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A Comparison of Missouri Pension Plans

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A Comparison of Missouri Pension Plans

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EXECUTIVE SUMMARY

We analyze the risk-adjusted return performance of five Missouri pensions. We find that one pension earned significant, positive risk-adjusted returns. The other pension funds earned returns in line with the risk that they undertook. The lack of negative performance is noteworthy, as many pension funds and mutual funds exhibit negative performance. The findings are robust to the choice of benchmark model of risk-adjusted returns. We also document that an investment in any of the five pensions beginning in June of 2001 would have initially lost money, then gained from 2004 until 2008, and then declined in value during the recent liquidity crisis. However, in all cases, the pensions have since recovered: over the 10-year period from 2001 until 2011, all five pensions produced positive gains for their investors. Moreover, all five pensions outperformed the S&P 500 Index over various sample periods.

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State and local employees in Missouri typically are eligible to receive pension benefits upon retirement; the particular pension each worker is eligible for depends on the employer and the position.

INTRODUCTION

State and local employees in Missouri typically are eligible to receive pension benefits upon retirement; the particular pension each worker is eligible for depends on the employer and the position. In this paper, we examine the return performance of five Missouri pensions:

- County Employees' Retirement Fund (CERF)
- Missouri Local Government Employees Retirement System (MOLAGERS)
- Missouri State Employees' Retirement System (MOSERS)
- Public Education Employee Retirement System of Missouri (PEERS)
- Public School Retirement System of Missouri (PSRS)

The data cover the majority of pensions falling under the jurisdiction of the Missouri Secretary of State (as described in the Missouri Code of State Regulations: Title 16). One exception is the Highway and Transportation Employees' and Highway Patrol Retirement System (MPERS), for which we do not have data.

Although the performance and stability of each pension is of obvious interest to the beneficiaries, employers fund, in part, all the pensions we examine in this study. As these are public pensions, the employer making that contribution is either a state or local government, and our findings will be of interest to them as well.

A BRIEF OVERVIEW OF THE PENSION PLANS

Although the details differ from pension to pension, there are certain commonalities among the plans. The general purpose of a pension is for a worker and/or the employer to contribute funds during the worker's employment in exchange for receiving periodic payments, typically monthly, after retirement. Pension managers pool the funds and invest on behalf of the clients. The main goals of pension management focus on wealth preservation and growth of principal. Pension payments to retirees represent an obligation. Pensions that are well-managed and earn high returns are less reliant on worker and employer contributions in order to meet current and future obligations and are less likely to experience funding shortfalls.

Pensions can be funded from three sources: the individual worker, the employer, and investment returns. Although many of the organizations we discuss in this paper also offer workers access to defined contribution plans (such as 401(k) and 401(a) plans), savings plans, and other financial services, we focus on the performance of the defined benefit plans. Under a defined benefit plan, the employee, employer, or both, contribute a stated amount of funds, typically a percentage of the employee's compensation, over the course of the worker's employment. Upon retirement, the pension periodically pays the employee a set amount based on a previously determined formula. The formulas vary considerably by pension but typically involve a payout based on a fraction of the employee's yearly salary averaged over a number of years. Unlike a 401(k) plan (an individual retirement account), the payout of a defined-benefit pension is not based on the performance of the fund. Whether the market goes up or down, pension beneficiaries receive payments based on factors such as years of service and average yearly pay.

Another characteristic common to most pensions is that although a worker typically begins contributing to the pension when hired, he or she must typically hold the position for a period of time as well as reach a specified age before becoming eligible to take the pension. The first requirement is referred to as vesting. A typical vesting period for public pensions is five years, although the number of years varies by position; some require no vesting period while others have vesting periods of up to 10 years. If a worker leaves the position before the vesting period is complete, the worker might be eligible to roll over the contribution into a retirement savings account or to receive the funds and be subject to a tax liability. In such cases, the pension typically charges a withdrawal fee.

Details relating to each pension can be found on each individual pension's website or in the Missouri Code of State Regulations: Title 16.[2] Here, we offer a brief description of each pension in our sample. We intend this section to provide the reader with an overview of each pension. Because the details of each pension are nuanced, this description is not meant to be exhaustive, nor should it be relied upon for financial decision-making. Table 1 also provides a breakdown of a number of key statistics for each pension based on actuarial estimates. We obtain the data for the statistics shown in Table 1 from each pension's annual report.

County Employees' Retirement Fund (CERF)

CERF provides pension services to workers employed at the county level in the state of Missouri. Although most full-time county workers are eligible if hired to work more than 1,000 hours in a year, there are certain positions, such as circuit clerks, prosecuting attorneys, and nurses, who are not eligible for CERF benefits.[3] Since 2002, the contribution rate on the part of the employee has been 4 percent of the employee's gross compensation.

The general purpose of a pension is for a worker and/or the employer to contribute funds during the worker's employment in exchange for receiving periodic payments, typically monthly, after retirement.

Table 1: Descriptive Statistics

PENSION	Active Members	Average Active Member Pay	Actuarial Value of Assets	Stated Funded Ratio
County Employees' Retirement Fund (CERF)	11,015	$32,156	$294 M	70.0%
Missouri Local Government Employees Retirement System (MOLAGERS)	32,851	$41,114	$3.945 B	81.6%
Missouri State Employees' Retirement System (MOSERS)	51,660	$36,306	$8.022 B	79.2%
Public Education Employee Retirement System of Missouri (PEERS)	48,800	$28,984	$3.433 B	85.3%
Public School Retirement System of Missouri (PSRS)	77,708	$55,837	$32.988 B	85.5%

Sources: Annual Reports, available on the websites for each pension.

Pensions that are well-managed and earn high returns are less reliant on worker and employer contributions in order to meet current and future obligations and are less likely to experience funding shortfalls.

It is also possible for certain employees to contribute to both CERF and MOLAGERS (discussed next).

Missouri Local Government Employees Retirement System (MOLAGERS)

MOLAGERS provides pension services to employees of a "political subdivision," which is defined as a recognized subdivision of the state with the power to tax. Examples include city and local governments. When deciding to participate, a political subdivision determines whether it will have a contributory or non-contributory plan. Under MOLAGERS rules, funding is 4 percent of monthly salary. With a contributory plan, each worker is responsible for part of the contribution. The worker is then guaranteed a minimum payout of their contribution with interest. The benefits accrue according to a set formula. Under a non-contributory plan, the employer is responsible for all contributions.

Missouri State Employees' Retirement System (MOSERS)

MOSERS provides pension services to state employees and organizes benefits by position:

- Administrative Law Judges and Legal Advisors
- General State Employees
- Judges
- Legislators
- State Officials

Although the general pension structure is similar for each group, there are many differences in required contributions and the administration of the plans. Some of the groups are required to participate and contribute 4 percent of their annual pay while the employer covers others' contributions in their entirety.[4]

Public Education Employee Retirement System of Missouri (PEERS) and Public School Retirement System of Missouri (PSRS)

PEERS and PSRS are closely related pensions that focus on offering retirement services to workers employed in the Missouri public school system. PSRS provides services primarily to teachers and administrators and PEERS provides services to employees who work 20 or more hours per week who are not covered by PSRS. For example, PEERS focuses on services for non-certificate employees. The contribution rates for these two pensions are different and vary by year. For 2011, PEERS participants were required to contribute 6.86 percent of their compensation. PSRS participants were required to contribute 14.5 percent of their compensation if they did not pay Social Security taxes and 9.67 percent if they did pay Social Security taxes. The employer contributes matching funds in both plans.

DATA AND METHODS

We obtain returns data for MOSERS, PSRS, PEERS, and MOLAGERS through a data request by the Show-Me Institute. Monthly return data for CERF were taken from CERF's monthly report.[5] We have at least 10 years of monthly return observations for each of the five pensions we examine in this study, and we have a longer time series for some of the pensions. As a result, we conduct our analysis over two time periods: monthly returns using all available data and monthly returns for a period common to all five pensions. We use pension fund net-of-fees returns. We also have benchmark information for MOSERS, which we use in our analysis. In addition to the pension return data, we obtain risk factors and the risk-free rate of return from Kenneth French's website.[6]

Table 2: Summary Return Information

RETURN SERIES	Full Sample Time Series	Full Sample Average Annualized Return	Common Sample Period Average Annualized Return
County Employees' Retirement Fund (CERF)	July 2001 – Nov 2011	5.71%	4.72%
Missouri Local Government Employees Retirement System (MOLAGERS)	Jan 1995 – Nov 2011	7.47%	2.12%
Missouri State Employees' Retirement System (MOSERS)	July 1991 – Sept 2011	7.47%	2.26%
Public Education Employee Retirement System of Missouri (PEERS)	Jan 1995 – Oct 2011	7.09%	1.83%
Public School Retirement System of Missouri (PSRS)	Jan 1995 – Oct 2011	7.07%	1.84%
S&P 500 Index	July 1991 – Oct 2011	5.42%	0.31%

Table 2 provides a breakdown of the time series we have for each pension as well as two annualized geometric mean return values, one for the full sample period available and one for the sub-period of our data common to all five pensions. These return values are net-of-fees but are not risk adjusted. The first thing to note is that all pensions appear to outperform the S&P 500 over the time period(s) we examine. The pensions earn between 5.7 percent and 7.5 percent over the full time series compared with 5.4 percent for the S&P 500. They earn approximately 2 percent for the sub-period of June 2001 to October 2011; the S&P 500 earned only 0.3 percent over the same time period. Based on these returns (unadjusted for risk), CERF stands out as the highest performer.

We should, however, interpret these and later results with the following caveat: The analysis we conduct is, unavoidably, based on data availability, yet the time period may influence the results. For example, we have the shortest time series for CERF. If we look at the full time series data, it would appear that CERF underperformed compared to the other pensions, at least in terms of unadjusted returns. However, when we limit all observations to the common time frame, we see that CERF in fact earned a higher unadjusted return compared to the other pensions. It is clear that the length of the time series matters. In particular, our common time series includes two recessions. Portfolios with less risk exposure may do better comparatively during a market downturn than portfolios with higher levels of risk, but the less risky portfolios may

Pensions can be funded from three sources: the individual worker, the employer, and investment returns.

Portfolios with less risk exposure may do better comparatively during a market downturn than portfolios with higher levels of risk, but the less risky portfolios may also underperform when the market is performing well.

also underperform when the market is performing well. Notwithstanding this limitation, the results provide important information about Missouri pension fund performance.

The relation between risk and return makes it important to examine the returns on a risk-adjusted basis. To examine each pension's performance, taking risk into account, we focus on two empirical methods: regression analysis and the Sharpe ratio.

The regression framework we use focuses on variations of the following model:

$$r_{it} - r_{ft} = \alpha_i + \beta_{iMRTK}*MRKT + \beta_{iSMB}*SMB + \beta_{iHML}*HML + \beta_{iUMD}*UMD + \varepsilon_{it}$$

for each pension portfolio i at time t. The dependent variable in all regression models is the return on the individual pension portfolio minus the return on the risk-free rate of interest, as proxied by short-term Treasury bill returns.

The independent variables depend on the model. In the first case, the Capital Asset Pricing Model (CAPM), we only include the intercept and market term (MRKT). MRKT is the excess return (the return minus the risk-free rate) on a broad portfolio of securities meant to capture the market return. The coefficient on the market term we obtain from the regression is commonly referred to as the portfolio's beta. This coefficient captures the co-movement of the portfolio returns and the market returns. If the portfolio had a beta of 0, then it would move independently of the market; whether the broad market improves or declines then we cannot make any predictions as to the returns on the portfolio. If the portfolio had a beta less than 0, then the portfolio generally does well when the market does poorly. As the portfolio beta approaches 1, this indicates that the portfolio's return will move in sync with the return on the market. This last case is roughly descriptive of a portfolio of publicly traded securities.

For the 3-factor model, we include the intercept, MRKT, SMB, and HML on the right-hand side of the equation. SMB is the return on a portfolio of small stocks minus the return on a portfolio of large stocks where each is measured using market capitalization. HML is the return on a portfolio of stocks with high book-to-market ratios minus the return on a portfolio of stocks with low book-to-market ratios. For the 4-factor model, we include all independent variables from the 3-factor model plus UMD. UMD is a factor that captures momentum. Empirical evidence shows that these additional factors help explain the returns observed on securities and portfolios.

In all models, the key variable of interest is the intercept, or alpha. Consider the case of the CAPM (the 1-factor model). If a portfolio is able to earn returns above and beyond what we would expect based on the exposure to the risk factors, this "abnormal" return is captured by the CAPM alpha, often referred to as Jensen's alpha. Similar reasoning applies when we include additional factors based on the Fama-French-Carhart models (the 3- and 4-factor models). In all cases, the variable that captures the ability of the pension fund to earn superior returns is the alpha term.

After looking at alpha, we also examine the coefficients for SMB, HML, and UMD to help us determine the investment style of the fund. Positive values for the coefficient on SMB indicate that the fund offers greater exposure to small stocks (as opposed to large market cap stocks). A positive coefficient for HML indicates that the fund is exposed to stocks with higher book-to-market ratios, often referred to as value stocks (as opposed to stocks labeled as growth stocks). A positive coefficient on UMD indicates that the fund invests in stocks exhibiting momentum, that is, stocks that over the past few months have outperformed.

The second method we use to assess the performance of each pension portfolio is the Sharpe ratio:

$$S_i = \frac{\overline{R}_i}{\sigma_{\overline{R},i}} \qquad (2)$$

where $\overline{R}_i$ is the average return for pension portfolio i minus the return on the risk-free security, and σ is the standard deviation of the return on the pension portfolio. The Sharpe ratio (Sharpe, 1966) represents the relation between risk and reward (or as Sharpe originally describes it, a reward-to-variability ratio), where the standard deviation captures the risk. If a pension is able to achieve a higher rate of return for a given level of risk, it will have a higher Sharpe ratio. The Sharpe ratio also takes into account cases where fund managers increase their risk exposure, seeking higher returns: increasing the standard deviation decreases the Sharpe ratio if returns do not increase proportionately. Thus, the Sharpe ratio is a way to standardize and compare returns across portfolios. Portfolios with higher Sharpe ratios offer investors higher returns per unit of risk.

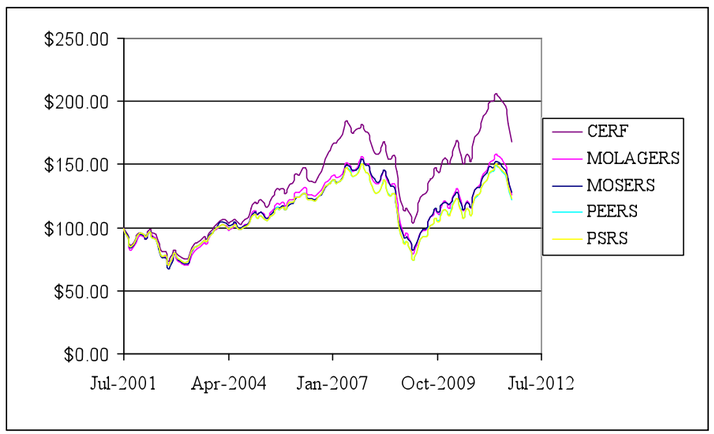
Before moving to the results, we would like to explicitly point out what may be obvious to the reader: we are using realized or historical data. The data allow us to describe what has happened. But, as the saying goes, past performance is no guarantee of future performance. Nonetheless, we can clearly see how the various funds have performed in recent years. The results are useful for plan beneficiaries worried about the health of their retirement plans. They are also useful for those persons charged with evaluating and compensating the pension funds' investment managers.

RESULTS

We begin our analysis by looking at the period for which we have data that is common to all pensions: June 2001 to October 2011. Figure 1 illustrates how a $100 investment (with no additional contributions) in each of the five pensions

The relation between risk and return makes it important to examine the returns on a risk-adjusted basis.

Figure 1: Growth of a $100 investment in July of 2001



The data allow us to describe what has happened. But, as the saying goes, past performance is no guarantee of future performance.

made in June of 2001 would have fared.

In the early years, all five pensions in our sample underperformed. An initial investment of $100 in June of 2001 would have resulted in a loss of principal in all cases during the market downturn from 2001 to 2002. From 2004 until 2008, the value of an investment in all pensions grew, but took another downturn during the recent liquidity crisis. Since 2009, all pensions have recovered. Taken as a whole, despite periods of loss, over the entire the period shown, all five pensions were able to preserve the principal investment and offer positive returns. A $100 investment in any of the portfolios in which the five pensions invested would have lost money for a period, but at the end of the 10 years, would have recovered fully and earned a positive return. The graph illustrates the variability of performance over time.

We next move to looking at the returns on a risk-adjusted basis. Table 3 reports the regression results for the common period using the market return. The coefficients on SMB, HML, and UMD indicate that CERF, MOLAGERS, PEERS, and PSRS have greater exposer to small stocks, that MOSERS has is greater exposer to growth stocks, and that MOLAGERS, PEERS, and PSRS have greater exposer to momentum stocks.

We now turn to the intercept (alpha) to analyze overall performance: The results in Table 3 indicate that one pension, CERF, was able to earn statistically significant positive alpha over the period of June 2001 to October 2011.[7] In all other cases and in all other model specifications, the alphas for the other pensions are not statistically significant. This outcome does not mean that they performed badly. It means that the returns these funds earned were in line with — but did not exceed — the risk of their investment portfolio.

Table 4 reports the regression results for the common time period using the MOSERS benchmark in place of the broad market return. The results in Table 4 are similar to those in Table 3. The coefficients on SMB, HML, and UMD provide information consistent with that shown in Table 3. And although we use a different benchmark in this case to proxy for the broad market return, only one pension, CERF, earns a positive and statistically significant alpha.

One question arises: are the results unique to the sample period? While data limitations restrict our ability to perform a full out-of-sample test, we repeat the analysis shown in Tables 3 and 4 using the full time series of returns available for each pension. Table 5 reports the regression results for using all available data and they mirror those found in Tables 3 and 4. Specifically, CERF has provided statistically significant alpha (marginally significant using the 4-factor model) and the other pensions funds did not underperform. Repeating what we said earlier, an insignificant alpha means that the pension earned returns commensurate with the risks that it undertook. Because we use net-of-fees returns, this finding means that the gross returns of the pensions were sufficiently high to cover expenses and still net a

We begin our analysis by looking at the period for which we have data that is common to all pensions: June 2001 to October 2011.

Table 3: Regression Results Using A Common Time Series (t-statistics below coefficients)

PENSION	CAPM Model		3-Factor Model				4-Factor Model				
	Alpha	Beta	Alpha	Beta	SMB	HML	Alpha	Beta	SMB	HML	UMD
CERF	0.0021	0.9069	0.0017	0.8775	0.1578	-0.0380	0.0017	0.8892	0.1557	-0.0383	0.0198
	2.26	*40.73*	*1.81*	*42.07*	*4.02*	*-0.82*	*1.78*	*36.52*	*4.02*	*-0.82*	*1.18*
	Adj R^2	0.9455			Adj R^2	0.9527				Adj R^2	0.9528
MOLAGERS	-0.0001	0.9903	-0.0009	0.9433	0.2151	0.0159	-0.0010	0.9750	0.2094	0.0152	0.0540
	-0.16	*45.63*	*-1.41*	*48.83*	*7.61*	*0.59*	*-1.63*	*53.08*	*7.91*	*0.60*	*4.63*
	Adj R^2	0.9690			Adj R^2	0.9810				Adj R^2	0.9839
MOSERS	0.0000	0.9130	0.0004	0.9327	-0.0030	-0.1839	0.0004	0.9351	-0.0034	-0.1839	0.0042
	-0.01	*23.65*	*0.45*	*26.83*	*-0.07*	*-4.00*	*0.43*	*25.69*	*-0.08*	*-3.98*	*0.11*
	Adj R^2	0.9374			Adj R^2	0.9477				Adj R^2	0.9473
PEERS	-0.0004	0.9728	-0.0004	0.9731	0.0269	-0.0572	-0.0004	0.9908	0.0238	-0.0575	0.0302
	-1.10	*87.83*	*-1.06*	*98.19*	*1.79*	*-3.80*	*-1.24*	*95.46*	*1.79*	*-4.86*	*4.15*
	Adj R^2	0.9920			Adj R^2	0.9930				Adj R^2	0.9940
PSRS	-0.0004	0.9723	-0.0004	0.9728	0.0268	-0.0602	-0.0004	0.9909	0.0236	-0.0606	0.0307
	-1.06	*86.55*	*-1.01*	*97.69*	*1.74*	*-3.88*	*-1.19*	*95.97*	*1.73*	*-4.98*	*4.09*
	Adj R^2	0.9917			Adj R^2	0.9929				Adj R^2	0.9939

Table 4: Regression Results Using A Common Time Series and Moser's Benchmark (t-statistics below coefficients)

PENSION	CAPM Model		3-Factor Model				4-Factor Model				
	Alpha	Beta	Alpha	Beta	SMB	HML	Alpha	Beta	SMB	HML	UMD
CERF	0.0030	0.9400	0.0023	0.9002	0.2094	-0.0254	0.0023	0.9110	0.2082	-0.0255	0.0180
	3.08	*36.54*	*2.52*	*41.82*	*5.73*	*-0.50*	*2.49*	*34.34*	*5.75*	*-0.49*	*1.02*
	Adj R^2	0.9420			Adj R^2	0.9551				Adj R^2	0.9551
MOLAGERS	0.0008	1.0244	-0.0002	0.9664	0.2713	0.0298	-0.0003	0.9972	0.2678	0.0296	0.0513
	0.96	*43.68*	*-0.37*	*51.55*	*9.81*	*1.02*	*-0.48*	*53.99*	*10.04*	*1.00*	*4.61*
	Adj R^2	0.9614			Adj R^2	0.9813				Adj R^2	0.9840
MOSERS	0.0009	0.9490	0.0011	0.9558	0.0524	-0.1703	0.0011	0.9570	0.0523	-0.1703	0.0019
	0.84	*25.82*	*1.16*	*29.59*	*1.36*	*-3.53*	*1.14*	*27.75*	*1.32*	*-3.51*	*0.06*
	Adj R^2	0.9393			Adj R^2	0.9486				Adj R^2	0.9482
PEERS	0.0005	1.0105	0.0003	0.9979	0.0844	-0.0431	0.0003	1.0146	0.0824	-0.0432	0.0280
	1.39	*112.66*	*0.99*	*150.81*	*7.08*	*-2.95*	*0.98*	*133.97*	*7.76*	*-3.11*	*4.14*
	Adj R^2	0.9926			Adj R^2	0.9950				Adj R^2	0.9959
PSRS	0.0005	1.0100	0.0003	0.9976	0.0842	-0.0462	0.0003	1.0147	0.0823	-0.0463	0.0285
	1.38	*110.95*	*1.03*	*149.25*	*6.89*	*-3.13*	*1.01*	*133.45*	*7.54*	*-3.35*	*4.36*
	Adj R^2	0.9924			Adj R^2	0.9949				Adj R^2	0.9957

In the early years, all five pensions in our sample underperformed. . . . Since 2009, all pensions have recovered.

"normal" rate of return. The coefficients on SMB, HML, and UMD indicate that CERF and MOLAGERS are particularly exposed to smaller stocks and that MOLAGERS has greater exposer to value and momentum stocks.

Our second empirical method is the Sharpe ratio. Table 6 reports the Sharpe ratio results using the time period common to all pension data. The results are consistent with the regression results. Specifically, CERF had the highest returns per unit of risk. There is no measure of statistical significance for the Sharpe ratio. Rather, it is a comparative measure. We can conclude that CERF performed best when performance is measured in this way, but that does not mean that the other pension funds performed poorly.

CONCLUSION

In this study, we analyze return data for five Missouri pensions: Public School Retirement System of Missouri (PSRS), Public Education Employee Retirement System of Missouri (PEERS), Missouri Local Government Employees Retirement System (MOLAGERS), Missouri State Employees' Retirement System (MOSERS), and County Employees' Retirement Fund (CERF). The results can be summarized as follows. We find that one pension, CERF, earned significant, positive risk-adjusted returns. We come to this conclusion based on the regression results and the results using the Sharpe ratio, methods that allow us to account for the relation between risk and return. This finding is robust — it is seen in the 1-, 3-, and 4-factor models as well as in the Sharpe ratio.

Table 5: Regression Results Using the Complete Available Time Series (t-statistics below coefficients)

PENSION	CAPM Model		3-Factor Model				4-Factor Model				
	Alpha	Beta	Alpha	Beta	SMB	HML	Alpha	Beta	SMB	HML	UMD
CERF	0.0023	0.9138	0.0018	0.8837	0.1594	-0.0423	0.0018	0.8964	0.1569	-0.0423	0.0222
	2.41	*40.65*	*1.96*	*41.98*	*4.02*	*-0.91*	*1.91*	*36.61*	*4.02*	*-0.90*	*1.32*
	Adj R^2	0.9474			Adj R^2	0.9544				Adj R^2	0.9546
MOLAGERS	0.0004	1.0013	0.0002	0.9921	0.1036	0.0576	-0.0003	1.0130	0.1108	0.0706	0.0609
	0.52	*53.93*	*0.30*	*51.55*	*2.81*	*1.95*	*-0.38*	*53.68*	*3.44*	*2.68*	*3.27*
	Adj R^2	0.9544			Adj R^2	0.9594				Adj R^2	0.9637
MOSERS	0.0004	0.9143	0.0005	0.9188	-0.0406	-0.0118	0.0008	0.9057	-0.0458	-0.0206	-0.0446
	0.60	*35.76*	*0.67*	*32.70*	*-0.93*	*-0.35*	*1.11*	*33.91*	*-1.21*	*-0.63*	*-1.42*
	Adj R^2	0.9365			Adj R^2	0.9370				Adj R^2	0.9396
PEERS	0.0001	0.9504	-0.0001	0.9618	-0.0297	0.0401	0.0001	0.9520	-0.0331	0.0340	-0.0287
	0.27	*78.26*	*-0.14*	*57.89*	*-0.66*	*1.78*	*0.32*	*49.34*	*-0.83*	*1.52*	*-1.39*
	Adj R^2	0.9742			Adj R^2	0.9758				Adj R^2	0.9768
PSRS	0.0001	0.9501	-0.0001	0.9605	-0.0253	0.0384	0.0001	0.9507	-0.0287	0.0323	-0.0286
	0.24	*77.75*	*-0.16*	*57.69*	*-0.56*	*1.69*	*0.31*	*49.54*	*-0.72*	*1.44*	*-1.37*
	Adj R^2	0.9752			Adj R^2	0.9765				Adj R^2	0.9775

Table 6: Sharpe Ratio Results

	CERF	MOLAGERS	MOSERS	PEERS	PSRS
Mean	0.0037	0.0015	0.0015	0.0012	0.0012
Std. Dev.	0.0449	0.0484	0.0454	0.0470	0.0470
Sharpe Ratio	0.0816	0.0316	0.0331	0.0255	0.0258

We also find that an investment in any of the five pensions beginning in June of 2001 would have initially lost money, then gained from 2004 until 2008, and then declined in value during the recent liquidity crisis. However, in all cases, the pensions have since recovered: over the 10-year period from 2001 until 2011, all five pensions produced positive gains for their investors. Moreover, all five pensions also outperformed the S&P 500 Index over the various periods we examine.

The results we present here should be interpreted with the awareness that the period common to all pension data covers two recessions. Different portfolios perform differently under different market conditions. Less risky portfolios may outperform more risky portfolios during turbulent times and then underperform during periods of market growth. Ideally, it would be better to have a longer time series of data. But the data we do have strongly suggest that the pension funds examined did not underperform and, in one case, earned positive risk-adjusted returns.

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[A]ll five pensions also outperformed the S&P 500 Index over the various periods we examine.

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Pension Websites

CERF: http://www.mocerf.org/

MOLAGERS: http://www.molagers.org/

MOSERS: https://www.mosers.org/

PSRS: https://www.psrsmo.org/PSRS/PSRS-index.html

PEERS: https://www.psrsmo.org/PEERS/PEERS-index.html

NOTES

[1] I acknowledge the excellent research assistance of David A. Maslar. University affiliation shown for identification purposes only.

[2] More specific details relating to each pension can be found on each pension's website (listed in the References section) or in the Missouri Code of State Regulations: Title 16, which can be found online at: http://www.sos.mo.gov/adrules/csr/current/16csr/16csr.asp.

[3] For a list of non-eligible positions, please see: http://www.mocerf.org/PensionPlan/cpp_non_eligible_positions.htm.

[4] For a complete description, each handbook can be found at: https://www.mosers.org/en/Members/Benefits.aspx.

[5] An example of CERF's monthly report can be found at: http://www.mocerf.org/Publications/ASAP_Reports/ASAPMay11.pdf?ASP_cur_month=May11&B3=Submit.

[6] Risk factors and the risk-free rate can be downloaded from Kenneth French's website:http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

[7] To assess statistical significance, look at the t-statistic below the alpha coefficient. If it is greater than 1.96, we interpret the alpha as being statistically significant.

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