in the underfunding of pension plans. The earliest study was conducted by Marks et al. (1988). In this study, the authors developed a conceptual model to empirically test whether underfunding of state-administered pension plans can be attributed to economic and political incentives. Based on a regression analysis of cross-sectional data, the authors found support for the hypothesis that underfunding can partially be explained by the presence of political incentives.

Building on Marks findings, Mitchell and Smith (1991) and Mitchell and Hsin (1997) produced and published two studies in the 1990s. Both studies add insight into the determinants of public employer pension funding practices by showing that pension systems are more likely to underfund their plans during times of fiscal stress. In addition, the Mitchell and Smith (1991) study found that past funding practices had a significant influence on current funding decisions.

A more recent study was conducted by Chaney et al. (2002). It confirms previous findings and adds additional insights into the determinants of underfunding. Based on an analysis of data collected from CAFRs for all 50 state governments, the authors found evidence in support of the thesis that fiscally stressed states that are required to balance their budgets tend to underfund their pensions.

Beyond the realm of pension accounting, several related studies can also be found that suggest that governments utilizes a variety of discretionary accounting opportunities for opportunistic reasons (Stalebrink, 2007; Vinnari & Nasi, 2008; Plicher & Dean, 2009). More specifically, these studies have shown that governments may use “discretionary accruals” for purposes of balancing their results across time. A limited number of studies have also been conducted that have shown that nonprofits may engage in similar practices (Christensen & Mohr, 1995; Leone & Van Horn, 2005; Pilcher & Mitchell, 2010; Trussel, 2003).

In the context of private sector entities, studies examining opportunistic use of accounting discretion have been widespread (Barefield & Comisky, 1971; Dhaliwal, Salamon, & Smith, 1982; Kinney & Trezevant, 1995; Penno & Simon, 1986; Zucca & Campbell, 1992). These studies have shown that private firms manage financial performance for a variety of opportunistic reasons including (a) reducing the likelihood of violating lending agreements (Dhaliwal, 1980), (b) influencing stock market perceptions, (c) influencing management’s compensation (Healy & Wahlen, 1999), (d) avoiding regulatory intervention (Healy & Wahlen, 1999; Watts & Zimmerman, 1978), (e) reducing the cost associated with external financing (Deschow, Sloan, & Sweeney, 1996), and (f) influencing the negotiation of union contracts (Brown & Raghunandan, 1995).

Finally, there is a large body of literature, conducted in corporate contexts, which provides empirical support for the theory that outside board directors tend to make decisions that are more closely aligned with the interests of the principals than those made by internal directors (Bhagat & Black, 1998; Lin, 1996). Referencing this literature, Hess (2005) suggests that similar relationships may exist in the context of public sector pension investment boards. Hess writes:

With respect to controlling agency problems within the firm, inside directors are expected to side with management. Outside directors, on the other hand, are generally considered to be sufficiently independent from the CEO, such that they can protect shareholders’ rights when they may be harmed by top management’s behavior. Likewise, politically-appointed trustees do not make decisions based on the interest of pension beneficiaries, but principally to improve their own political situations.

This study adds to the above literature in several important ways. Perhaps most important, it centers on investment boards as the central decision-making unit that determines actuarial assumptions. A focus on investment boards is important because of the central role they play in the governance and management of public pension funds. Typically, state constitutions or statutes require pension plans to be managed as trust funds and overseen by an investment board. In this capacity, investment boards are responsible for establishing overall policies for the operation and management of the pension plans, including but not limited to the adoption of actuarial investment return assumptions and policies that establishes parameters for investment decisions (Bovbjerg, United States Congress Joint Economic Committee, & United States Government Accountability Office, 2008). A survey conducted by the PPCC (2001) indicates that investment boards have the controlling authority over actuarial assumptions in almost 95% of the existing state and local pension funds. Furthermore, as noted by Hess and Squire (2009), investment boards typically select the actuary that issues these recommendations. As such, they have the opportunity to select only those actuaries that are deemed to be “team players.” Previous research has not emphasized the fact that investment boards typically enjoy the controlling authority over actuarial assumptions. For example, the studies by Vermeer et al. (2010) and Eaton and Nofsinger (2004) refer more generally to the decision-making unit as being either a “government” or a “pension system.”

In addition, this study is based on nationwide data for state government DB pension plans. To date, no study has examined determinants of actuarial assumptions in the context of pension accounting, using nationwide state data drawn from CAFRs. While the above-mentioned study by Vermeer et al. (2010) is based on data collected from CAFRs, the study is confined to counties and municipalities in Michigan and Pennsylvania. Furthermore, Eaton and Nofsinger’s (2004) study is based on self-reported data, which may be argued to compromise the reliability of the findings.

Finally, the analysis conducted in this study is based on data reported after the adoption of GASB Statement No. 27. GASB Statement No. 27 was adopted for purposes of requiring full accounting of pensions for state and local governments. In brief, it requires governments to disclose its ARC, key actuarial assumptions and a variety of additional information that allows readers of the financial reports to determine the funding status of a pension plan. Prior to the adoption of GASB Statement No. 27, disclosure information was guided by GASB Statement No. 5, which did not require governments to disclose this information. Vermeer et al. (2009, p. 512) summarizes the situation under GASB Statement No. 5 as follows:

... the ARC was not required to be calculated, disclosure of information about significant actuarial assumptions was minimal, and pension information was not required on the face of the financial statements except when amounts were paid.

Without the transparency provided by the ARC, choices to underfund pensions could be done with limited political consequences. It may therefore be argued that these lax disclosure requirements have immediate implications for the study of opportunistic use of actuarial assumptions. Without the transparency provided by the ARC, choices to underfund pensions could be achieved in a variety of ways. Without being able to isolate these other opportunities to underfund pension plans, it is difficult to determine the validity of Eaton and Nofsinger’s results.

Research Objective

Explicitly stated, the objective of this research is to explore how oversight and monitoring efforts and investment boards’ relative independence from the political process influence adopted investment return assumptions. The general working assumption is that investment boards, under certain conditions, may select investment return assumptions for opportunistic

reasons. The theoretical argument underlying this assumption is partly grounded in the public choice literature, which suggests that evaluations of public sector output decisions require researchers to determine the incentives and disincentives of opportunistic accounting choice. The political incentives for selecting relatively high investment return assumptions stem largely from the effect these have on the ARC. The ARC consists of the amount needed to cover the cost of benefits that accrue during the fiscal year and an amortization amount to pay off existing unfunded liabilities. As noted in the background section, GASB's Statement No. 25 states that state and local governments should base the discount rate used to discount future pension obligations on the estimated long-term investment yield of the plan's investments. Since the ARC and existing unfunded liabilities are determined based on obligations that often extend far into the future, relatively small increases to the discount rate often lead to significant reductions in the ARC. Hess (2005) notes that a general rule of thumb is that a 1% increase in the assumed rate of return typically creates a 20% decrease in the employers' required contribution (Hess, 2005). Given this impact, the selection of relatively high investment return assumptions may be argued to be attractive for political actors seeking to reduce the size of the annual payments to the pension system and making the plans appear better funded.

Another important theoretical foundation underlying this research is Principal-Agent (P/A) theory (see Fama & Jensen, 1983), which informs us that agency costs may arise when principals delegate decision-making authority to agents. The accounting system is closely linked to P/A-theory, given that accounting has the function of producing information that reduces the information asymmetries that arise when decisions are delegated from principals to agents. Zimmerman examined this theory in the context of municipal accounting and suggests that the agency problem exists in all organizational contexts no matter if they are commercial or political (Zimmerman, 1977). In the context of DB pension plans, the principals include both pension plan beneficiaries (given that underfunding may result in benefit cuts and increased employee contributions) and the general public (given that pension payments are guaranteed by the state and may therefore ultimately impose financial burdens on taxpayers). The primary agents in the context of DB pension plans are the investment boards. As already noted, these serve as trustees on behalf of the principals. Political actors may impose pressure on board members (i.e., the agents) to adopt optimistic actuarial assumptions for purposes of reducing the ARC and to make the plan appear better funded. From a P/A perspective such decisions would be in direct conflict with the interests of the principals, given that they contribute to underfunding of the pension system.

Hypotheses

Six different hypotheses are explored in this research. The first two hypotheses were developed for purposes of exploring the influence that investment boards' relative independence from the political process has on the adoption of investment return assumptions. This hypothesis is grounded in the assumption that adopted rates are partly determined by investment boards' ability to shield themselves from political pressure. It is theorized that boards that operate relatively independently from the political process are less prone to adopt rates for purposes of reducing annual plan contributions, compared to boards that operate in relatively close affiliation with the political process. As explained above, the choice of actuarial assumptions may have political consequences for legislators and the executive of the government, given that the adoption of a lower discount rate may free up budgetary resources. Conversely, the adoption of a higher rate may remove budgetary resources and force legislators and government executives to make politically costly decisions. In addition, the adoption of a relatively high rate may point to poor governance, given that it may increase the magnitude of the unfunded pension liability.

In this research, it is assumed that a board's relative independence from the political process is partly determined by the proportion of political appointees who serve on the investment board.

As noted by Hess (2005), Mayors and Governors may impose political pressure directly on politically affiliated board members for purposes of making them undertake short-term decisions at the expense of future generations, such as providing larger payouts and requiring lower contributions. They may also impose pressure indirectly via political appointees, including board members appointed by the executive or a legislator. Given this, the following hypothesis is proposed and tested for purposes of exploring the influence of political affiliation on investment return assumptions:

Hypothesis 1: The proportion of political appointees serving on a board, including board members that are appointed by a governor or a legislator, is positively related to the expected rate of return.

In addition to being determined by the proportion of political appointees that serve on an investment board, it is hypothesized that a board's relative independence is determined by its level of expertise or its access to expertise. Boards that exhibit or have access to relatively high levels of expertise are assumed to be better equipped to independently withstand political pressure. Conversely, boards without access to expertise are argued to be more vulnerable to political pressure and thus more prone to adopt investment return assumptions opportunistically.

In this research, it is assumed that investment boards' access to expertise is captured by their access to an investment council. Investment councils serve investment boards in an advisory capacity on matters relating to the management and oversight of pension funds. To assure that their responsibilities are carried out effectively, investment council members ought to be appointed based on their expertise and experience with investment-related matters. Statutes or boards tend to regulate required levels of investment experience for non ex-officio members. It can therefore be reasonably assumed that investment boards that have access to an investment council have access to relatively high levels of investment expertise. Given this, the second hypothesis explored is as follows:

Hypothesis 2: Boards without access to an investment council will on average adopt higher investment return assumptions than boards that do not have access to an investment council.

Given that investment councils have oversight responsibilities, it may also be argued that boards with access to investment councils are subject to more oversight and monitoring, compared to plans without access to an investment council. In this research it is theorized that oversight and monitoring efforts reduce investment boards' propensity to adopt actuarial assumptions opportunistically. Hence, the above hypothesis may also be used to offer insight into the influence that oversight and monitoring efforts has on investment return assumptions.

The third, fourth, and fifth hypotheses were developed for purposes of exploring the influence of oversight and monitoring efforts on investment return assumptions. The working assumption is that investment boards that are subject to oversight and monitoring are less prone to adopt rates for purposes of reducing annual plan contributions, compared to boards that are subject to more limited oversight and scrutiny. The underlying logic is that monitoring and oversight efforts discourage opportunistic behavior because they increase the likelihood that opportunistic attempts are detected.

The third hypothesis was developed to explore the effect that monitoring and oversight efforts and access to professional capacity has on the adoption of investment return assumptions. To capture professional capacity, data available from NASRA were used, indicating whether or not the pension system had been a recipient of the "Recognition Award for Administration" under the PPCC's standards award program. To receive this award, the retirement system must certify that

it meets requirements in five areas of assessment. On its website, NASRA outlines these as follows (NASRA, 2012):

1. *Comprehensive benefit program*: The system must provide a comprehensive benefit program including service retirement benefits, in-service death benefits, disability benefits, vesting, and provisions for granting a cost-of-living adjustment.
2. *Actuarial*: An actuarial valuation must be completed at least every 2 years using generally recognized and accepted actuarial principles and practices.
3. *Audit*: The system must obtain an unqualified opinion from an independent audit conducted in accordance with government auditing standards generally accepted in the United States.
4. *Investments*: The system must follow written investment policies and written fiduciary standards and the system must obtain an annual investment performance evaluation from an outside investment review entity.
5. *Communications*: Members must be provided a handbook or summary plan description, regular updates to the documents, and an annual benefit statement. Meetings of the governing board of the system are conducted at least quarterly with adequate public notice.

These requirements suggest that systems that receive this reward subject themselves to various monitoring efforts and lives up to certain administrative standards. As such, receipt of this award may be regarded as a reasonable proxy of monitoring and oversight. The following hypothesis is therefore proposed:

Hypothesis 3: Pension systems that have been awarded with PPCC's "Recognition Award for Administration" will on average adopt lower investment return assumptions compared to boards that have not received this award.

Given that the PPCC award indicates that a pension system lives up to certain administrative standards, it may be argued that receipt of the award also serves as an indicator of professional and administrative capacity. In this research, it is assumed that decision-making within boards that exhibit relatively high levels of professional and administrative capacity are more likely to adhere to high professional and ethical standards compared to boards that exhibit limited administrative or professional capacity. Given this it is expected that such boards are more likely to withstand political pressure and therefore less likely to adopt opportunistic assumptions. Hence, similar to the second hypothesis, the testing of Hypothesis 3 will offer insight into both monitoring and oversight efforts and independence.

The fourth hypothesis was developed to explore the effect that the proportion of board members who are pension plan beneficiaries has on the adoption of actuarial assumptions. It is hypothesized that boards that have a relatively large proportion of board members who are beneficiaries of the pension plan are less likely to adopt actuarial assumptions opportunistically. This hypothesis is grounded in the argument that the presence of such members removes the potential conflict of interest that may arise from delegating responsibilities to agents, given that such agents are also the principals. Consequently, the following hypothesis is tested:

Hypothesis 4: The proportion of plan members serving on an investment board is inversely related to the adopted assumed rate of return.

The fifth hypothesis explores the effect that unions have on the adoption of the assumed rate of return. The effect of this factor is difficult to predict. Previous research suggests that pension plans where the beneficiaries of a pension plan are unionized tend to have a strong "voice" and

are therefore more likely to monitor the activities of the pension plan (Vermeer et al., 2012). Good examples of such plans are fire and police employees' retirement plans, and teachers' retirement systems. As such, it may be hypothesized that these plans are less prone to adopt actuarial rates opportunistically. However, anecdotal evidence suggests that unions may have incentives to resist efforts aimed at lowering relatively high assumed rates of return based on the logic that such rates may lead to reduced public pension benefits. As noted by Walsh and Hakim (2012), public retirement systems are ". . . facing opposition from public sector unions, which fear that increased pension costs to tax payers will further feed the push to cut retirement benefits for public workers." Walsh and Hakim exemplifies this by drawing attention to the firemen union in Rhode Island's resistance to efforts by the trustees of its Police and Firefighters' pension fund to lower the rate from 8.25% to an assumed rate of return of 7.5%. In terms of annual required contributions this would result in an additional US\$300 million annual required contribution to the fund. According to Walsh and Hakim's report, lawmakers regarded this amount to be beyond the state's budgetary means and decided, as a result, to reduce public pension benefits. In this research, the following hypothesis is proposed:

Hypothesis 5: Investment boards that govern unionized plans *may* on average adopt lower rates of return, compared to nonunionized plans.

Fiscal Condition and Asset Allocation

As evidenced in previous empirical research, opportunistic adoption of actuarial assumptions may also be explained by a government's fiscal condition and the fiscal condition of the individual pension plan (Chaney et al., 2002; Mitchell & Smith, 1991). To account for these influences, three additional hypotheses are explored in this research. The first was added to explore the influences that pension plans' fiscal condition has on investment return assumptions. A common and generally accepted threshold for determining whether pension plans are financially healthy or not is to classify them based on whether they meet a generally accepted threshold of 80% funding level. According to Brainard and Zorn (2012) this threshold reflects a "healthy or minimum public pension funding level" that has its genesis ". . . in corporate plans, for which it was a statutory threshold." In addition, Brainard and Zorn (2012) note that this threshold is used by credit rating agencies as a general indicator of a public pension plan's financial health. They write:

S&P assigns a "strong" rating for funding levels above 90 percent; a rating of "above average" for levels between 80 percent and 90 percent; "below average" for funded levels 60 percent to 80 percent; and "weak" below 60 percent.

Given that the adoption of relatively high investment return assumptions reduces the present value of pension obligations and thereby improves the funding ratio, it is hypothesized that retirement systems that fail to meet the threshold have higher incentives to adopt relatively high assumptions, compared to systems that are already meeting the threshold.

The second and third hypotheses explore the influence of governments' fiscal situation on investment return assumptions. As noted above, previous research suggests that governments that are experiencing fiscal stress are more prone to adopt actuarial assumptions opportunistically. In this research, I rely on data about each individual state's budget outlook to capture their fiscal situation in the given year. Specifically, it is hypothesized that the size of a state's fiscal gap increases the propensity of the government to impose political pressure on board members to adopt actuarial assumption that reduces the ARC.

Another possible indicator that may be used to capture the level of fiscal stress experienced by a state government during a particular year is the proportion of the ARC that the government

pays. With the adoption of GASB Statement No. 27, it may be argued that governments have few reasons not to pay the full amount of the ARC, unless they are experiencing severe fiscal constraints. As noted earlier, the adoption of GASB Statement No. 27 placed emphasis on making the ARC transparent, making it particularly important for governments wanting to be perceived as fiscally responsible to pay the full ARC. Given the transparency that surrounds the ARC, it is assumed that there are few reasons beyond fiscal stress that would entice a government to not pay the full ARC. In this research it is therefore hypothesized that the proportion of ARC a government pays is negatively related to the adopted rate of return.

In addition to fiscal constraints it is also important to account for the potential influence that asset allocations have on investment return assumptions. The asset allocation associated with a portfolio is regarded to be an important determinant of adopted investment return assumptions (Brainard, 2010). Portfolios that are allocated relatively heavy in equities and alternative assets should expect to earn higher rates of return than portfolios that invest in relatively safe instrument such as fixed income securities and cash. In this research, it is therefore hypothesized that investment boards that govern funds invested in relatively conservative investment portfolios will on average adopt lower investment return assumptions compared to boards that govern funds invested less conservatively.

Data Description

The data used for this research were drawn from several different sources. The majority of the data were drawn from the Boston College Public Plans Database (Center for Retirement Research at Boston College, 2012). This database provides time series data for 107 state DB pension plans in the United States, including data on assumed rates of return, their historical performance, and a range of data that may be used to capture not only the relative independence of investment boards, but also the extent to which they are subject to monitoring and oversight. These data were supplemented by data collected from CAFRs published by the individual retirement systems, as well as with data on retirement systems awarded with the “Recognition Award for Administration” under the PPCC standards award program. The latter were gathered from NASRA’s website.

Three types of adjustments were made to the data set. First, given that this research centers on actuarial decisions controlled by investment boards, the data set was adjusted for purposes of removing investment plans that are not governed by a board of trustees. Second, the data set was adjusted for purposes of removing plans where the boards of trustees do not have control over actuarial decisions. As noted above, survey data collected by the PPCC (Zorn, 2002) indicate that investment boards have the controlling authority over actuarial assumptions in almost 95% of the existing state and local pension funds. Finally, data were incomplete or could not be identified for two systems. These two observations were removed from the data set. Following these adjustments the data set consisted of 88 observations.

As indicated by the descriptive data in Table 1, the plans in the sample range from relatively small (investments of US\$781 million) to very large (US\$245 billion) and have a wide range of governance characteristics. The largest board governing a plan had 20 members and the smallest board consisted of 3 members. On average, approximately 48% of board members are appointed. The assumed rates of return for the plans range between 7.25% and 8.5%, with an average assumed rate of 7.97%. The actual rate of return earned by the pension plans during the years 2001 to 2009 was 3.06%. Hence, based on the 9 years of data included in the Boston plan data, the assumed rate of return exceeded the actual rate with 4.91%. The average fund ratio for the plans in 2009 was 74.7 and more than half of the plans (61%) in the data set failed to meet the generally accepted threshold of an 80% fund ratio. Finally, plans from 48 states were represented in the data set.

Table I. Variables and Descriptive Statistics

| | N | Minimum | Maximum | Mean | SD |
|--|----|---------|-----------|-------------|--------------|
| ActAssets | | | | | |
| Actuarial value of plan assets (thousands) | 87 | 780808 | 244964000 | 26308560.30 | 38144507.203 |
| PropPolAppt | | | | | |
| Percent of appointed board members | 88 | 0.00 | 1.00 | 0.4974 | 0.28367 |
| InvCncl | | | | | |
| Board has access to an investment council | 88 | 0.00 | 1.00 | 0.3182 | 0.46844 |
| PropBrdPart | | | | | |
| Percent of board members participating in investment plan | 88 | 0.00 | 1.00 | 0.5670 | 0.22364 |
| Union | | | | | |
| Unionized | 88 | 0.00 | 1.00 | 0.6364 | 0.48380 |
| BudGap | | | | | |
| Budget gap | 88 | 0.00 | 28.10 | 8.5602 | 6.20674 |
| PercARC | | | | | |
| Percent ARC | 88 | 5.99 | 139.30 | 88.3033 | 21.95594 |
| FundRatio | | | | | |
| Fund ratio | 88 | 41.30 | 100.00 | 74.7468 | 15.46835 |
| FailThreshold | | | | | |
| Failed to meet 80% fund ratio | 88 | 0.00 | 1.00 | 0.6136 | 0.48971 |
| INVASSUMP | | | | | |
| Investment assumption | 88 | 7.25 | 8.50 | 7.9665 | 0.31033 |
| Totbrd | | | | | |
| Total number of board members | 88 | 3.00 | 20.00 | 10.4091 | 3.54491 |
| AverageROR | | | | | |
| Average rate of return during years 2001-2009 | 88 | 1.61 | 7.14 | 3.0580 | 1.05551 |
| PPCCaward | | | | | |
| Recipient of PPCC certificate | 88 | 0.00 | 1.00 | 0.6477 | 0.48042 |
| PropFixedCash | | | | | |
| Proportion of fixed income investments and cash in relation to total investments | 88 | 14.00 | 85.00 | 29.8560 | 10.99420 |
| Valid N (listwise) | 87 | | | | |

Analysis and Results

In order to explore the above hypotheses, the following model was estimated:

$$\text{INVASSUMP} = \alpha + \beta_1 \text{PropPolAppt} - \beta_2 \text{InvCncl} - \beta_4 \text{Union} - \beta_5 \text{PropBrdPart} - \beta_6 \text{PercARC} + \beta_7 \text{BudgetGap} + \beta_8 \text{FailThreshold} - \beta_9 \text{PropFixedandCash} + \varepsilon$$

The dependent variable, assumed rate of return (INVASSUMP), was drawn directly from the Boston College data set and is based on the reported investment return assumptions for each of

the pension plans in fiscal year 2009. As discussed above, the assumed rate of return is expected to be inversely related to the relative independence of investment boards and the level of monitoring and oversight efforts they are subjected to.

The expected signs of the coefficients for the independent variables are shown in the above equation. The variable used to capture the proportion of politically appointed board members is referred to as "PropPolAppt." It is defined as the proportion of board members appointed by either a governor or a legislator. Given that it is hypothesized that boards with a larger proportion of politically appointed board members are more likely to adopt actuarial assumptions opportunistically, the coefficient "PropPolAppt" is expected to be positively related to "INVASSUMP."

The variable used to capture an investment board's access to expertise is referred to as "InvCncl." As noted above, it is assumed that a board's access to expertise is partly determined based on whether it has access to an investment council or not. To operationalize this variable, a dummy variable was used to distinguish boards that have access to an investment council from those that lack such access. Specifically, the variable was coded as "1" if the plan had a board with access to an investment council and as "0" if not. The expectation is that a board's access to expertise reduces its propensity to adopt optimistic actuarial assumptions. As noted above, it is also expected that a board's access to an investment council partially captures the level of monitoring it is subject to. Given this, the variable "InvCncl" is expected to be inversely related to "INVASSUMP."

To capture the extent to which the pension system has access to professional capacity, I relied on data indicating whether or not the pension system was a recipient of "The Recognition Award for Administration" under the PPCC's standards award program. A dummy was developed to distinguish between plans that had received a PPCC award from those that had not received such an award. Specifically, it was coded as "1" if the retirement system received the award during the given fiscal year and as "0" if not. As noted above, recipients of the award subject themselves to additional oversight and monitoring. This variable is therefore assumed to also capture the influence of monitoring and oversight efforts. As indicated by the equation, the variable "PPCCaward" is expected to be negatively related to the dependent variable.

The fourth variable "Union" was also coded as a dummy variable. Specifically, this variable was coded as "1" if the plan serve beneficiaries who have strong unions, including police and fire and teachers pension plans, and coded as "0" if the plan was a general DB state pension plan. As indicated by the equation and the above discussion, the relationship between "Union" and "INVASSUMP" is ambiguous.

The fifth variable was added to capture the effect that the proportion of board members who are participants in the pension plan has on the selection of the assumed rate. This variable is referred to as "PropBrdPart" in the above equation. Given that it is hypothesized that a higher proportion of members increases monitoring and oversight efforts, a negative relationship is expected between "PropBrdPart" and "INVASSUMP."

The variable used to account for the fiscal condition of pension plans is referred to as "FailThreshold." It was developed based on data about the magnitude of the unfunded liability of the individual pension plans in the sample. The generally accepted threshold of 80% funding level was used to distinguish plans that are financially healthy from those that are not. Specifically, a dummy variable was used to distinguish between pension plans that met the given threshold in the given fiscal year from those that did not. The variable was coded as "0" if the plan met the threshold and as "1" if not. Given this, a negative relationship is expected between "FailThreshold" and "INVASSUMP."

Two variables were added to the model to account for the effects that fiscal stress of the general state government might have on investment return assumptions. These two variables are referred to as "PercARC" and "BudgetGap" in the above equation. "PercARC" measures the

Table 2. Model Summary

| Model | R | R ² | Adjusted R ² | SE of the Estimate | |
|------------|----------------|----------------|-------------------------|--------------------|-------|
| I | 0.596 | 0.356 | 0.281 | 0.26308 | |
| Model | Sum of squares | df | Mean square | F | Sig. |
| I | | | | | |
| Regression | 2.980 | 9 | 0.331 | 4.784 | 0.000 |
| Residual | 5.399 | 78 | 0.069 | | |
| Total | 8.379 | 87 | | | |

proportion of the ARC that is paid. It is defined as the percentage of the annual required contribution that the system funded in fiscal year 2009. As discussed above, there are few reasons beyond fiscal stress that would entice a government from not paying the full ARC. An inverse relationship is therefore expected between “PercARC” and “INVASSUMP.” The variable “BudgetGap” reflects the budget gap experienced by the government in the given fiscal year. Based on previous empirical findings, fiscal stress is expected to increase the propensity of boards to adopt actuarial assumptions opportunistically. Specifically, the variables “BudgetGap” and “PercArc” are expected to be positively related to “INVASSUMP.”

Finally, data drawn from the public plans database were used to capture the influence that portfolio allocation has on the investment return assumption. In the above model, this variable is referred to as “PropFixedCash.” It is defined as the proportion of fixed income investment and cash that is held in the plan’s investment portfolio. A relatively heavy proportion of investments in fixed income securities and cash suggest that the portfolio is relatively conservative in terms of its investment strategy. Hence, a negative relationship is expected between “PropFixedCash” and “INVASSUMP.”

The results from the estimation of the above equation are shown in Tables 2 and 3. As indicated by Table 2, the model is statistically significant and the R^2 statistic indicates that the model explains more than 35% (the adjusted R^2 is 29%) of the variation in INVASSUMP. Furthermore, an assessment of the relationships across the independent variables suggests that problems of multicollinearity are limited. The correlation matrix in the appendix indicates that there are no strong linear relationships between the independent variables. Three of the variables are correlated at statistical significant levels. However, the correlation coefficients indicate that the correlations are relatively weak, ranging from -0.213 to -0.293 . The coefficients for the remaining variables are not statistically significant.

As indicated by the regression results in Table 3, four of the nine variables in the model are statistically significant. With respect to the main variables of interest, the model provides empirical support for the hypothesis that the proportion of political appointees serving on an investment board increases its propensity to adopt relatively high investment return assumptions. Specifically, the variable “PropPolAppt” is statistically significant at the 5% level and carries the correct sign. The coefficient is also relatively strong with a β that equals 0.219, suggesting that the assumed rate of return will increase by 0.219% for each percentage increase in the proportion of political appointees serving on the board.

The second statistically significant variable is “InvCncl.” Contrary to expectations, the results suggest that investment boards with access to an investment council, on average, adopt higher investment return assumptions than boards without access to an investment council. As suggested by Vermeer et al. (2010), this may indicate that expertise may be used for purposes of helping clients (i.e., the board in the context of this research) to act opportunistically. While

Table 3. Regression Coefficients^a

| Model | Unstandardized coefficients | | Standardized coefficients | | Sig. |
|---------------|-----------------------------|-------|---------------------------|--------|-------|
| | β | SE | β | t | |
| I | | | | | |
| (Constant) | 7.944 | 0.190 | | 41.731 | 0.000 |
| PropPolAppt | 0.219 | 0.109 | 0.201 | 2.019 | 0.047 |
| InvCncl | 0.192 | 0.063 | 0.290 | 3.070 | 0.003 |
| PPCCaward | 0.040 | 0.063 | 0.061 | 0.629 | 0.531 |
| Union | -0.004 | 0.062 | -0.007 | -0.070 | 0.944 |
| PropBrdPart | 0.201 | 0.134 | 0.145 | 1.500 | 0.138 |
| PercARC | -0.002 | 0.001 | -0.156 | -1.627 | 0.108 |
| BudGap | 0.005 | 0.005 | 0.107 | 1.139 | 0.258 |
| FailThreshold | 0.247 | 0.066 | 0.390 | 3.724 | 0.000 |
| PropFixedCash | -0.010 | 0.003 | -0.341 | -3.620 | 0.001 |

^aDependent variable: INVASSUMP.

Vermeer et al.'s research centered on expertise gained through auditors, a similar argument may be made in cases where expertise is gained via investment councils. A possible venue of future research might therefore be to examine the political linkages between investment councils and actuarial assumptions.

The third statistically significant variable in the model is "FailThreshold," which was added to capture the fiscal condition of the pension plan. As indicated by the model, this variable is statistically significant at the 1% level, carrying the expected sign. The results indicate that pension boards that govern plans that fail to meet the 80% funding threshold, on average, adopt higher assumed rates of return than boards that govern plans that meet this threshold. As theorized above, this may partly be a result of an effort to minimize the risk for bad publicity. Neither of the two variables that were added to capture the impact of fiscal constraints experienced by the government was statistically significant (i.e., PercARC and BudGap).

As theorized, support is also provided in support of the hypothesis that the adoption of assumed rates of return is partly determined by asset allocations. As expected, the results indicate that plans that establish more conservative investment portfolios (i.e., a larger proportion of assets invested in fixed income and cash), on average, assume lower rates of return compared to plans that invest their assets more aggressively (i.e., stocks and alternative assets). However, the weakness of the coefficient is notable (-0.01). Considering the strength of the coefficient for "PropPolAppt," the results suggest that the political component has a stronger explanatory value than asset allocations in terms of explaining the adoption of investment return assumptions. Finally, neither of the monitoring variables in the model is statistically significant.

Conclusion

This research has sought to add to an existing body of research that suggests that the adoption of investment return assumptions may partly be explained by political opportunism. This research has sought to add to this body of literature by examining how oversight and monitoring efforts and investment boards' relative independence from the political process influence adopted investment return assumptions. Based on a multivariate regression analysis of data on 88 state government DB pension funds in the United States, the analysis suggests that adopted

investment return assumptions are partly determined by investment boards' affiliation with the political process. Specifically, the results suggest that investment boards consisting of a relatively high proportion of political appointees, on average, assume higher rates of return compared to boards consisting of a lower proportion of political appointees. The results also indicate that adopted investment return assumptions are partly explained by asset allocations. Specifically, the results suggest that boards that govern more conservative investment portfolios, on average, assume lower investment return assumptions than boards that govern portfolios that assume higher risks.

Consistent with previous empirical research, support was also provided for the hypothesis that the fiscal condition of pension plans affects investment return assumptions. The results suggest that fiscally unhealthy plans, on average, adopt higher investment return assumptions than fiscally healthy plans. Finally, and contrary to expectations, the results suggest that investment boards that have access to an investment council, on average, adopt higher investment return assumptions than boards that do not have access to an investment council.

The above findings are important, in part, because they draw attention to possible linkages between the quality of financial information that is reported about the financial condition of public pension funds and their surrounding governance structure. As noted earlier, reliable information about the actual size of unfunded pension liabilities is critical in political environments, where there tend to be a bias toward shifting pension obligations to future constituents. The findings also raise questions about the effectiveness of existing pension accounting practices in terms of providing accurate information about the size of unfunded pension liabilities. Such information is critical for purposes of providing transparent information about the implications that funding decisions have on intergenerational equity. As noted by Peskin (2001), assuring intergenerational equity is the primary purpose of pension funding. The GASBs recent adoption of Statement No. 68 responds to these concerns, in part, by requiring state and local governments to include their net pension liabilities on the balance sheet, and by providing more transparent information about the annual costs of pension benefits. Statement No. 68 is also likely to mitigate concerns over the relatively high discount rates that governments adopt, by way of requiring governments to use a separate discount rate for any portion of the liability that is not funded. As noted earlier, this discount rate will be based on the index rate on a tax-exempt 20-year AA or higher-rated municipal bonds; a rate that is significantly lower than the typical discount rate adopted by state and local governments.

Finally, the above findings are important in that they offer insight into potential problems that may arise from the use of accounting discretion in political environments. A common theoretical argument is that competitive markets discipline entities to make prudent and transparent accounting choices. Such disciplining factors are typically not present in public sector contexts. In this research, several types of oversight and monitoring efforts were explored. No empirical support was found that suggests that these affect the selection of investment return assumptions. As such, it may be argued that it is particularly important, in political environments, to implement measures aimed at reducing the political vulnerability of investment board decisions. The findings presented in this research suggest that a reduction of the proportion of politically appointed members serving on the boards may reduce this vulnerability.

Given that this study is based on a limited number of observations ($N = 88$), some caution ought to be taken in interpreting the results of the analysis. Having said this, however, it should also be noted that the regression coefficients generated in the empirical model are quite strong and that the pension plans in the sample represents the majority of the state run DB pension plans in the United States (48 states). As such, the findings of this research ought to carry a relatively high degree of external validity or generalizability, despite the limited number of observations.

Appendix: Correlation Matrix

| | PropPol Appt | InvCncl | PPCC award | Union | PropBrd Part | PercARC | BudGap | FailThresh hold | PropFixed Cash |
|------------------------|-----------------|---------|---------------|---------|-----------------|---------|--------|--------------------|-------------------|
| PropPolAppt | | | | | | | | | |
| Pearson's correlation | 1 | -0.070 | -0.095 | -0.042 | -0.203 | 0.106 | 0.150 | -0.213* | -0.020 |
| Sig. (two-tailed) | | 0.517 | 0.377 | 0.698 | 0.057 | 0.325 | 0.162 | 0.046 | 0.851 |
| N | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 |
| InvCncl | | | | | | | | | |
| Pearson's correlation | -0.070 | 1 | 0.095 | 0.060 | 0.049 | 0.019 | -0.151 | -0.210 | -0.015 |
| Sig. (two-tailed) | 0.517 | | 0.378 | 0.579 | 0.653 | 0.857 | 0.159 | 0.050 | 0.892 |
| N | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 |
| PPCCaward | | | | | | | | | |
| Pearson's correlation | -0.095 | .095 | 1 | 0.184 | 0.159 | 0.110 | -0.034 | -0.292** | -0.061 |
| Sig. (two-tailed) | 0.377 | 0.378 | | 0.086 | 0.140 | 0.306 | 0.753 | 0.006 | 0.575 |
| N | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 |
| Union | | | | | | | | | |
| Pearson's correlation | -0.042 | 0.060 | 0.184 | 1 | 0.049 | 0.177 | 0.043 | -0.260* | 0.105 |
| Sig. (two-tailed) | 0.698 | 0.579 | 0.086 | | 0.647 | 0.098 | 0.691 | 0.014 | 0.330 |
| N | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 |
| PropBrdPart | | | | | | | | | |
| Pearson's correlation | -0.203 | 0.049 | 0.159 | 0.049 | 1 | 0.108 | -0.023 | -0.107 | -0.155 |
| Sig. (two-tailed) | 0.057 | 0.653 | 0.140 | 0.647 | | 0.318 | 0.832 | 0.322 | 0.149 |
| N | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 |
| PercARC | | | | | | | | | |
| Pearson's correlation | 0.106 | 0.019 | 0.110 | 0.177 | 0.108 | 1 | 0.093 | -0.190 | 0.122 |
| Sig. (two-tailed) | 0.325 | 0.857 | 0.306 | 0.098 | 0.318 | | 0.389 | 0.076 | 0.259 |
| N | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 |
| BudGap | | | | | | | | | |
| Pearson's correlation | 0.150 | -0.151 | -0.034 | 0.043 | -0.023 | 0.093 | 1 | 0.012 | 0.074 |
| Sig. (two-tailed) | 0.162 | 0.159 | 0.753 | 0.691 | 0.832 | 0.389 | | 0.915 | 0.490 |
| N | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 |
| FailThresh hold | | | | | | | | | |
| Pearson's correlation | -0.213* | -0.210 | -0.292** | -0.260* | -0.107 | -0.190 | 0.012 | 1 | 0.047 |
| Sig. (two-tailed) | 0.046 | 0.050 | 0.006 | 0.014 | 0.322 | 0.076 | 0.915 | | 0.661 |
| N | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 |
| PropFixed Cash | | | | | | | | | |
| Pearson's correlation | -0.020 | -0.015 | -0.061 | 0.105 | -0.155 | 0.122 | 0.074 | 0.047 | 1 |
| Sig. (two-tailed) | 0.851 | 0.892 | 0.575 | 0.330 | 0.149 | 0.259 | 0.490 | 0.661 | |
| N | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 |

*Correlation is significant at the 0.05 level (two-tailed).

**Correlation is significant at the 0.01 level (two-tailed).

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Bio

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