

Public Policy and Market Reality:
Analyzing the unfunded liability in the
Kentucky Non-hazardous Employees' Retirement System

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Executive Summary

In 2006, an issue of serious concern to state legislatures was the long-term security of the defined benefits that state and local public pension plans promise to current and future retirees (Snell, 2006). Public pension systems are growing in terms of members and the benefits they offer to their members. Part of this group includes the estimated 77 million baby-boomers who will be living the next 20 to 30 years in retirement (Wharton, 2006). These dynamic changes are raising the burden public pension plans place on government operating budgets. Expecting a large number of their employees to retire, public administrators are becoming more concerned about meeting the retirement pledges to their public employees and also maintaining a desired level of public services demanded by their taxpayers (Mattoon, 2006).

In a study of 58 state pension systems, Wilshire Associates found that 84% were under-funded in 2005 by an estimated \$157.1 billion (Wilshire and Associates, 2006). The pension unfunded liability problem has been gaining attention in the Commonwealth of Kentucky. During February 2007, Governor Ernie Fletcher passed an executive order to establish a task force that would examine ways to restore the financial health of the state's two main public retirement systems, the Kentucky Retirement System (KRS) and the Kentucky Teachers Retirement System. As of June 30, 2006 the unfunded liability for KRS was \$11.9 billion (excluding the County Retirement systems), \$3 billion more than the General Fund operating budget for fiscal year 2007.² The unfunded liability is a measure of the degree to which the cost of benefits that have been earned by members to date but not yet paid exceeds the value of the assets available to pay for benefits. These benefits are contractual obligations of the Commonwealth and are protected by statute as well as the state constitution (KRS, 2006).

Several states, including like Kentucky, are trying to address their unfunded liabilities and escalating costs before the real hardships occur. Severely under-funded public pension systems have caused some governments to reduce their provision of public services. Municipal bond ratings and, therefore, government's potential to borrow funds has also been negatively affected. In addition, if the unfunded liability problem continues to be deferred by policymakers it will raise the employer contribution rates needed to pay for future pension liabilities and consume an even larger portion of their operating budgets increasing the financial burden on future taxpayers. To avoid these negative consequences, public administrators are developing policies aimed at funding their pension systems at actuarially sound levels.

This paper analyzes how the cyclical market affects the funding levels of public pension systems and evaluates funding strategies public pension systems can use to prepare for the future. I analyze the impact of different investment management policies on the KERS Non-hazardous system and the feasibility of issuing pension obligation bonds to pay off the unfunded liability. The first section provides an overview of the structure of public pension plans, describes how these systems are funded, and identifies the factors that can affect their funding level. The next section discusses causes of unfunded liabilities and their implications. The third section discusses potential solutions various states have implemented to address unfunded liabilities and improve the funding of their plans. The fourth section looks at the Kentucky Employees' Retirement Non-hazardous System's unfunded liability and analyzes the specific conditions that caused it. The fifth section discusses my analysis with the data, methodology and results discussed within each subsection. In the last section, I discuss various policy implications associated with my analysis and offer recommendations for improving public pension funding.

² The combined unfunded liability of KRS's five separate systems was an estimated \$18.8 billion as of June 20, 2006. This data was reported in KRS's Comprehensive Annual Financial Report. Kentucky's General Fund operating Budget was \$8.8 billion for fiscal year 2007.

Background of Public Pension Systems

There are two general types of pension plans, defined benefit and defined contribution. In a *defined-benefit* plan, the employer guarantees a specified dollar amount to be received in retirement. The benefit is based on a formula that usually incorporates the employee's salary, years of service, age at retirement, and a multiplier known as a benefit factor. Most state plans use the employee's highest three to five years of salary in the benefit calculation. In addition, an employee normally has to be vested in the plan for a certain number of years before they are entitled to their benefit. Finally, the initial amount of the individual's check is usually adjusted annually for the effects of inflation (NASRA, 2006).

Using an example, the defined benefit for an Illinois State employee retiring at age 60 with a final average salary of \$45,000 and 30 years of service is calculated by multiplying the employee's years of service (30) by his final average compensation (\$45,000) and multiplying that number by Illinois' benefit factor of 1.67%. This yields an initial retirement benefit of \$22,545, which will be paid for the rest of that retiree's life (Hynes, 2006).

In a *defined-contribution* plan an individual investment account is maintained for each employee. The benefit in a defined contribution plan is determined by the amount contributed to the account by the employer and employee and the investment returns earned by the account contributions. In a defined contribution plan, the employer contribution is specified and guaranteed. However, the future annual income is not guaranteed under a defined contribution plan as it is in a defined benefit plan. Therefore, the value of employee's investment (and therefore, the amount available for annual withdrawal) can fluctuate depending on the returns to investment on the contributions to the account. At retirement, the employee can withdraw the total lump sum, have it converted to a lifetime annuity, or receive it in a certain number of periodic payments. A *hybrid* plan is another type of plan that is

gaining popularity among states. The hybrid plan combines both types of plans and allows the employee to receive a relatively smaller guaranteed annual amount through a defined benefit plan but requires the employee to supplement that benefit with what is earned from contributions to a defined contribution plan (NCSL, 2006, NASRA).

In Michigan, the state is required to contribute 4 percent of an employee's salary to his individual account. The employee is not required to make a contribution but may receive a dollar-for-dollar match if they contribute up to 3 percent of their salary. If an employee wants to contribute above 3 percent he can, but the state will only match the first 3 percent of the employee's contribution. He can choose among different investment options for the funds in his account. His retirement benefit depends on the total contributions to the fund and the earnings made on the selected investments (NCSL, 2006).

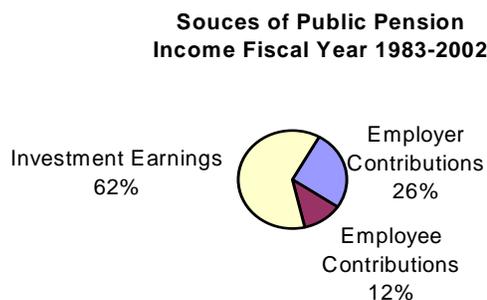
A key difference between these plans is party that assumes the investment risk. In defined-benefit plans, the employer is responsible for deciding how much to contribute to the plan annually and how the contributions will be invested. The employer absorbs both the gains and losses associated with investment returns while guaranteeing payment of the retirement benefit calculated by the formula. Conversely, the employee is responsible for the investment management of their own funds in the defined-contribution plan. If investment returns on the pension funds are below expected levels, an increase in employer contributions will be necessary to cover the loss. Since the employer contribution is fixed for defined-contribution plans, the pension liability problem does not exist (Peng, 2004; NASRA, 2006).

According to the U.S. Bureau of Labor Statistics, about ninety percent of state and local government employees participate in a defined benefit. States such as Alaska, Colorado, Montana, and Florida have elected to offer a defined contribution plan in the past six years (NASRA, 2006; NCSL.

2006). Over the last few decades, more employers have begun offering defined contribution plans for reasons like portability of plan benefits for employees who may switch jobs, shifting the investment risk to employees by allowing them to select and manage the investments in their account, and because these plans require less oversight and regulation from the employer or plan trustees since employees assume most of the responsibility for their accounts. I will discuss later the experiences of states that have switched from their traditional defined benefit plan to a defined contribution plan. Since the majority of public employees participate in a traditional defined benefit plan, the remainder of my paper will apply to this popular type of plan (NASRA, 2006; NCSL, 2006).

How Public Pension Systems are Funded

Pension funds can be thought of as a financial account where the contributions are saved and invested for payment of employment benefits at some point in the future. Most of the assets needed to fund the future liabilities of the pension plan are accumulated during the working life of the employee.



Source: National Association of Retirement Administrators 2002

The main three assets in a public pension plan are employee contributions, employer contributions, and the investment returns on those contributions. According to the National Association of Retirement System Administrators, public pension systems collected \$2.7 trillion

dollars in income in 2002 (NASRA, 2002). Employee contributions made up 12 percent of that income, while employer contributions and investment earnings made up 25 and 62 percent respectively (NASRA, 2006).

In 2004, ninety percent of public pension plans required employees to contribute some of their own earnings to the retirement account. The employee contribution rate is usually set by law and does not vary. The 2005 Public Fund Survey on state and local retirement systems reported a median employee contribution rate of 5 percent (Brainard, 2005).³

Employer contribution rates are typically either set by statute or based on an *actuarial valuation*. An actuarial valuation uses a cost method that estimates the present value of benefits to be payable in the future considering employee service to date. This method assigns some equal benefit amount to each year of accrued, actual, and expected future service. The *actuarial accrued liability* is allocated to past service. The actuarial accrued liability is a cost that should currently be fully covered by the assets in the account or fund. If this liability is not covered by the available assets it is known as the *unfunded actuarial accrued liability* (UAAL). The *normal cost* is the cost assigned to the benefits accruing during the current year for normal retirements. This is also known as the actual cost and is expressed as a percentage of payroll. The *future normal cost* is the expected benefits for future service that will need to be funded in the future. These are the three cost components considered by the employer when determining funding methods (Mason, Brainard, Langer, Young and Ross, 2004).

The employee and employer contributions are placed in a pension trust fund where they are invested to earn the hoped-for actuarial investment rate of return. The investment returns on the contributions are a critical component of public pension income as shown in pie chart on page five.

³ The Public Fund Survey represents approximately eighty-eight percent of state and local government retirement systems.

Factors that affect the funding levels of Public Pension Systems

As stated in the previous section, a fund with assets that are less than accrued liabilities is considered underfunded. The amount by which the liabilities exceed the assets is called the unfunded liability. A public pension system's funding level and, therefore, the size of the system's unfunded liability, is affected by the growth of the pension fund's assets and liabilities. This section discusses the impact of the investment returns and employer contributions on asset levels.

Investment returns are a significant source of income for public pension systems. The investment and asset allocation strategy used by the trustee of the pension fund determines the level of investment returns the fund achieves. When a government has a conservative investment strategy, its portfolio has a higher percentage of low-risk instruments such as treasury securities. Because these securities are considered low-risk they carry a lower yield than other securities which might prevent the funds from realizing the actuary's projected earnings depending on how the market performs. On the other hand, when a government adopts an aggressive investment strategy its portfolio has a higher percentage of high-risk instruments with higher yields like equitable securities. The key to asset allocation is diversification so that the portfolio achieves the desired level of earnings for a bearable amount of risk to the employer (Peng, 2004).

During the 1990's, states started investing a greater percentage of their investment portfolios in equity securities. To their advantage, the shift in asset allocation and the bull market of that period improved funding levels of public pension funds during the period because it substantially increased the valuation of the assets held in these funds. However, the downturn of the market between 2000 and 2002 caused several systems to lose significant investment value, which dramatically reduced their asset to liability ratios (Mason, Brainard, Langer, Young and Ross, 2004). Many states are facing major increases in employer contribution rates to cover the losses their systems suffered in asset value

from their poor market experience. The Wilshire Report on State Retirement Systems reported state pension portfolios had an average allocation to equities of 67.7 percent and 32.3 percent fixed-income securities in 2005 (Wilshire, 2005). While the market downturn had a major effect on many state systems, this experience may have also taught these systems to prepare for future cyclical swings in the market (Peng, 2004).

Growth in liabilities is dependent upon the level of benefits payable to current and future retirees estimated by the actuary. Actuarial assumptions play a critical role in pension funding, since they estimate the liability or the long-term cost of defined benefit pensions. Among the many assumptions made by the actuary are the number of employees vested, expected mortality rates, cost of living adjustments, employee withdrawals, and the average work life of the employer's labor force (Livingston, 1996). The actuary makes three main economic assumptions in his analysis. The actuary first projects the amount of an individual's future benefit by estimating the salary increases until retirement. Second, the actuary estimates the rate of inflation for each year after retirement until death. Third, after the final benefit is determined he assumes the rate at which he will discount the benefit back to obtain the present value (Hustead, 2001).

The discount rate represents the expected rate of investment return on the pension fund until the employee's retirement. Mahoney suggests using a discount rate that is as close to the reality of the market as possible for determining the accurate actuarial level of contributions needed (Mahoney). According to the efficient market theory, "financial prices exhibit a random walk behavior and thus can not be predicted with consistency." Conversely, research on "market timers" from Timers Digest and Hulbert Financial Digest shows that some timers have been reliable in their predictions about the market.⁴ The Public Fund Survey says the median discount rate assumption of most pension plans is 8

⁴ Timers Digest and Hulbert financial digest track the performance of market timers over thirty year periods and publish information on "timers" recommendations and signals.

percent although the number of plans using an assumption lower than the median have increased (NASRA, 2005). Husted considers between 8 percent and 7.75 to be a very conservative assumption about the market (Husted, 2001).

To illustrate the effect of the discount rate, return to the example of the Illinois state employee with the annual retirement benefit of \$22,545. If the State of Illinois wanted to find out how much it would have to invest today for 30 years assuming a future investment rate of 8 percent, it could determine the present value of the annual benefit using the 8 percent discount rate which is \$3,577. If the discount rate is changed to 6 percent, the present value of the benefit changes to \$6,267. Therefore, the higher the discount rate assumption (expected investment return) the lower the investment needed today.

The discount rate is probably the most controversial assumption in the evaluation because of its impact on the liability or cost of plan to the employer. If the actuary assumes a market upswing and predicts the pension fund will have strong investment returns in coming years, he will assume a higher discount rate and reduce the present value liability which reduces future required employer contributions. This assumes that the assets would earn substantial investment returns from the market and the higher value of the assets will cover the fund's estimated pension liabilities (Husted, 2001). The level investment returns is also dependent upon the asset allocation of the pension fund's investment portfolio. If the actuary is wrong and market does worse than expected the plan would be at risk due to the failure of the fund's assets to earn projected level of investment returns and the reduced employer contributions (Mahoney, 2002).

The Funding Decision

The division between who decides the required contribution to cover future benefits, how the contributions should be invested, and the actual amount the employer will contribute can add

inconsistency to the pension funding decision if the benefit policy, investment policy, and funding policy are not somewhat integrated. The trustee of a pension plan, with assistance from the actuary, is generally responsible for deciding the employer's *actuarial contribution rate*-the employer's contribution rate determined by actuarial valuation.⁵ An investment committee assists the trustee with the investment strategy and asset allocation of the funds. But the funding decision is left to the discretion of the policymaker (Useem and Hess, 2001).

Some employers fully fund their defined benefit plans at levels where the value of the current fund assets is equal to the estimated benefit liabilities of current and future retirees. While employers should strive to meet their required contribution rates to fully fund state pension funds, it is often difficult, especially if their state is experiencing a budget deficit. Regardless of poor market performance or whether their actuary's contribution rate is sufficient, employers are still responsible for funding pension obligations (Mason, Brainard, Langer, Young and Ross, 2004).

Larry Langer with Gabriel, Roeder, Smith & Company, a benefit and actuary consulting firm, says when a plan is underfunded "we make sure that the normal cost amount is contributed and then we try and pay off the sliver of unfunded actual accrued liability that is not yet covered by the assets." This is known as the *annual required contribution* (ARC). The Governmental Accounting Standards Board (GASB) requires governments to pay off their unfunded liability over a thirty-year period. Generally, governments will amortize the unfunded liability within the thirty-year limit and include the amortization payment on the unfunded liability in their annual required contribution (ARC) (Mason, Brainard, Langer, Young and Ross, 2004).

Fiscal stress is the most cited reason for pension contribution deferment by government employers. When money is tight and times are tough employers typically do not view pension

⁵ The actuarial contribution rate includes the normal cost for the current fiscal year and the amortization payment on the unfunded liability. This rate is usually expressed as a percentage of projected payroll.

obligations to be as urgent as other budgetary demands for general fund dollars. In those situations, demands for public safety, Medicaid, or education can be greater (Peng, 2004). While deferment of employer contributions may seem irresponsible, most employers use deferment as a countercyclical budget tool (Peng, 2004; Mahoney, 2002; Mason, Brainard, Langer, Young and Ross, 2004; Mitchell and Smith, 1994).

Mitchell and Smith discuss how the cyclical nature of the economy to cyclical changes in government budgets and financial markets. This makes pension fund management an important factor in sustaining a structural budget balance during the course of business cycle. For example, a slow economic growth rate can cause revenue shortfalls for governments. Instead of adopting policies to increase taxes or cut services a government may choose to reduce or defer pension contributions. Of course, since the cyclical deficit is a short-term problem and deferment is a short-term solution, there is an expectation that the employer will pay back the deferred amount by paying more than the required contribution when the economy improves and surplus funds are available. If the deficit is structural-created by the government allowing spending growth to exceed revenue growth-deferment is discouraged because it exacerbates the real problem by not addressing the causes of the structural deficit. When continuous deferment is used, the employer's pension liability increases even higher since the accrued unpaid portion or unfunded liability compounds with interest (Mitchell and Smith, 1994; Peng 2004).

In most cases where there is a cyclical budget surplus and the pension plan is over-funded, governments find it difficult to set aside savings. For politicians, its much more tempting to offer benefit enhancements or reduce the employer contribution rate. Robert Snell of the National Conference of State Legislatures conducts a survey of legislative changes in state pension funds. His responses showed that many states increased benefit levels and reduced employer contributions during

the market expansion of the 1990's (Snell, 2003). Often, employers do not recognize the implications of their actions.

The reduction in employer contributions and increases in benefits reduces the fund's asset levels. If the market declines, the weight of the pension bill or liability will be harder to carry and result in an even larger increase in employer contributions. Therefore, Peng advises employers to handle surpluses with caution since the cyclical nature of the economy makes it likely that a deficit will follow at some point in the future (Peng, 2004).

Implications of Unfunded Pension Systems

An unfunded liability is not always necessarily a sign of fiscal concern. It's only when the fund's liabilities create fiscal stress for the employer that it should begin to worry. Still, having an under-funded pension plan has several implications, which can have a significant impact on government operating budgets. These implications include opportunity costs of lost investment returns, violation of the intergenerational equity principle, potential crowding-out of public services, and the possibility to negatively impact a government's municipal bond rating and borrowing costs (Mahoney, 2002; Mason, Brainard, Langer, Young and Ross, 2004; Mitchell and Smith, 1994, Peng, 2003).

When an employer fails to make contributions to the pension fund or their contribution does not meet the required contribution rate determined by the actuary, the projected level of investment returns may not be realized which reduces the fund's assets. A shortfall occurs when an employer doesn't contribute the actuarial required rate. Not only does the employer lose investment returns on what it didn't contribute, but that amount compounds over future periods. The lost investment earnings represent the employer's opportunity cost for not making the required contribution. This is also the amount that would have yielded a reduced dependency on future tax dollars. It is important to

fund pension systems now rather than later because the effects of compounding mean that the longer governments wait to fund their systems, the higher the opportunity cost of lost investment returns (Peng, 2003; KRS, 2006; Mahoney, 2004).

Parry Young of Standard's and Poor's says bond rating agencies pay attention to two main measures of pension fund fiscal health during the credit rating process. The first measure is the funded ratio which is the ratio of a government's net assets to its accrued liabilities. The greater the percentage of the funded ratio the higher the funding level of the pension system. The second measure is the relative size of the unfunded liability over time. Young says that rating agencies consider unfunded liabilities as much as they consider debt when evaluating the fiscal health of a municipality or state employer and the agencies examine the historical trend of the employer's pension funded ratio as well as their employer contribution history, considering the age of the plan (Mason, Brainard, Langer, Young and Ross, 2004; Young, 2005).

Underfunding the system also puts pressure on operating budgets by increasing the amount of the pension bill that will have to be paid by future taxpayers. Mahoney discusses the ethical implications of deferring pension contributions and liabilities. Mahoney states that employer contribution deferment violates the principal of *intergenerational equity*-the generation that benefits from a particular public service should be the generation that pays for it. When public officials decide to provide more public services to the current generation by under-funding their public pension systems, there is a possibility that the future generation will have to pay the price for the older extra generation's services. The later generation will pay in the form of higher tax bills or a lower level of public services. He uses philosopher John Rawls' "just-savings theory" and GASB standards to argue that fully funding pension systems should be a responsibility of the public administrator (Mahoney, 2002).

Improving the Accountability of Public Pension Funds

The Employee Retirement Income Security Act (ERISA) of 1974 set standards for corporate disclosure of pension fund information and set rules for vesting, restrictions on underfunding, and investment of pension funds. The Pension Benefit Guarantee Corporation was also established as part of this Act to insure private pension funds against underfunding. ERISA does not apply to public sector employers. This is the reason public employers can defer pension fund contributions, shifting the financial burden to future taxpayers (Lamb, 1993; Mahoney, 2002).

In an effort to increase accountability of public pension funds the Governmental Accounting Standards Board requires public pension systems to report on their plan's funded status. GASB No. 5 *Disclosure of Pension Information by Public Employee Retirement Systems and State and Local Governmental Employers* standardizes the measure of the pension obligation, requires disclosure of annual trends of specific pension funding ratios and disclosure of the assumption used by the actuary in calculating the pension obligation. The elements of GASB No. 5 have made public pension systems more comparable across states and municipalities (Lamb, 1993; GASB 1986).

A standard measure of pension liabilities reported on governmental financial statements is the *pension benefit obligation*.⁶ The pension benefit obligation can be thought of as the actuarial valuation of benefits owed. GASB requires public employers to report their pension funding levels using different measures such as the Funded Ratio. Rating agencies use the funded ratio as an indicator of the public pension plan's fiscal health as mentioned in the previous section (Brainard, 2004; Lamb, 1993). The National Association of Retirement System Administrators considers a Funded Ratio of 80 percent to be fiscally healthy (NASRA, 2006).

⁶ This measure represents the present value of benefits estimated to be payable in the future considering employee service to date of actuarial valuation, calculated by attributing some equal benefit amount to each year of accrued, actual, and expected future service. Expected benefit enhancements or salary increase projections are accounted for in the benefit calculation. The pension benefit obligation includes the retirees and beneficiaries currently receiving benefits, terminated employees entitled to benefits but not yet receiving them, employee contributions, investment income accumulated, and vested and non-vest employees employer financed share. Governments must also estimate net assets with their pension benefit obligation.

The City of San Diego's unfunded liability for its pension plan was well on its way to \$2 billion by 2009. In 2006, the city disclosed misleading information in official statements for municipal bond offerings and to credit rating agencies about its pension and retiree health care obligations and the amount of assets available to pay for those obligations. The bond offerings raised over \$260 million from investors. The SEC issued an Order which stated that the city failed to fairly disclose to bond investors that it had been intentionally under-funding its pension plan, putting at risk its ability to make the promised future debt service payments. The city was sanctioned for committing securities fraud by misleading bond investors about its financial solvency. San Diego provides an example of the greater attention being paid to the accountability of public pension systems (SEC, 2006).

How states are addressing funding levels

A review of pension and retirement plan enactments by state legislatures in 2006 indicates that state governments are using different approaches to address the under funding of their pension funds. States like New Jersey and Illinois have issued pension obligation bonds as a way to finance their unfunded liabilities. Another approach for governments that are trying to reduce their risk of unexpected costs is to convert from their traditional defined benefit plans to a defined contribution plan or a hybrid plan. Many have increased contributions to their pension plans and have created stabilization accounts to try and set aside extra money to cover shortfalls. Others are cutting or reducing benefit levels for new hires in order to drive down their future pension costs, as well as prohibiting benefit enhancements or cost-of-living-adjustments until their pension plans reach a certain level of funding. These approaches vary in risk and savings (Snell, 2005; Snell, 2006).

Pension obligation bonds have been used by some states and municipalities to pay for a portion or the entire cost of their unfunded liability in an attempt to reduce annual pension costs. When the bonds are issued, the proceeds are immediately placed in the retirement plans and then invested. The

objective is to earn a higher rate of return on the bond proceeds than the interest rate that is paid to service the bonds. Because of this arbitrage transaction, the employer will realize interest cost savings in the form of lower payments for debt service on the bonds than the payments the employer would have paid to amortize the unfunded liability. However, this strategy involves interest rate risk. If the market does not reach the assumed investment rate of return over the long-term, the rate of return may then become lower than the interest rate paid on the bond. Therefore, the uncertainty of the market makes it hard to predict whether the outcome of the bond issue or other financing strategies will be successful in producing net savings for the employer (Burnham, 2003; Snell, 2006).

Another pension cost-reducing approach is for a state to convert from a defined benefit plan to a defined contribution or a hybrid plan. Studies show that switching to a defined contribution plan can produce savings to the employer in the long-term and increased costs in the short term. These costs and savings are dependent on the level of difference between contributions and liabilities between the new and old plans. For instance, several government employers switch to the defined contribution plan to shift their risk to the employee since they guarantee the benefit under the defined benefit plan and that benefit can vary. With the defined contribution plan, the employer's contribution is fixed and does not change. Switching to a defined contribution plan does not eliminate an unfunded liability. The employer will still need to address any accrued liabilities in addition to the costs related to implementing the new plan (NSCL, 2006; Reason Foundation, 2005).

Reducing or eliminating the level of benefits is another way states have tried to reduce costs. Most pension plans are inviolable contracts protected by state statute and the state and federal constitutional law. This means policymakers can not modify the benefits for existing retirees or employees. The only alterations they can make to the pension plan structure are for new hires. Any savings from benefits changes will not occur until the new employees that are affected by the benefit

changes make up a large percentage of the employer's workforce. The Missouri legislature considered, but did not pass legislation to prohibit cost-of-living-adjustments and benefit enhancements in plans that are less than 80 percent funded (Snell, 2006).

Background of Kentucky's Public Employees' Retirement Systems

The Kentucky Retirement System (KRS) consists of five main separate systems:

- Kentucky Employees Retirement System (KERS) for Non-hazardous employees
- Kentucky Employees Retirement System (KERS) for Hazardous employees
- County Employees Retirement System (CERS) for Non-hazardous employees
- County Employees Retirement System (CERS) for Hazardous employees
- Kentucky State Police System (KSP)

As shown above KERS and CERS have separate systems for non-hazardous and hazardous employees. KERS was established in 1956 by the state legislature. The CERS was established in 1958 and the State Police System was established in 1960. When the systems were established there were 16,000 participants in the state system, 2,617 participants in the county system, and 415 uniformed state troopers. Today, there are over 300,000 active, inactive and retired members in all the systems combined. Each system offers a defined-benefit pension as well as health insurance benefits to its participating members (KRS, 2006).

The funded ratio for all systems has been declining since 2000, at when the systems were more than fully funded. Table 1 shows that KERS Non-hazardous' funded ratio decreased by 80 percentage points from 140 percent to 60 percent in 2006. The funded ratio for CERS Non-hazardous was 83.6 percent in 2006, the highest for all five systems.⁷

According to KRS' actuarial report for 2006, the unfunded liability for the pension fund of all systems combined was \$5.37 billion. As indicated by Table 2, KERS Non-hazardous had the highest unfunded liability and accounts for 67% of KRS' total pension unfunded liability.

⁷ In Wilshire Associates 2006 Report on State Retirement Systems, the average national funded ratio for state pension systems was 87%.

Table 1: KRS Pension Funds Actuarial Fund Ratio as of FY ended June 30,2006					
Fiscal Year	KERS Non-Hazardous	KERS Hazardous	State Police System	County Non-Hazardous	County Hazardous
2000	139.6%	138.2%	136.4%	156.9%	133.3%
2001	125.7%	126.8%	128.1%	146.3%	124.5%
2002	110.4%	116.9%	115.3%	129.6%	111.9%
2003	97.4%	108.1%	99.6%	119.7%	97.8%
2004	85.1%	98.4%	88.0%	105.1%	88.8%
2005	73.6%	92.3%	77.1%	94.0%	80.9%
2006	60.0%	84.1%	66.6%	83.6%	75.0%

Source: KRS 2006 CAFR.

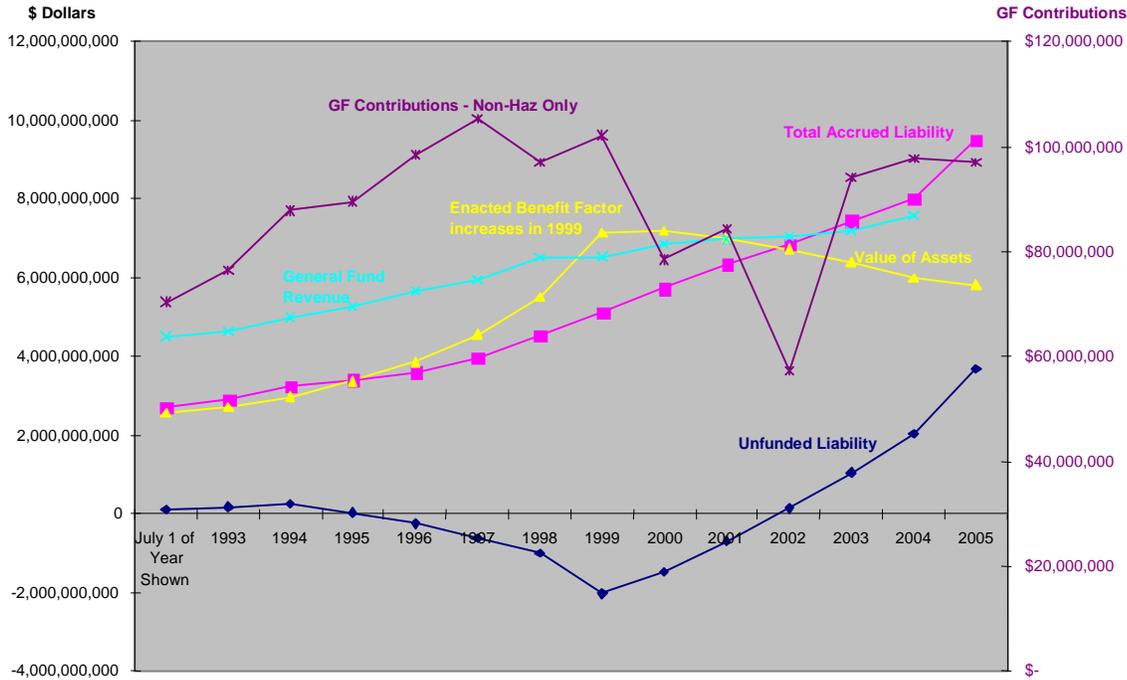
Table 2: KERS Non-hazardous FY 2006 Unfunded Liability on Actuarial Value of Assets for Pension Funds		
KRS System	Unfunded Liability	Percentage of Total Unfunded Liability
KERS Non-hazardous	3,600,739,924	67%
KERS Hazardous	80,671,711	2%
KSP	172,466,101	3%
County Non-hazardous	1,016,675,131	19%
County Hazardous	505,067,753	9%
KRS Total	\$5,375,620,620	

Source: KRS 2006 CAFR..

The conditions that created the unfunded liability in Kentucky are similar to the conditions that affected the solvency of other state pension systems. There are three main issues discussed in this section:

- Reductions in employer contributions
- Lower than expected investment returns due to the market decline
- Benefit enhancements enacted by the legislature

Figure A: Historic Trend of conditions impacting the growth of KERS Non-hazardous Pension Fund's Unfunded Liability 1993-2005



Source: Data for Figure provided in KRS Actuarial Reports and CAFRs for Fiscal Years 1990-2006. Dollar amounts for Employer contributions were calculated using projected payroll data and employer contribution rates.

Reductions in Employer Contributions

Figure A shows the historic trend of employer contributions scaled on the right axis, and the unfunded accrued actuarial liability, the total accrued actuarial liability, and actuarial value of assets scaled on the left axis. Note the two sharp declines in general fund contributions in 1999 and 2002. A likely reason for the reduced employer contributions is the favorable market experience prior to 2001 which led to higher than expected investment returns on the fund's assets above the actuary's assumed rate of return of 8.25 percent. The investment returns after the mid-nineties reduced the unfunded liability by an estimated \$1.93 billion and thus, lowered the required employer contributions needed to fund the pension plan.

In recent years, the legislature has contributed below the KRS' Board of Trustees' requested employer contribution rates. These reductions result in shortfalls that come with an opportunity cost of

**Table 3: KERS Non-hazardous Actuarial Requested and Enacted
Employer Contribution Rates for Fiscal Years 1993-2008 (in millions)**

FY	Actuarial Requested Rate	Enacted Rate By Legislature	Requested Contribution By Board	Actual Contribution	Annual Contribution Shortfall
1993	8.66%	7.65%	\$79.6	\$70.3	\$9.3
1994	8.66%	7.65%	\$86.4	\$76.3	\$10.1
1995	8.56%	8.56%	\$87.8	\$87.8	-
1996	8.75%	8.56%	\$91.5	\$89.5	\$1.9
1997	8.89%	8.89%	\$98.5	\$98.5	-
1998	8.89%	8.89%	\$105.3	\$105.3	-
1999	8.03%	8.03%	\$97	\$97	-
2000	8.03%	8.03%	\$102.1	\$102.1	-
2001	5.89%	5.89%	\$78.3	\$78.3	-
2002	5.89%	5.89%	\$84.3	\$84.4	-
2003	5.89%	3.76%	\$89.8	\$57.3	\$32.5
2004	7.53%	5.89%	\$120.2	\$94	\$26.2
2005	10.29%	5.89%	\$170.6	\$97.7	\$72.9
2006	13.62%	5.89%	\$224.6	\$96.9	\$127.2
2007	17.13%	7.75%	\$283.6	\$128.3	\$155.3
2008	20.15%	7.75%	\$342.9	\$131.9	\$211

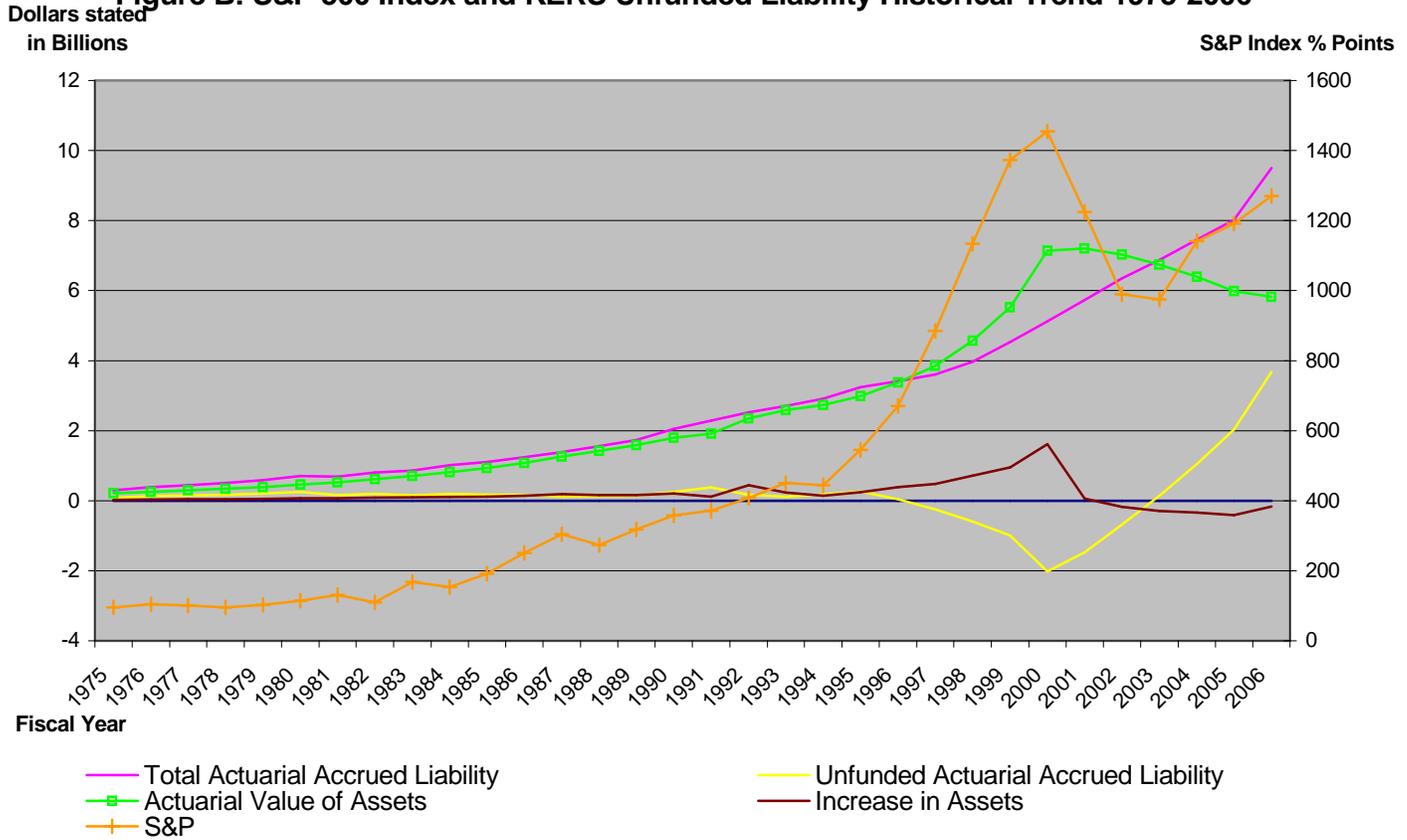
Source: KRS Actuarial Reports and CAFRs 1990-2006

lost contributions and investment returns. Not only does this increase the system’s unfunded liability, but it also likely increases future employer contribution rates. The stock market decline had a major effect on future employer contributions. The projected employer contribution rates for the KERS Non-hazardous pension fund determined by KRS

actuary (considering the state’s past funding behavior) are 19.13 percent of projected payroll for fiscal year 2012 and 23.86 percent for fiscal year 2017 (KRS, 2007).

A recent report by the system’s actuary, Cavannaugh Macdonald, projects that if the state continues the trend of paying less than the actuarially recommended contribution rate, “the KERS non-hazardous health insurance trust will be in default by the year 2013 and the pension trust will be in default beginning in 2021 to 2023 (KRS, 2007).”

Figure B: S&P 500 Index and KERS Unfunded Liability Historical Trend 1975-2006



Source: S&P Historical Data was obtained from yahoofinance.com. KERS data was provided in KRS CAFRs and Actuarial Reports for fiscal years 1990-2006.

Investment Returns on Assets

The stock market decline between 2000 and 2003 had a major impact on the state pension system's funding levels. The downturn caused investment losses on assets, which will likely increase the employer required contribution levels in the future. Figure B on the following page shows the historical trend of KERS' unfunded liability with the S&P 500 Index. Note the relationship between the two. The unfunded liability reaches its all-time low and the actuarial value of the fund's assets reaches its highest point when the market peaks. It is also interesting how the increase in the value of the assets lags behind increases in the market. Since the graph shows the market index

increasing beginning in 2003 it is possible that KRS can expect an increase in its value of assets. This is also dependent on the Board's investment strategy.

The investment strategy used by the pension fund's managers during the past decade may have contributed to the current unfunded liability. To evaluate the impact of managers' investment strategy on KERS Non-hazardous pension funding level, I researched the investment policy and the asset allocation of the fund's investment portfolio since 1990.

Bo Cracraft, Investment Compliance Officer with the KRS, responded to my questions regarding the system's investment strategy. According to Mr. Cracraft, the fund's managers do not have any statutory restrictions on their investment policy. When asked about the asset allocation method and caps he said that the Board conducts an Asset Liability Modeling Study with the assistance of an investment consultant. Part of the purpose of the study is to set "target allocations" for the fund for each asset class (such as equity, fixed-income, and cash). This establishes a limited range within which the actual allocation can fall.

In 1990, the managers' target allocation included 55 percent of U.S. Equity, 25 percent of fixed-income securities, 10 percent of real estate, and 10 percent of cash. Two adjustments were to made to the target asset allocation methods since 1990 as shown in Table 4 below.

Table 4: KRS Target Asset Allocation 1990-2007			
Asset Type	July 1, 1990-June 30, 1997	July 1, 1997-June 30, 2000	July 1, 2000-June 30, 2007
U.S. Equity	55%	65%	40%
Non-U.S. Equity	-	-	15%
Fixed-Income	25%	27%	27%
TIPS	-	-	10%
Alternative	-	-	5%
Real Estate	10%	5%	-
Cash	10%	3%	3%

Source: Bo Cracraft, Investment Compliance Officer for KRS

From 1997 to 2000, KRS increased the target allocation of U.S. equity by 10 percentage points and fixed-income securities by 2 percentage points. It reduced the target allocation for real estate by 5 percentage points and that for cash by 7 percentage points. In 2000, KRS made several changes. The Board decided to set a target for 15 percent for international equity, 5 percent for alternative investments that would include real estate and private equity, and 10 percent for a TIPS portfolio. The TIPS portfolio was added as a means to protect assets from inflation and consist primarily of U.S. and international government-issued inflation protected securities as well as commodities derivative contracts, cash, and cash equivalents.

It appears from table that managers had more of an aggressive investment strategy since they have a higher proportion of equity in the portfolio. While this strategy allowed KRS to earn a higher level of investment returns on assets during the bull market, it may have contributed to losses in investment returns that could have been prevented had the managers used a more conservative approach.

Benefit Increases

In the past nine years, the legislature has enacted benefit enhancements for KERS Non-hazardous. In 1998, the benefit factor was increased from 1.97 percent to 2.2 percent for employees who retire between February 1, 1999 and January 31, 2009 with at least twenty years of service credit. This might explain why the number of retirements has increased in recent years. In 2001, the legislature also changed the average salary used for determining benefits at the time of retirement from the highest five years of service to the highest three years of service. Note in Figure A, that the time at which these benefit increases took place, the KERS pension fund was more than fully funded. As discussed earlier, many states decided to increase benefits and reduce contributions during this period

rather than set aside the money to cover future shortfalls. These enhancements have increased and will continue to increase the pension plan's liabilities in the future. If future investment gains are not sufficient to cover the additional costs, then employer contribution rates will need to increase.

Analysis

The extent to which cyclical market swings impact pension system funding levels can depend on the fund managers' investment strategy. In addition, unfunded liabilities can have negative implications and impose burdens on pension systems and government operating budgets. Considering this, I evaluate the impact of planning for cyclical market swings by using a different investment strategy. I also estimate the amount of lost investment returns to date due to reduced employer contributions. Finally, I compare two financing alternatives for addressing the system's unfunded liability. Each section discusses the data and methodology used to answer each research question.

The unit of analysis in this study is the KERS Non-hazardous pension fund. This system's funding levels have declined by a greater percentage over the past five years compared to the other four systems of KRS. The system's health insurance fund is not addressed in the analysis due to the great complexities of health insurance in general, and for retirees in particular, coupled with the time limitations of this research paper.

Investment Strategy Analysis

In this analysis, I estimate the impact of the fund managers' investment strategy on the system's value of assets. The research question I address in this analysis is:

- What if managers had used a lower-risk lower return investment strategy?

Data

I use financial and sensitivity analysis to estimate the impact a lower-risk lower return investment strategy could have had on the pension fund's current financial position. Data on actual employer contribution rates, projected payroll, market value of the fund's assets, and the actual investment rate of return results on the system's pension fund portfolio were provided in KRS's Actuarial Reports and KRS's Comprehensive Annual Financial Reports.

Methodology

I determine the dollar amount of the actual employer contribution for fiscal years 1995 through 2006. I explain later why I chose this particular period. Employer contribution rates are expressed as a percentage of payroll so I multiply the actuary's projected payroll for each fiscal year by the enacted rate to find the actual employer contribution.

To determine the impact of the system managers' investment strategy on the value of the fund's assets I calculate the investment returns on the market value of the assets and employer contributions again for fiscal year 1995 through 2006 by adding the market value of the assets and the employer contribution for each fiscal year and then multiplying the sum amount by the fund's actual rate of return. Then I added the investment returns for the fiscal year to the beginning value of the assets and employer contribution to get the value of the assets for the end of the fiscal year. Then I used the current fiscal year end value of the fund's assets as the beginning value of the fund's assets for the next fiscal year and repeated the calculation for the subsequent years.

I estimate the impact of a steadier investment strategy using a sensitivity analysis. I analyze the change in the value of the assets in response to the change in the rate of return (investment strategy) from Kentucky's actual rate to the South Carolina Retirement System's (SCRS) pension portfolio's rate of return. SCRS's strategy is appropriate for this analysis because until recently, the state had a

constitutional prohibition against the public retirement system investing in securities not listed on a national exchange. With passage of the State Preservation and Investment Reform Act of 2006 increased the maximum portion of the fund that may be invested in equities from 40 percent to 70 percent. Therefore, before 2006 the state was limited to a more conservative investment strategy compared to Kentucky. Data for SCRS's investment rates of return was not available for fiscal years prior to 1995 thus my analysis is limited to this particular period.

Results

The results indicate that the value of the fund's assets are higher at the end of the 11-year period with Kentucky's investment strategy at \$10.8 billion than South Carolina's lower-risk lower-return strategy at \$8.12 billion, a difference of \$2.7 billion. One likely explanation for the difference is the higher return earned on riskier investments in Kentucky's portfolio. Compared to SCRS, Kentucky's portfolio had a higher rate of return for almost every year except fiscal years 2001 to 2003. This highlights another potential reason for the large difference in the value of the assets between the two strategies. Since Kentucky's strategy is more aggressive than SCRS, the current managers' portfolio is more volatile meaning it is more sensitive to the market.

This important point is illustrated in Figure C. Notice how the value of the assets varies more over the period with Kentucky's investment strategy than with SCRS' investment strategy. The value of the assets under South Carolina's strategy appears to have a predictable and less variable trend, however, with Kentucky's strategy the value of the assets although more variable significantly exceeds South Carolina's strategy over the period. Therefore, Kentucky would not be better off if it had adopted a more conservative investment strategy. The results from this analysis are shown in tables 5 and 6.

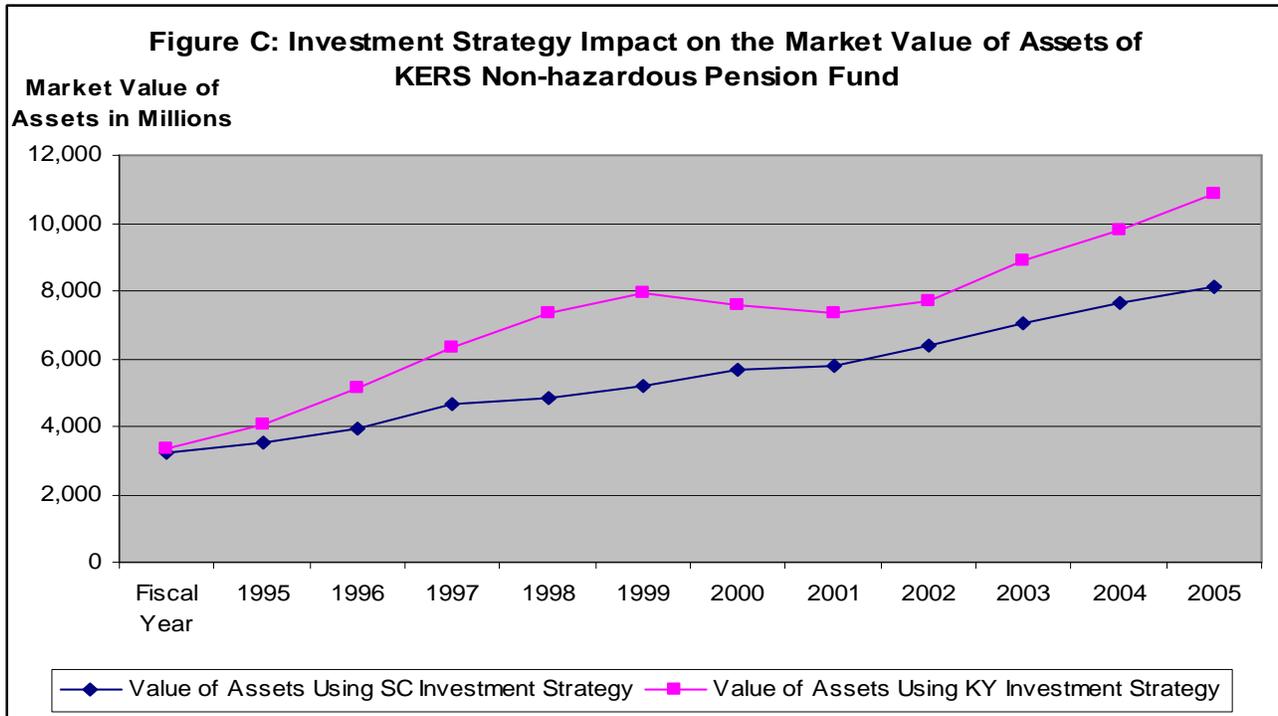
Table 5: Investment Strategy Analysis: Kentucky's Actual Strategy

Fiscal Year	Beginning Value of Assets	Employer Contribution	KY Actual Rate of Return	Fiscal Year End Value of Assets
1995	2,729,048,987	87,820,420	18.99%	3,351,792,907
1996	3,351,792,907	89,524,654	17.63%	4,048,021,847
1997	4,048,021,847	98,558,742	24.16%	5,148,394,459
1998	5,148,394,459	105,265,461	20.76%	6,344,319,719
1999	6,344,319,718	97,020,920	14.27%	7,360,519,947
2000	7,360,519,947	102,167,019	6.41%	7,941,045,201
2001	7,941,045,200	78,392,216	-5.41%	7,585,585,852
2002	7,585,585,853	84,363,425	-4.30%	7,340,141,459
2003	7,340,141,459	57,343,384	4.29%	7,714,836,943
2004	7,714,836,942	94,083,590	13.58%	8,869,371,940
2005	8,869,371,941	97,691,817	9.26%	9,797,413,862
2006	9,797,413,861	96,914,778	9.68%	10,852,099,651

Table 6: Investment Strategy Analysis: South Carolina's Strategy

Fiscal Year	Beginning Value of Assets	Employer Contribution	SC Actual Rate of Return	Fiscal Year End Value of Assets
1995	2,729,048,987	87,820,420	15.40%	3,250,667,296
1996	3,250,667,296	89,524,654	5.00%	3,507,201,547
1997	3,507,201,547	98,558,742	8.99%	3,929,918,139
1998	3,929,918,139	105,265,461	15.06%	4,642,882,250
1999	4,642,882,250	97,020,920	2.42%	4,854,608,827
2000	4,854,608,827	102,167,019	4.77%	5,193,214,054
2001	5,193,214,054	78,392,216	7.14%	5,647,998,958
2002	5,647,998,958	84,363,425	0.91%	5,784,526,880
2003	5,784,526,880	57,343,384	8.98%	6,366,470,214
2004	6,366,470,214	94,083,590	8.79%	7,028,436,483
2005	7,028,436,483	97,691,817	7.03%	7,627,095,120
2006	7,627,095,120	96,914,778	5.11%	8,118,706,804

Source: Data was provided in KRS Actuarial Reports, KRS CAFRs, SCRS CAFRs, and from the Bo Cracraft with KRS.



Lost Investment Returns due to Employer Contribution Reductions

In this analysis, I estimate the lost investment returns the system could have earned on employer contributions that were actually reduced below the required rate requested by the actuary.

The research question I explore is:

- What is the estimated amount of lost investment returns due to reduced employer contributions since 1995?

Data

Data for actual rates of return were provided by KRS. I calculated the actual and required contributions with projected payroll data from Actuarial Reports from KRS for fiscal years 1995 through 2006.

Methodology

To determine the system's lost investment returns (opportunity cost) since 1995, I multiply the employer contribution shortfall by the actual rate of return on the fund's portfolio to get the lost

investment returns for the year. Then I add this amount to the employer contribution shortfall to get the total lost employer contribution and lost investment returns for 1995. Then I repeat this same calculation for fiscal year 1996 only when I calculate the lost investment return I include the total lost employer contribution and investment returns from the previous fiscal year because they could have been reinvested. I repeat this calculation for each fiscal year through 2006. Once I have the total for fiscal year 2006, I deduct the total of lost employer contributions for all fiscal years since 1995 to get total amount of lost investment returns for the period.

Results

The results indicate a total of \$53.4 million in investment returns on assets were lost due to reduced levels of employer contributions since 1995. This illustrates the importance of making timely contributions that are of the full amount requested by the actuary. This amount represents about 1.4 percent of the system's current unfunded liability. Employer contributions are one of the three components of a pension fund's income. This analysis shows that when contributions are not made employer's lose opportunities to earn investment returns on fund assets. The results from this analysis are presented in Table 7.

Financing Alternatives for the Unfunded Liability

In this analysis I analyze two different alternatives to retiring the system's current unfunded liability.

- Pension obligation bonds (POBs)
- A pension stabilization fund which would serve as an account for annual cash contributions

Table 7: Lost Investment Returns due to Reduced Employer Contributions since Fiscal Year 1995

FY	Required Contribution	Actual Contribution	Annual Contribution Shortfall	KY Actual Pension Portfolio Rate of Return	Lost Investment Returns	Total Fiscal Year end Lost Investment Returns and Employer Contributions
1995	87,820,420	87,820,420	0	18.99%	0	0
1996	91,511,766	89,524,654	(1,987,112)	17.63%	(350,328)	(2,337,440)
1997	98,558,742	98,558,742	0	24.16%	(564,725)	(2,902,165)
1998	105,265,461	105,265,461	0	20.76%	(602,490)	(3,504,655)
1999	97,020,920	97,020,920	0	14.27%	(500,114)	(4,004,769)
2000	102,167,019	102,167,019	0	6.41%	(256,706)	(4,261,475)
2001	78,392,216	78,392,216	0	-5.41%	230,546	(4,030,929)
2002	84,363,425	84,363,425	0	-4.30%	173,330	(3,857,599)
2003	89,827,800	57,343,384	(32,484,416)	4.29%	(1,559,072)	(37,901,087)
2004	120,280,040	94,083,590	(26,196,450)	13.58%	(8,704,446)	(72,801,983)
2005	170,670,423	97,691,817	(72,978,606)	9.26%	(13,499,283)	(159,279,872)
2006	224,105,182	96,914,796	(127,190,386)	9.68%	(27,730,321)	(314,200,579)
Total Lost Employer Contributions and Investment Returns						(314,200,579)
Total Lost Employer Contributions						(260,836,970)
Total Opportunity Cost to date of Lost Investment Returns						(53,363,609)

Source: Projected Payroll was provided in Actuarial Reports. With pension valuations, the valuation for each fiscal year is completed around the following November for presentation to the Board of Trustees.

Source: SCRS Investment Rates of Return provided in SCRS CAFRs for Fiscal Years 2000 and 2006.

Data

The data for this analysis were based on interviews with analysts of the Kentucky Legislative Research Commission, KRS, and documents prepared by KRS’s actuary, Cavanaugh McDonald. My assumptions regarding the bond issue and stabilization fund are based on the information gathered in my discussions with analysts.

Methodology

I evaluate if borrowing to invest the POBs proceeds yields greater present value earnings than investing a cash annuity in a stabilization fund. I make the assumption that the state has the option to issue \$3 billion worth of POBs at a rate of 5.75 percent with a 30-year maturity. I make the \$3 billion

assumption since KERS Non-hazardous' unfunded liability was \$3.6 billion for fiscal year 2006 and the bonds are expected to earn income on the proceeds.

Because POBs are utilized for interest rate arbitrage⁸ I determine the net present value by finding the amount I would have to borrow today at 5.75 percent to accumulate the same amount that the bond proceeds would grow to in thirty years if invested at a 7.75 percent rate. First, I assume that the POBs would have issuance costs equal to 50 basis points and deduct the costs from the total value of the issue to get the present value of the POB proceeds net issuance cost. Next, I found the amount the POB net proceeds would grow to in thirty years if invested at 7.75 percent using the future value formula. The future value formula is expressed as:

$$FV = PV(1 + r)^n$$

where *PV* is present value of the POB net proceeds, *r* is arbitrated investment rate of return, and *n* is the number of years. Then I discounted the future value of the POB net proceeds at the lower interest rate using the present value formula to find the amount I would have to borrow today at 5.75 percent to accumulate what the POBs would earn when invested at the higher rate of return. The present value formula is expressed as:

$$PV = FV / (1 + r)^n$$

where *FV* is the future value of the net bond proceeds invested at the higher rate, *r* is the discount rate or the cost of borrowing, and *n* is the number of periods. The difference between this amount and the present value of the POB issue is the net present value of the POB issue.

⁸ Arbitrage in the case of pension obligation bonds means that the bonds are sold the employer invest the proceeds of the bond sale in riskier higher-yielding securities (Burnham, 2003).

I also assume that the state has the financing alternative of creating a stabilization account for the KERS Non-hazardous pension fund to which appropriations can be made and the funds in the account can be invested. I use the present value of an annuity formula to estimate the present value earnings of this option:

$$PVA = ann \left[\left(1 - \frac{1}{(1+i)^n} \right) \right] / i$$

where *ann* is the annuity payment or annual appropriation to the account, *i* is the rate of return on the investment, and *n* is the number of periods. I assume that the annuity, *ann*, would be equal to the debt service payment made on the POB issue and the payments would earn 7.75 percent over a 30-year period. I find the annual debt service payment for the bond issue using the straight-line amortization method. Then I compared net present value of the POB issue with the present value of the cash annuity to see which had the higher present value earnings.

Results

Evaluating the two financing alternatives, the present value earnings from the cash annuity payments to the stabilization fund are higher than the POB issue option. The cash annuity option yields \$2.44 billion in earnings compared to the POB issue's \$2.23 billion. Therefore, the state can earn \$211 million more from investing in a cash annuity than if it were to borrow and then engage in arbitrage using the POB proceeds. The POB bond proceeds net issuance cost (\$2.98 billion) would grow to \$28 billion in 30 years at the arbitrage rate of 7.75 percent. The state would have to borrow \$5.2 billion today at the lower rate of 5.75 percent to accumulate that amount. The cash annuity alternative assume that the state would make an investment equal to the debt service payment on the POBs (\$212 million) each year for the next 30 years in a cash annuity stabilization account. The results from this analysis are shown in Table 8.

This analysis shows that the state would actually earn more from making cash contributions to a stabilization fund than issuing the bonds and arbitraging the proceeds. The arbitrage nature of the transaction associated with POBs makes this alternative more risky than the stabilization account option. When employers issue POBs, they are assuming that they can earn a higher rate of return on the bond proceeds than they will have to pay in interest to service the bonds. Market timing can be an important factor for the employer when issuing POBS since they are seeking the higher rate on the proceeds. However, as I have explained, there is a great deal of uncertainty in predicting market behavior and there will be periods where the market is above the interest rate to service the bonds and periods where it is below that rate. The success of a POB issue can not be determined until the bonds have reached final maturity when the savings are known.

In addition, there are implications that employers must take into consideration when issuing POBs such as its effect on the state's debt capacity. If we assume that Kentucky's projected required debt service all projects was \$885 million for fiscal year 2008 and the projected general fund revenues were estimated at \$13 billion, the addition of the \$3 billion POB issue with annual debt payments of \$212 million would increase the debt capacity from 6.81 percent to 8.44 percent. This increase in the debt capacity could potentially have negative implications on the state's borrowing cost as well as its municipal debt's credit rating (Hardin, 2007).

The stabilization account does not involve the risk of the POB alternative. This alternative requires the General Assembly to appropriate money each year into the account so the contribution will earn a certain level of investment return on account's assets. The investment returns earned on the account are dependent upon policymakers' decision to contribute to the account annually whereas with the POB issue the debt service payments are mandated.

Table 8: Financial Analysis: Pension Obligation Bonds versus Cash Contribution to Stabilization Fund

Net Present Value of Pension Obligation Bond Issue	Dollar Amount
Present Value Cost of POB Issue	\$3,000,000,000
Issuance Cost (54 Basis Point)	16,200,000
Net Proceeds of Bond Issue	<u>2,983,800,000</u>
Arbitrage Net Proceeds at 7.75% for 30 years	28,008,385,454
Future Value of Net Proceeds	
Investment today at 5.75% for 30 years to accumulate Arbitrage Earnings	5,234,519,153
Present Value of Future Value of Arbitrated Proceeds	
Investment to accumulate Arbitrage Earnings	5,234,519,153
POB Proceeds	3,000,000,000
Net Present Value of POB Option	<u>2,234,519,153</u>
Present Value of Annual Cash Contribution to Stabilization Fund	
Present Value of an Annuity equal to the debt service paid with POB (Annual Debt Service payment for POB= \$212.15 million)	<u>2,445,720,751</u>
NPV of POB Issue	2,234,519,153
PVA of Cash Contribution to Stabilization Fund	2,445,720,751
Difference between POB and Stabilization Fund Alternatives	-\$211,201,598

Policy Implications and Recommendations

In this section, I build on the results of my analysis by discussing the policy implications of each alternative and incorporate the recommended practices suggested by the Committee on Retirement and Benefits Administration of the Government Finance Officers Associations. A more conservative low-risk lower return investment strategy can provide managers with a more predictable less variable rate of return on their assets. However, if the investment strategy is too conservative a pension fund will lose opportunities to benefit from cyclical market upswings. A more aggressive strategy which invest more in riskier instruments will allow the fund to earn higher investment returns.

The more aggressive the investment strategy the more likely the value of the assets will vary with the volatile nature of the market.

Because public pension systems are not identical the managers should adopt an investment strategy that has a level of risk that is favorable for that particular pension system's condition. Managers can limit the impact of market volatility, and thus risk, through diversification of assets in their system's pension portfolio. Zorn recommends that governments consult with the plan's actuary and other analysts to determine the plan's expected rate of return, the volatility of returns, and the expected time horizon for achieving those objective. Investment plans and strategies should be reviewed annually to ensure that the asset allocation is meeting the plan trustees' risk and performance objectives (Zorn, 1998).

In addition, failing to make employer contributions could reduce the level of investment returns on the assets in the pension fund. This could increase the plan's unfunded liability and increase employer contributions in future years. In times of budget deficits when other budget pressures can seem more immediate than pension funding most governments use deferment of pension funding as a countercyclical budget tool. Deferment during cyclical budget deficits, however, requires the employer to offset the delayed contribution during surplus years when investment earnings exceed their target return (Peng, 2003). The Government Finance Officers Association recommends that actuarially required contributions be made on a timely basis to ensure the plan's funding stability. According to GFOA, reduced employer contributions can constitute a threat to responsible funding (GFOA, 2005.)

POBs provide employers will an alternative to finance all or part of their unfunded liabilities. While the immediate availability of funds to pay off the liability is attractive, the consequences of not achieving the higher return on the POB proceeds than the cost to service the bonds can have serious

consequences as I have discussed. Even if savings are not realized from the arbitrage transaction the government is still obligated to make annual debt service payments on the POBs. When making the decision to issue POBs, a government should also consider the effect the issue will have on the government's debt capacity as well as its future borrowing costs (Burnham, 2003; GFOA, 2005).

Establishing additional reserve funds for a pension plan such as a stabilization account can serve as another source of income when investment returns on assets are lower than expected or funding levels fall below certain levels. When investment returns are better than expected, funds can be deposited into a stabilization account (GFOA, 2005). This account can also serve as a savings account where appropriations can be made to the account and then invested. Compared to financing with POBs a stabilization fund doesn't involve the risk associated with the arbitrage transaction. However, the success of the stabilization fund is dependent upon how responsible the state's legislature is with making the annual payments to the fund and not withdrawing funds for alternate uses.

Discussion

Since an increasing number of public pension systems seem to be adopting more aggressive investment strategies (i.e. South Carolina) it should be expected that the funding levels of their pension funds will be more volatile as the cyclical market changes occur. So how can this information help system managers and policymakers plan for the future?

If policymakers are educated about the market's impact on pension funds then in times of cyclical upswings when the value of the assets exceeds liabilities and pension funds appear to be more than fully funded, they should understand that the upswing is temporary. With that in mind, they should not react to the pension fund surplus by increasing benefits or reducing their required contribution to the fund. Instead, they could set aside part of surplus as in a stabilization fund for future years when investment returns will not be as high.

Another valuable lesson that might be learned from this analysis is whether it makes sense to issue POBs during market downturns if the market is expected to recover eventually. If the state decided to issue bonds during a market downturn, but then say we had another experience like the late nineties. This would increase the pension fund's investment returns on assets potentially to the level of covering most of the accrued liability causing the pension fund to be almost fully funded. But the state would still be making debt service payments for the POBs. This is a pretty unrealistic assumption, but if one expects pension fund levels to mirror the activity of the market this is how they can apply that to making decisions about funding policies. Before making decisions regarding funding options for pension plan obligations or benefit policies, a government should conduct a thorough analysis of the risks, implications, and costs of each alternative (GFOA, 2005).

Conclusion

In conclusion, the fiscal health of public pension systems is affected by cyclical changes in the economy. This paper examines how managers' investment strategies can be used to limit volatility to market changes, the importance of employer contributions, and evaluated different funding alternatives to addressing unfunded liabilities. The results indicate that Kentucky's investment strategy yielded higher investment returns to KERS Non-hazardous than if it used a more conservative investment strategy. I also find that the system has lost investment returns due to reductions in employer contributions. Finally, I compare the option of making cash contributions to a stabilization account with the option to issue POBs as a way to finance the system's unfunded liability. I find that the stabilization alternative yields greater present value earnings to the employer. However, POBs are an arbitrage transaction thus, their success depends on whether the proceeds can earn a higher rate of return than what is used to service the bond. The success of the cash contribution alternative depends on the ability of the legislature to make timely payments to the stabilization fund.

A number of state public pension systems are adopting aggressive investment strategies. With the decline in pension system funding levels and the rise of unfunded liabilities, more states are considering POBs as a way to finance their unfunded liabilities. By educating policymakers about the influence of the cyclical nature of the market on pension funding levels, they can make better policy decisions related to pension benefits and funding.

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