

Spring 5-2017

# Public Fund Strategic Asset Allocation to Hedge Funds: A Time Series Analysis

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Steadwell, Morgan, "Public Fund Strategic Asset Allocation to Hedge Funds: A Time Series Analysis" (2017). *Honors College Theses*. 156.

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***Public Fund Strategic Asset Allocation to Hedge Funds:***

***A Time Series Analysis***

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### **Abstract**

Public funds represent some of the U.S.' largest institutional investors. These funds are a pool of money saved for retirement by those who are still working. Boards of Directors of these funds have strict standards for their investments, as the money they are investing is not their own; rather, it comes from the thousands of workers that pay into the funds. Alternative investments such as private equity, private debt, real assets, real estate, and hedge funds are historically more risky than traditional public equities or fixed income investments. Recently, public funds' investments in hedge funds have been called into question not only by the boards of these funds but also by the fund participants themselves. With high fees, low transparency, and currently average returns, investing in hedge funds has become a popular topic in the institutional investment industry.

This research looks to perform an in-depth analysis on a sample of public funds with investments in hedge funds. Limited to the last ten years, data from eight public funds with over \$15 billion in AUM was analyzed. These funds were chosen due to their hedge fund data availability ranging from FY 2007 through FY 2016, and because they had AUM of at least \$15 billion, ranging as high as \$133 billion as of September 2016. The analyses on these funds were done in three sections: Pre-Financial Crisis, During the Financial Crisis, and Post-Financial Crisis. Annual reports, news articles, manager reports, consultant reports, and institutional investor authored reports were used.

An analysis of the public funds within the sample and a review of current market sentiment on hedge funds revealed that there are split thoughts on the investment vehicle. Some public funds within the sample, like Virginia Retirement System, have a positive outlook for hedge funds, while New Jersey State Investment Council has looked to decrease their hedge fund

allocation. The ten-year review on the sample showed that allocations to hedge funds have increased over the time period but over the past two years specifically allocations have declined slightly. A highly valued equity market since the financial crisis has negatively impacted hedge fund returns. Despite underperforming traditional asset class returns, I believe public fund investment in hedge funds is still beneficial.

This research faced certain data limitations due to lack of disclosure in alternative investments pre-Financial Crisis. Although disclosure in hedge funds increased after the financial crisis, it only did so marginally. Due to this, original graphs and charts may not include data from all public funds within the sample. The results of this research call for future analyses into the types of investors public funds should be given different market environments.

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## **Introduction**

### **Public Funds**

Public funds are investment pools of mostly public employees' retirement money. Teachers, firefighters, and police officers all deduct a portion of their paycheck and send it towards a retirement fund. This fund continues to grow as more and more employees put money away for their retirement. Examples of these funds are 401K plans and pension funds. Employees continue to pay into these funds until their retirement date, at which point, the fund begins to pay the employee's back principal plus interest. These funds can be quite large, also. For example, as of September 30, 2016, California Public Employees' Retirement System has over \$306 billion dollars in assets.

So that these funds can pay back their employees during retirement, they hire investment consultants and managers to invest and grow their assets. The funds are overseen by a board of trustees and/or an investment committee. These groups of individuals are responsible for the sound investing of the public employees' money. Investment decisions must be well thought out and full risk/return studies should be completed prior to any investment decision. Investment decisions for these public funds affect all of the public employees who have paid into these retirement funds. As such, the retirement board/committee must make intelligent and educated decisions regarding the investment of this money. Prior to investment activity, consultants and managers for the funds present to the board/committee on their strategies and logic behind their recommendations. Careful attention must be paid to the types of investments being recommended to these funds. Even though the fund is looking to grow their assets, the board/committee must not forget that their job is to assure that public employees receive their

retirement payments. This plays a large role in the types of asset classes that the board/committee decides to commit money towards.

### **Types of Asset Classes**

Portfolio and investment management revolves around choosing the types of asset classes to invest in. Asset classes are defined by their investment attributes and characteristics.

“These investment characteristics include (1) the major economic factors that influence the value of the asset class, and as a result, correlate highly with the returns of each member included in the asset class; (2) have a similar risk and return characteristic and (3) have a common legal or regulatory structure” (Wilcox & Fabozzi, 2013).

When deciding which asset classes are best for the portfolio, portfolio managers have to first identify a goal for their investments’ returns. The riskier the investment, the higher the return capability.

### **Introduction to Alternative Asset Classes**

The definition of alternative assets varies amongst different types of investors. For the purpose of this research document, alternative assets will refer to a type of investment strategy that includes, but is not limited to: private equity, real estate and real assets, and hedge funds. Investing in alternative asset classes often requires more individual skill and time than investing in traditional asset classes such as stocks and bonds.

Private equity refers to direct investing in private companies. These companies can be involved in various sectors and industries in the economy including innovation of new technology or even acquisitions of new companies. Investing in real estate refers to investments in buying and/or constructing buildings. This type of investment can be in both residential

buildings and commercial buildings. In this case, the investment return can be from the sale of the building or the rent capability of the building. Examples of real assets include agriculture, energy, and infrastructure. All these alternative investments make returns for the investor through company profits. Hedge funds are an investment vehicle that utilizes traditional securities and more sophisticated investment techniques. “Hedge funds typically use long-short strategies, which invest in some balance of long positions (buying stocks) and short positions (selling stocks) with borrowed money (or shares), then buying them back later when their price has, ideally fallen” (Barclay Hedge, 2017). All of the investment strategies previously described are risky. The returns of these investment strategies can be very volatile and depend on more factors than traditional assets. Hedge fund allocation has seen the most drastic changes, positive and negative, in public fund investment strategies. This research paper will focus on hedge fund allocation.

### **Public Fund Strategic Asset Allocation in Hedge Funds**

Hedge funds are known for their lack of transparency and their high fees. Looking through the news archives from the past few years, a headline such as “How Secretive Hedge Funds Hurt Investors” in the *Wall Street Journal* is not a surprise. In the world of institutional investing, hedge funds have become a popular topic of conversation. Public funds are not as excited about paying high fees for what has seemed like average returns from the asset class. Hedge funds are also a riskier investment for these public funds, and risky is not necessarily the best investment strategy for public money -- “...the potential use of leverage, options, the more frequent trading of positions, the illiquidity of positions and the event risk for event strategies, among others, can individually or collectively increase the risk of investment” (Larochelle, 2016). Adding the fact that they are not regulated by the SEC and their investments are much



more difficult to liquidate, public funds have been paying a closer attention to this them.

Transparency and little regulation are the two main reasons why public funds have extreme views on hedge funds. Most recently, public funds are trending towards two opposite positions on hedge funds. We are seeing many boards recommend to either liquidate or increase their allocation to this investment vehicle.

### **Purpose of this Paper**

This research paper focuses on public fund strategic asset allocation to hedge funds specifically. Public funds tend to have drastic positions on hedge funds, and there is more ongoing research and data collection being executed on this type of investment vehicle. This paper explores hedge funds on a deeper level and analyzes public funds' commitments to hedge funds during the Financial Crisis and after the Financial Crisis. Additionally, recent hedge fund returns were analyzed and research into the future outlook on hedge funds was conducted. Due to data availability, a sample of eight public funds was used to conduct this research. These funds are: Teacher's Retirement System of Texas (Texas TRS), New Jersey Division of Investment, Virginia Retirement System (VRS), Michigan State Employees' Retirement System (MSERS), Massachusetts Pension Reserves Investment Management Board (Mass PRIM), Public School & Education Employee Retirement System of Missouri (PSRS/PEERS), Illinois State Board of Investment (SBI), and Los Angeles Fire and Police Pensions (LAFPP). Each of these funds have market capitalizations of over \$15 billion in assets under management (AUM) as of September, 2016 and have explicit documentation on their hedge funds portfolios during the designated time

period. Table 1 illustrates the top twenty public funds by defined benefits<sup>1</sup> AUM as of September 2016, and includes the various public funds referenced in this research.

### **Literature Review**

Institutional investors represent a majority of market participants. When looking into stock ownership of public companies, the leading investor by percentage is generally categorized as an “institutional investors”. As mentioned previously, public funds are considered institutional investors. Many public funds are retirement systems in the form of pension funds. Since these funds are made of public money, the funds are required to publicly disclose investment materials. Resources for information regarding pension funds are: *Pension & Investment*— a periodical and online resource, *FundFire* – a *Financial Times* service, eVestment – an online analytics tool, Prequin—alternative assets intelligence data, and more recently Public Plan IQ, which was introduced to the market in 2015. Prior to Public Plan IQ, information that was not explicitly disclosed by or requested from the public funds was not made available in aggregate to industry professionals. Because of this, in-depth analysis on public funds’ investments by a third-party was more difficult to conduct.

Quantitative research is conducted by firms like eVestment and Prequin, where the companies analyze data points collected on or provided by public funds and their managers, and interpret, compare, and contrast the sample. Articles related to major news in public funds were written by *Pensions & Investments* and *FundFire*. However, prior to the introduction of Public Plan IQ, it was rare to find aggregated data on public funds. Public Plan IQ is a research service and database that aggregates competitive intelligence on primarily U.S public funds with over \$1

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<sup>1</sup> Defined benefits refers to a type of pension plan where the employer administers the portfolio management and investment risk for the plan participants

billion in assets. As such, it has become a leader in the institutional investment space for investment knowledge on public funds. The data and documents within Public Plan IQ are all sourced from the public fund themselves. The database is as current as the public funds are; it holds documents dated from 2015 onward.

This original research looks to build on the current research in the market that covers public funds and alternative investments in hedge funds. When looking at the existing research in this market, I found that there was little research conducted that included both quantitative and qualitative data. The introduction of Public Plan IQ has provided me with the opportunity to conduct original research based off of data sourced from these institutional investors directly with much greater ease. This original research is also supported by scholarly articles and other news articles related to public fund investment strategies. Hedge funds are one of the most controversial investment vehicles used by public funds and as such, an in-depth analysis of public funds investment in hedge funds should be conducted.

## **Hedge Funds**

### **Seeking Alpha**

In financial markets, excess return on an investment is called “alpha”. Alpha refers to the returns an investment achieves above the required rate of return for the investment. Hedge funds are an investment class sought out by educated and lucrative investors; this includes wealthy families, endowments, and institutional investors. As mentioned in the prior section, hedge funds see little regulation and have very little transparency. Hedge fund managers can invest in a multitude of strategies and are not limited to one particular strategy. These managers can focus on equity strategies one year and then switch to fixed income or real estate the next. Freedom in

investment activity and the supposed knowledge and skill in a variety of investment strategies are contributing factors to high management fees. Moreover, hedge fund managers carefully choose their trades and due to their high fees, are expected to perform beyond the required rate of return for their investors. Hence, hedge funds were an optimal investment to provide their clients with alpha.

### **Benefits of Hedge Funds**

Hedge funds are an investment vehicle that can benefit their investors in a multitude of ways. This investment vehicle may have characteristics such as:

“...absolute return focused, seek low correlation with major equity and bond markets, may emphasize low volatility and capital reservation, prioritize risk management through use of hedging tools, and can also offer an illiquidity premium, inflation hedging or cash yield generation” (Grosvenor Capital Management, L.P., 2016).

Hedge funds look to exploit and profit off of market inefficiencies. By careful analysis of the market, hedge fund managers “provide superior risk-adjusted returns versus traditional market indices” (Grosvenor Capital Management, L.P., 2016). Hedge funds can be used for return generation, diversification, or hedging. Their allocation in a portfolio can prove favorable in adverse market conditions. These funds are positioned well and are flexible enough to react to uncertain macroeconomic conditions.

### **Hedge Fund Returns Pre-Financial Crisis**

Due to the lack of transparency and regulation of hedge funds, hedge fund indices may not be the most accurate representation of return data. Hedge fund managers are not required to report their performance to these index fund companies, and if they do report their performance,

they are not required to report all of their funds' performances. This means that hedge funds may only report the funds that performed well last year instead of providing the index with complete data that could include funds that performed negatively. However, when managers and consultants present to their investors, in this case, public funds, they do disclose their performance for those investors. Reviewing public fund manager presentations provided insight into hedge fund returns. Chart 1 in the appendix analyzes hedge fund returns by GAM, a manager for Los Angeles Water & Power Retirement System (LAWP). Looking at the 2005-2007 period, you can see that hedge funds were performing quite well, with few hedged strategies resulting in negative returns. During Meketa Investment Group's November presentation for the Maryland Retirement System, the consultant pointed out that hedge funds had been performing much better two decades ago than they have been this past decade. Table 2 shows historical comparative returns in hedge fund investment strategies over the last twenty years. Almost each hedge fund strategy had more favorable performance from 1996-2006 than from 2006-2016. This data was collected by Hedge Fund Research Inc., which releases the HFRI indices.

Hedge funds as an investment vehicle grew tremendously in overall popularity in the market. All types of investors have seen the potential for hedge funds. Chart 2 in the appendix illustrates investment in hedge funds was in its earlier stages in 2000. Investments in hedge funds began to increase rapidly until 2007, which was the start of the financial crisis.

### **Hedge Fund Returns vs. S&P 500 Returns**

During a bull market it is not uncommon that the S&P 500 outperforms hedge funds. When equity markets perform well, there are limits to arbitrage for hedge funds. The opposite holds true for underperforming equity markets. In this case, hedge funds will outperform equity

markets 90% of the time (Virginia Retirement System, 2017). NEPC conducted a review on hedge fund performance pre and post crisis relative to popular market indexes. The results in Chart 3 and Chart 4 show that over a 25 year cycle, hedge funds have outperformed traditional assets classes. But, looking at only post Financial Crisis years returns, hedge funds have underperformed traditional asset classes (NEPC, LLC , 2016).

### **What Happened During the Financial Crisis?**

The financial crisis of 2007-2008 was caused by a bubble in the housing market. A bubble occurs when assets are overvalued but the market doesn't bring prices back down to true value and these overvalued assets continue to be bought and sold, continuing to inflate prices. In this case, real estate was the asset class in question. Mortgage-backed securities became extremely popular in the early 2000's, specifically residential mortgage-backed securities (RMBS) and commercial mortgage-backed securities (CMBS). These assets were basically insurance policies on mortgages; they were sold by banks and other underwriting financial institutions to investors. When homeowners began to default on their mortgages in late 2007 and 2008, these "insurance policies" that the banks never thought they would have to pay out were suddenly all called upon at once. This led to major and many bank failures and thus the collapse of the financial markets.

Public funds fell prey to this financial crisis. Traditionally, public funds are long investors and tend to be less risky in investments, but the bubble prior to the crisis caused a lax in this traditional investment strategy. Public funds' consultants/managers were investing in many mortgage-backed securities. When banks and hedge funds began to fail because of mortgage defaults, public fund portfolios fell in value. During the prime years of the housing bubble, the

S&P 500 was trading at around \$1600; during the lowest point of the crisis, in 2009, the S&P 500 was trading below \$700.

### **Public Fund Asset Allocation at the Beginning of the Financial Crisis (FY 2007)**

To complete an in-depth review of public fund strategic asset allocation in hedge funds, this paper will refer to funds with over \$15 billion in assets under management<sup>2</sup> with data availability. Comprehensive Annual Financial Reports (CAFRs) are an annual report completed by all public funds. These reports list investment holdings and other important and relevant information for investors. For data between 2007 and 2015 CAFRs are the best source of public fund investment data<sup>3</sup>. In addition to CAFRs, a comprehensive table was created for this research. The table details important data points and portfolio information on each public fund being analyzed in this paper.

### **Summary of Public Funds Analyzed**

This paper will continue to follow and analyze the aforementioned eight public funds through today, with an emphasis on how these funds have changed their asset allocation to hedge funds. As a reminder to the reader, the eight public funds being explored by this research paper are: Teacher's Retirement System of Texas (TRS), New Jersey Division of Investment, Virginia Retirement System (VRS), Michigan State Employees' Retirement System, Massachusetts Pension Reserves Investment Management Board (PRIM), Public School & Education Employee Retirement System of Missouri (PSRS/PEERS), Illinois State Board of Investment, and Los

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<sup>2</sup> As of September 2016

<sup>3</sup> Most public funds' fiscal year begins on the last day of either June, July or August. In turn, CAFRs may have financial information for two different calendar years, ex. June 2006-June 2007 data is disclosed in the 2007 CAFR. Occasionally public funds will have fiscal years ending on the last day of December.

Angeles Fire and Police Pensions (LAFPP). This research may refer to these funds as “the sample” or “sample funds” from this point forward.

### **What Were Public Funds Investing In?**

Each public fund has its own policies regarding asset allocation. Asset allocations are determined and voted on by a fund’s board. Asset allocation targets may be recommended by the fund’s consultant or by the board itself. Table 3 details the hedge fund and in some cases, alternative, portfolios of each of the eight public funds analyzed in this paper.

For the eight public funds that are analyzed in this paper, their respective FY 2007 CAFRs hold data for both 2006 and 2007. The average fund size of the sample was \$53.2 billion, where on average \$1.6 billion was invested in hedge funds, or 3.13%. Table 3 provides more detailed information for fund sizes and hedge fund allocations for each public fund in the sample. During 2006 and 2007 the market was experiencing positive momentum, partially stemming from the growth in mortgage-backed securities trading. Higher housing prices gave a sense of security to market participants, who believed that the economy was growing robustly. These beliefs are reflected in the total fund returns for the eight public funds being explored in this research. Fund returns are shown in Table 5.1.0. For FY 2007, total fund returns for this sample were on average 17.6%, where the minimum return was 14.4% for Texas TRS and the maximum return was 20.4% for Virginia Retirement System (VRS). Hedge fund returns averaged 14.58% for FY 2007<sup>4</sup>. The minimum return was 7.68% for Michigan SERS and the maximum return was 19.9% for Illinois SBI.

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<sup>4</sup> Due to data availability this average includes five out of the eight public funds in the sample



**Public Fund Asset Allocation during the Financial Crisis (FY 2008- FY 2009)**

Public funds suffered greatly during the Financial Crisis. The impact of bank failures and defaulted mortgages began in late 2007 but didn't heavily impact public funds until 2009, as was reflected in these funds' 2009 CAFRs. The average total fund investments for FY 2008 and FY 2009 were \$49.6 billion and \$40.7 billion respectively. This is a decrease of 6.7% for FY 2008 and a decrease of 17.9% for FY 2009. Total fund returns followed the same pattern as total fund investments, with average returns of -5.14% and -17.38% for FY 2008 and FY 2009 respectively. The S&P 500 was valued at \$1,549 on October 31, 2007 and by February, 27 2009 it was trading at \$735.<sup>5</sup>

During this time period, the sample of public funds showed increased allocations to hedge funds. On average, hedge fund allocations were 4.55% and 6.42% for FY 2008 and FY 2009 respectively. However, these increased allocations were not because there were increased commitments to hedge funds. In fact, the dollar value of investments in hedge funds decreased but relative to the overall portfolio hedge funds represented a larger portion. The average hedge fund portfolio of the sample was \$2.25 billion in FY 2008 and \$2.24 billion in FY 2009. Allocations to hedge funds increased as a result of major declines in the values of other asset class investments, most evidently the decreased values of public equity portfolios. Returns for hedge funds during this time period were similar to the returns of the overall funds, where hedge funds returns for FY 2008 and FY 2009 were -4.6% and -17.95% respectively<sup>6</sup>. For FY 2008, Missouri PSRS/PEERS and LAFPP were the only public funds that disclosed a positive return for their hedge fund portfolios.

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<sup>5</sup> See Tables 4 and 5 in the Appendix for a detailed investment data during this period

<sup>6</sup> Due to data availability hedge fund returns were calculated from data provided by four funds in the sample for FY 2008 and seven funds in the sample for FY 2009

**Public Fund Asset Allocation Post Financial Crisis (2010-2017)**

The drastic decline in domestic equity returns made way for public fund investment in alternative asset classes. These assets classes were introduced as a safeguard against volatile markets with systematic risk. As mentioned previously, alternative asset classes include strategies such as private equity, private debt, real assets, and real estate and investment vehicles such as hedge funds. Tables 6, 7, and 8 in the Appendix includes investment data pertaining to FY 2010- FY 2016. In 2010, the average total fund portfolio of the sample was \$43.3 billion, ranging from \$9.6 billion to \$94.9 billion. Of this average total fund portfolio, an average of \$2.7 billion was invested in hedge funds, which is an allocation of 7.2%. Total fund returns were on average 12.68% versus average hedge fund returns of 9.13%. 2011 data for the sample was similar to that of 2010. Analysis showed that public funds were recovering well from the financial crisis. For FY 2011, the average total fund portfolio was valued at \$48.7 billion, just under the FY 2008 average. Since the purpose of public funds is to invest retirement money and then disburse these funds to retirees, it's logical that despite high returns, funds do not grow exponentially. The average fund return for FY 2011 was 19.29% compared to hedge fund returns of 11.47%. Hedge fund investments grew once again to an average of \$3.3 billion, or 7.86% of the average total fund portfolio.

A five-year average data analysis was conducted on each public fund within the sample. This analysis covers FY 2012- FY 2016. On average, the total fund portfolio for the sample is \$55.5 billion, with a minimum five-year average total portfolio of \$14.1 billion for Illinois SBI and a maximum five-year average total portfolio of \$124.3 billion for Texas TRS. Hedge fund portfolio sizes fluctuated between the eight public funds in the sample. LAFPP initiated their hedge fund portfolio during FY 2007, and in FY 2012 decided to terminate the program.

However, due to liquidation terms the fund continues to have investments in hedge funds through 2017. The five-year average of investments in hedge funds for the sample is \$5.7 billion, or 10.15%, and the time-weighted returns for this period is 3.87%.

### **Ten Year Analysis on Public Fund Sample**

After analyzing the portfolios of the sample pre-financial crisis, during the financial crisis, and post financial crisis, a holistic 10-year analysis was performed. On average hedge fund portfolios in the sample increased every year from 2007-2016, except for 2008 to 2009 and 2015 to 2016. The first decrease in average hedge fund investments was during the financial crisis. The second decrease in average investment in hedge funds is most likely due to mixed feelings about the investment vehicle. Charts 6-8 in the Figures section of the Appendix illustrate investments in hedge funds over the past 10 years, showcasing a steady increase in hedge fund investments.

Public fund average allocations to hedge funds has climbed irregularly. As explained earlier in this paper, allocations to asset classes not only change because of increased/decreased commitments to asset classes but also depend on their relative asset values to their peers'. Allocations to hedge funds showed a dramatic increase from 2007 to 2012 but have since tapered off. Chart 9 shows allocations going back and forth, from increasing to decreasing each year between 2012 and 2016.

### **Public Funds' Current Feelings on Hedge Funds**

The U.S economy and its financial markets have seen many changes since the 2008 Financial Crisis. This section of the research paper aims to compare and contrast public funds' asset allocations during the years of the financial crisis and the present. This analysis will

uncover how public funds have reacted to a major financial crisis. Public funds' CAFRs are a good source for investment information; however, Public Plan IQ has been utilized in this paper to further understand and analyze the investment strategies of public funds in the present day. This paper will use Public Plan IQ as a source for asset allocation information on the eight public funds being investigated.

### **Current Outlook for Hedge Funds**

Public funds continually review their asset class investments during board retreats, board meetings, and through asset allocation studies. These reviews are vital as the investment environments for different strategies change constantly. Both consultants and the institutional investors themselves perform the reviews. Many times, the institutional investors' views align with that of the consultants. However it is the job of the board of directors to challenge the positions of the consultants to assure sound investing processes. This section reviews both institutional investors' (staff) analyses on the outlook for hedge funds in addition to the market expectations reported by public fund consultants. To broaden the sample and look at the current hedge fund market in a macro lens, this section of research may reference other public funds with over \$15 billion in assets.

### **Institutional Investors with Positive Outlooks for Hedge Funds**

Virginia Retirement System performed a review of their hedge fund portfolio in March of 2017. One of their research documents was titled "Why Equity Hedge Funds". The VRS staff had an overall positive outlook for their hedge fund program.

"Since hedge funds have been used in Public Equity, they have achieved equity-like returns net of all fees with much less risk. In the current market environment with

arguably higher market valuations, these mandates should provide better downside protection looking forward” (Virginia Retirement System, 2017).

For VRS, hedge funds are used as an investment vehicle to protect the fund from downside when the market is considered to be fully valued. Historically, their hedge fund portfolio has outperformed their total public equity portfolio. The VRS staff took the time to note the high Cyclical Adjusted Price Earnings Ratio P/E 10 (CAPE)<sup>7</sup>, highlighting that “equity valuations are highest since the Financial Crisis” (Virginia Retirement System, 2017). The plan looks to continue their hedge fund investments for two reasons: 1) protection from downside risk and 2) high returns. Although hedge fund management fees are typically much higher than in traditional investments, VRS is not worried this since they have managed to negotiate their fees to an acceptable rate.

Joining VRS’ positive outlooks towards hedge funds is the State of Michigan Retirement System (SMRS). The fund’s March 2017 review of their absolute return and real return portfolios showed a cautious but positive stance on hedge funds. The SMRS is a combination of four interstate retirement funds, which get invested by one overseeing board. SMRS is more cautious regarding hedge funds. The board wants to be wary of unnecessary risk and will most likely look to target specific exposures within hedge fund investments (State of Michigan Retirement Systems, 2017).

In November of 2016, Mass PRIM released a Request for Proposal (RFP) for emerging hedge fund managers. The purpose of this program was to find a Global Macro or Commodity Trading Advisor (CTA) manager to help the fund mitigate risk. Similar to VRS, Mass PRIM was

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<sup>7</sup> The cyclically-adjusted price-to-earnings (CAPE) ratio of a stock market is one of the standard metrics used to evaluate whether a market is overvalued, undervalued, or fairly-valued. This metric was developed by Robert Shiller and popularized during the Dotcom Bubble when he argued (correctly) that equities were highly overvalued. (Alden, n.d.)

using hedge funds as a risk diversifying strategy. Specifically, the fund was looking for an emerging manager, a smaller fund, for this mandate as their research concluded that emerging managers were outperforming the median in this investment space and larger firms were underperforming the median (Massachusetts Pension Reserves Investment Management Board, 2016).

Public funds are looking to hedge funds as risk-diversifying investment vehicles. VRS, SMRS, and Mass PRIM all have positive outlooks for the hedge fund investment space, more so for protection from downside than for upside potential. SMRS and Mass PRIM are more cautious regarding their beliefs in hedge funds, whereas VRS believes hedge funds, especially equity-oriented hedge funds, are a smart investment due to the current valuation of the equity market.

### **Institutional Investors with Negative Outlooks on Hedge Funds**

New Jersey State Investment Council (NJ SIC) announced its FY 2017 Investment Plan during their August 2016 meeting. Within their investment plan, the board disclosed their unanimous vote to decrease investments in hedge funds. At the time of the meeting, the NJ SIC had a target allocation of 12% towards hedge funds. “The Division believes a modest allocation to hedge funds remains in the best interest of the Fund” (New Jersey State Investment Council, 2016). The new asset allocation decreased the target hedge fund allocation by half, from 12% to 6%. NJ SIC noted that costs would decrease as a result of less management fees, yet risk exposure would slightly increase in the portfolio. The fund made these changes to further diversify their asset classes, allocating more funds towards the traditional asset classes (New Jersey State Investment Council, 2016).

In addition to NJ SIC, New York City Employees' Retirement System (NYCERS) also decided to decrease their holdings in hedge funds. In April of 2016, NYCERS announced the liquidation of their hedge fund portfolio. NYCERS is one of five pension funds in the \$154 billion New York City Retirement Systems. Pensions and Investments reported that "Hedge funds accounted for \$1.45 billion of NYCERS \$51.2 billion in assets as of Jan. 31, 2016" (Stever, 2016). One key reason for liquidating their hedge fund portfolio was that there was "little evidence that the NYCERS hedge fund portfolio added overall value via increased returns or decreased risk" (Stever, 2016). The three year annualized return for the NYCERS hedge fund portfolio was 6.54% gross of fees compared to the benchmark at 7.29% gross of fees.

Illinois SBI was another public fund that took the initiative to decrease their hedge fund position. During their February 2016 board meeting, Illinois SBI voted to "reduce its hedge fund target from 10% to 3%" (Meketa Investment Group, 2016). The change was made in hopes of seeing similar average returns but less volatility.

LAFPP initiated their hedge fund program during FY 2007. For the first few years of investment, the portfolio had upwards of \$500 million in hedge funds. In May of 2013, the LAFPP board approved their elimination. Due to liquidation timelines and freezes, LAFPP continues to have a small portion of their portfolio in hedge funds. As illustrated by the previous and current sections in this research, public funds can have differing views on the same type of investment vehicle or strategy.

A smaller fund that has been in the news recently regarding decreasing their hedge fund portfolios is Kentucky Retirement Systems (KRS). With just over \$11 billion in assets as of September 2016, KRS has announced the liquidation of at least \$800 million of investments in hedge funds. At the time of the announcement, the plan had just over \$1.5 billion in hedge funds,

which represented 10% of the overall portfolio for the public fund (Gillers, 2016). The board of KRS discussed this divestment and found that “KRS’ hedge-fund investments have trailed stocks and bonds on a five-year basis, according to fund documents. Pension dollars invested in hedge funds produced a five-year return of 3.93%, compared with 5.14% for equities and 4.74% for fixed income” (Gillers, 2016).

High fees and low returns relative to peer asset classes have been the main reason for public funds to divest from hedge funds. Since the equity market has performed well since the Financial Crisis, public funds have seen hedge funds underperform while their correlation to equity portfolios has risen. “Pension funds in California, Rhode Island, New Jersey and New York all have pulled money from the \$2.9 trillion industry, which has underperformed broader financial markets since 2009” (Gillers, 2016).

### **Consultants’ Outlook on Hedge Funds**

In order to look at a holistic view of consultants’ views on hedge funds, this research analyzed consultant authored documents on the Public Plan IQ database. The documents analyzed were not limited to the sample of public funds researched in this paper. This is because there would be a limit to the number of consultants available to explore. Five popular consultants amongst the public funds are Meketa Investment Group, Pension Consulting Alliance (PCA), NEPC, Cambridge Associates, and AON Hewitt. Although consultants may work for multiple public plans, their investment beliefs, recommendations, and market outlooks should rarely differ between funds. The only reason as to why investment recommendations by the consultant would differ between clients is because the consultant believes that a strategy/vehicle is or isn’t able to compliment the overall portfolio.



*Positive Outlooks on Hedge Funds*

Meketa Investment Group did an analysis on hedge funds for their client, Los Angeles County Employee Retirement Association (LACERA). As of September 2016, LACERA had roughly \$49 billion in AUM. Meketa reported on an arbitrage opportunity for LACERA within hedge funds. “Short term inefficiencies in the market provide the opportunity for skilled investors to profit” (Meketa Investment Group, 2016). The consultant reminded the fund that as more hedge funds became aware of these short term inefficiencies returns would decrease; hedge fund specific hedge fund strategies may be cyclical. Meketa presented a number of ways that hedge funds could add to LACERA’s overall portfolio including the capacity to “enhance returns through an aggressive allocation, diversify market beta by investing in low correlation strategies, preserve capital via low/risk return, fixed income substitutes, and hedge a specific risk in the program” (Meketa Investment Group, 2016).

In December 2016, Cambridge Associates performed a Hedge Fund Program Review and Strategic Investment Analysis for Florida State Board of Administration (Florida SBA) also known as Florida State Board of Investment (Florida SBI). This public fund had about \$154 billion AUM as of September 2016. Cambridge Associates reported that the fund has faced a challenge with active management of their hedge fund portfolios, however, “certain hedge fund managers should be able to deliver attractive risk adjusted returns and cyclical pressure abates” (Cambridge Associates, 2016). The overall tone of the report was positive towards hedge funds. The consultant pointed out that “hedge fund managers possess the flexibility to invest in areas where they see the best opportunities for a good risk-adjusted return” (Cambridge Associates, 2016) and that they diversify sources of returns while also reducing volatility. Cambridge Associates believes that hedge funds returns should continue to improve especially since

“cyclical factors affecting hedge funds are at peak levels and are likely to mean revert”

(Cambridge Associates, 2016).

State Universities Retirement System of Illinois (Illinois SURS) had about \$19 billion in AUM as of September 2016. Their consultant, NEPC, performed an in-depth hedge fund market update report for the public fund during the board’s September meeting last year. The report highlights the positives and negatives of the portfolio. NEPC points out that “recent performance of broad hedge fund category has been disappointing vs. the traditional markets that have delivered strong returns driven by central bank liquidity” (NEPC, LLC , 2016). However, the consultant also pointed out the reasons behind the low returns in hedge funds. These reasons include: “central bank activity driving irrational or extreme pricing in some markets, the USD strength negatively impacting non-US equity and commodity market returns, sudden and brief market declines followed by extreme market rebounds, and the impact of hedging interest rate risk as rates continue to decline” (NEPC, LLC , 2016). Despite these negative impacts on the hedge fund portfolio, NEPC disclosed that overall hedge funds have helped the portfolio by reducing volatility and improving returns. The conclusion of NEPC’s report recommended that Illinois SURS stay in the hedge fund market as they expect to see hedge funds gaining stronger returns.

### ***Negative Outlooks on Hedge Funds***

In March of 2016, Meketa Investment Group performed an Asset Allocation Implementation Plan for Illinois SBI. This report was created a few months prior to their report to LACERA, which encouraged LA City to increase their investments in hedge funds. However, this March report for Illinois SBI encourages the fund to decrease their allocation to hedge fund from 10% to 3%. The target in the case of LACERA was an increase to a 5% allocation in hedge

funds. Meketa recommended that Illinois SBI work towards the new allocation of 3% in a six month implementation plan. The new allocation had the hopes of reducing volatility in the fund.

Orange County Employee Retirement Systems (OCERS) is a smaller public fund with just over \$13 billion in AUM as of September, 2016. PCA, an alternatives consultant for the plan, performed a review on the fund's absolute return portfolio. The consultant noted an increased correlation between OCERS' hedge fund and equity portfolios. PCA was also highly concerned regarding the fees the fund was paying to hedge fund managers. The consultant pointed out that the fund was not seeing good enough returns from hedge funds to justify the high fees they were paying. Language in the consultant presentation was quite strong, with PCA stating "nobody needs to invest in hedge funds, nobody needs to invest in any particular hedge fund style" (Pension Consulting Alliance , 2016). Additionally, the consultant pointed out that none of the fund's five hedge fund strategies were positively impactful to the overall portfolio.

### **Hedge Funds as a Diversifying Investment Strategy or as an Alpha Strategy?**

Reviewing hedge fund related documents authored by both by public funds and consultants in the past year revealed the overlying opinion that the use of hedge funds should be in a diversifying role. All public funds, just as any investor, look to maximize returns at minimum risk. When performing asset allocation studies, public funds will analyze sharpe ratios and efficient frontiers in order to find their optimal risk/return balance. When it comes to hedge funds, in addition to risk/return, public funds must also look into management fees paid to the hedge fund managers. The return on investment in hedge funds should be high enough to justify the fees being paid and the risk undertaken for the investment.

Hedge funds became popular with public funds in the early 2000's. The investment vehicle was undertaken as a search for alpha, which was spoken about earlier in this research.

Currently, public funds have seen hedge funds more so as a diversifying strategy with the upside potential for alpha. The public funds in the sample for this research all noted that hedge funds helped to protect them from prolonged losses during and after the Financial Crisis. VRS noted that their equity hedge fund portfolio bounced back from negative returns much faster than their private equity portfolio: “private equity didn’t get back to High Water until March 2013, over 2 years later” (Virginia Retirement System, 2017). Whether the public funds in the sample had positive or negative views on hedge funds, they all mentioned that hedge funds were being used (or supposed to be being used) as a risk diversifying investment vehicle that limited the volatility to the overall portfolio.

Crisis Risk Offset (CRO) hedge fund programs have seen attention from public funds. This type of investment, “described by some market participants as risk mitigation, focuses on investing in strategies that can help in a time of stress or crisis in equity markets but still deliver returns in normal cycles” (Tomkiw, 2017). This type of investment is designed to both diversify risk and create strong returns for a portfolio. Hawaii Employees’ Retirement System (Hawaii ERS), with just about \$15 billion in AUM as of September 2016, has been an investor in the CRO opportunities. Their consultant, PCA, a strong supporter of CRO, has recommended the investment to other plans such as VRS and OCERS. CRO investment looks to protect investors from volatility that isn’t properly representing market risk.

### **Future Outlook on Hedge Funds – Author Opinion**

There were many scholarly articles, annual reports, and investment-related documents reviewed during the writing of this research. As such, both positive and negative outlooks on the hedge fund market were analyzed. The financial markets have seen a period of growth and positive momentum since the Financial Crisis. The recent election of President Donald Trump

has given the equity market an extra bump as policies regarding decreased regulation and infrastructure spending were beneficial for U.S companies. As mentioned previously, the correlation between the U.S equity market returns and returns on hedge funds has increased over the past few years. On average, hedge funds outperform the equity market 90% of the time during a down market. This being said, the U.S economy is currently in a bull market, where stocks are up. This environment limits returns in the hedge fund market, making investors weary of high fees being paid for average returns.

In VRS' presentation on hedge funds, they point out that the Cyclical Adjusted Price Earnings Ratio P/E 10 (CAPE)<sup>8</sup> is just as high as it was right before the demise of the Financial Crisis. The Schiller P/E Ratio is currently at 28.93. In October of 2007 the Schiller P/E Ratio was 27.239. As such, a market plunge would not be surprising in the next few quarters. Bloomberg has run many television segments where contesting managers debate about whether the market is currently overvalued. Additionally, the stock market has been extremely sensitive to the remarks and policies made by President Trump. The market has fallen prone to active noise traders who make investment decisions based off of news that may not be fundamentally relevant to their investments or news that will take a significant amount of time to have a true impact on these investments. With this in mind, it would not be surprising for markets to see a lot of volatility in the coming months, resulting in declines in the market. Since hedge funds are shown to outperform equity markets during a down market, it is my opinion that public funds should look

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<sup>8</sup> The cyclically-adjusted price-to-earnings (CAPE) ratio of a stock market is one of the standard metrics used to evaluate whether a market is overvalued, undervalued, or fairly-valued. This metric was developed by Robert Shiller and popularized during the Dotcom Bubble when he argued (correctly) that equities were highly overvalued. (Alden, n.d.)

to invest in certain hedge fund strategies such as CRO or global macro, both of which look to protect the investor from downside risk.

An overvalued equity market can give experienced traders the opportunity to take advantage of shorting stocks and thus produce high returns for their investors. The key for these hedge funds is to know when valuations are going to take a turn for the worse. Low transparency makes it difficult for public funds to invest in hedge funds as they do not necessarily know what their hedge funds are investing in. Hedge funds are risky assets, but in the case of a down market, they are beneficial investment vehicles. Consultants should do due diligence on their recommended hedge fund managers and look to inform public funds on the different types of hedge funds. Despite the higher risk and fees of hedge funds, I think that given the overvalued equity market, hedge funds are a good choice of investment for public funds.

### **Conclusion**

This research involved both quantitative and qualitative analysis on public funds' investments in hedge funds. Eight public funds with over \$15 billion in AUM and with data availability were analyzed. This research showed that public funds' commitment to hedge funds has increased over the past ten years despite decreased returns. The logic behind investment in hedge funds from 2007 to 2016 has changed from seeking alpha to risk diversifying. Despite lower returns in the past five years, it is my belief that due to the overvalued equity market environment, it is in the best interest of public funds to continue their hedge fund programs. The benefits of investment in hedge funds is cyclical, and for that reason public funds may see that diversifying within their hedge fund strategies is in the best interest of the overall portfolio.

Further research should be conducted in this field to continue to analyze the type of investors that public funds are. Since these funds are investing public money for the purpose of

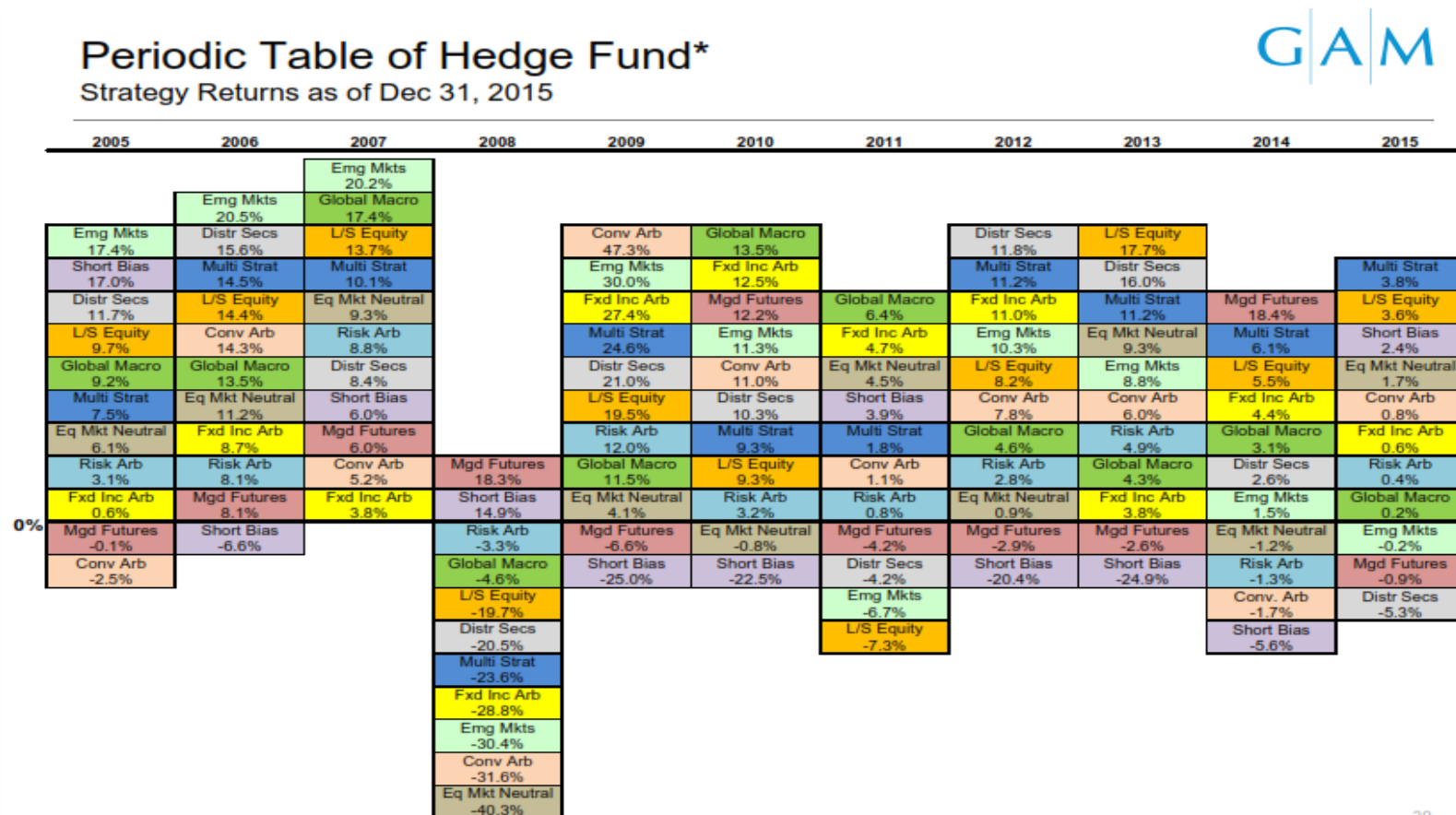
retirement, these funds should be long investors in the sense that they take on less risk. However, with changing market environments public funds should also be able to be flexible with their investment activity, allowing them to take advantage of arbitrage opportunities and protect themselves from inevitable market risk. Since the Financial Crisis, disclosure in alternative assets has increased, especially when it comes to public funds. Increased disclosure, coupled with the introduction of Public Plan IQ, have provided the institutional investment industry with an opportunity to thoroughly analyze the investment decisions and rationales of alternative investments by public funds. This research compares and contrasts hedge fund investments within a sample of public funds and while the time period of this research covers both up and down markets, it would be beneficial to the industry to conduct future-looking research in anticipation of both bear and bull markets.

## Appendix

## Figures

## Chart 1

*Periodic Table of Hedge Funds from Global Asset Management*



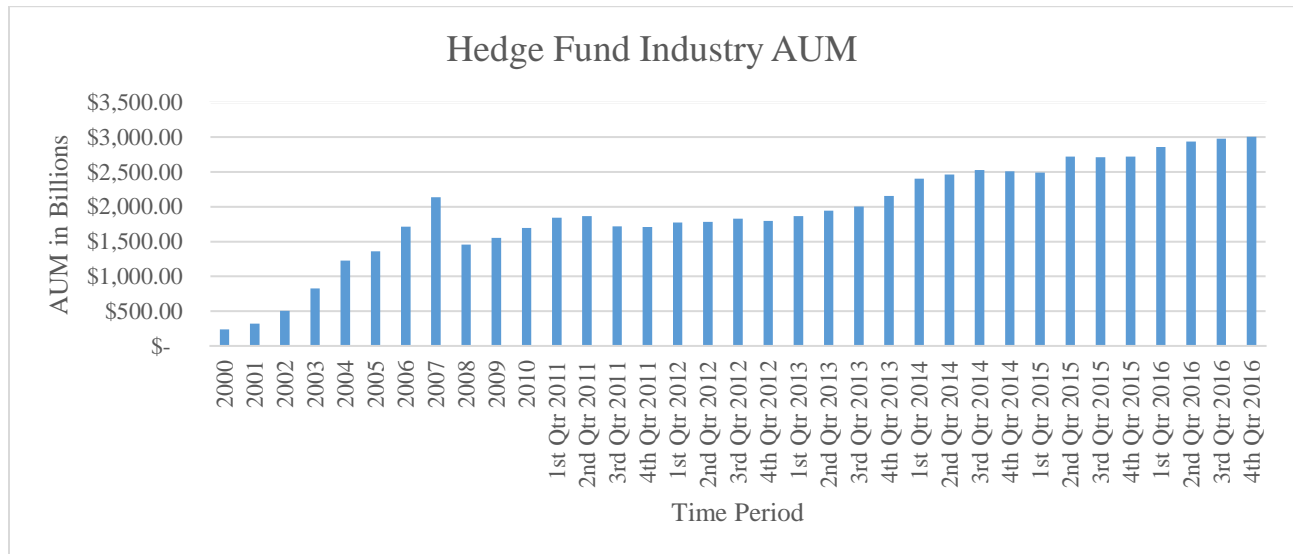
Source: \*Prepared by GAM based upon performance (net of fees) data from the applicable Dow Jones Credit Suisse hedge fund indices. GAM has not independently verified the information from other sources and no assurance can be given as to whether such information is accurate, true or complete and GAM makes no warranty, expressed or implied, regarding such information. Every effort has been made to ensure the accuracy of the information provided, but GAM cannot be held responsible for any errors or omissions. Past performance is not indicative of future returns.

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*Source: Public Plan IQ, Los Angeles Water and Power, 2016 (Global Asset Management, 2016)*

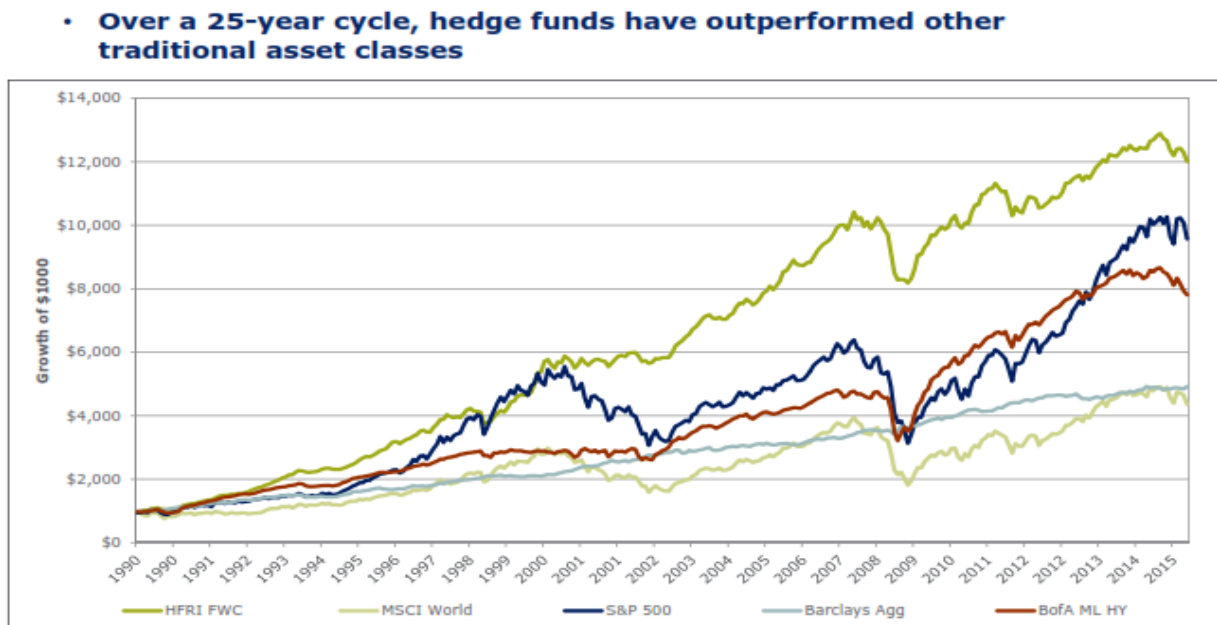


Chart 2

*Hedge Fund Industry AUM*

Source: BarclayHedge (BarclayHedge, 2016)

Chart 3

*Hedge Fund Performance versus Index Performances – 25 Year History*

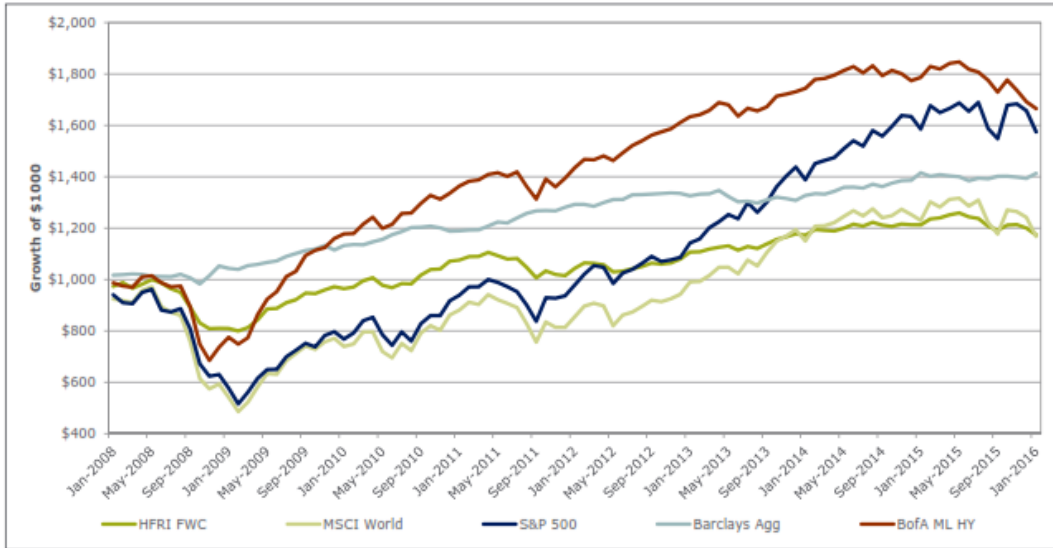
Sources: eVestment, HFR, Jan 1990 through Jan 2016. Past performance is no guarantee of future results.

Source: Public Plan IQ, Virginia Retirement Systems (NEPC, LLC , 2016)

Chart 4

*Hedge Fund Performance versus Index Performances- Post Financial Crisis to 2016*

- **Post-crisis, hedge funds have lagged many traditional asset classes leading to considerable scrutiny of the industry**
  - The S&P 500 overtook the HFRI Fund Weighted Composite in the third quarter of 2012



Sources: eVestment, HFR, Jan 1990 through Jan 2016. Past performance is no guarantee of future results.

Source: Public Plan IQ, Virginia Retirement Systems (NEPC, LLC , 2016)

Charts 5-7

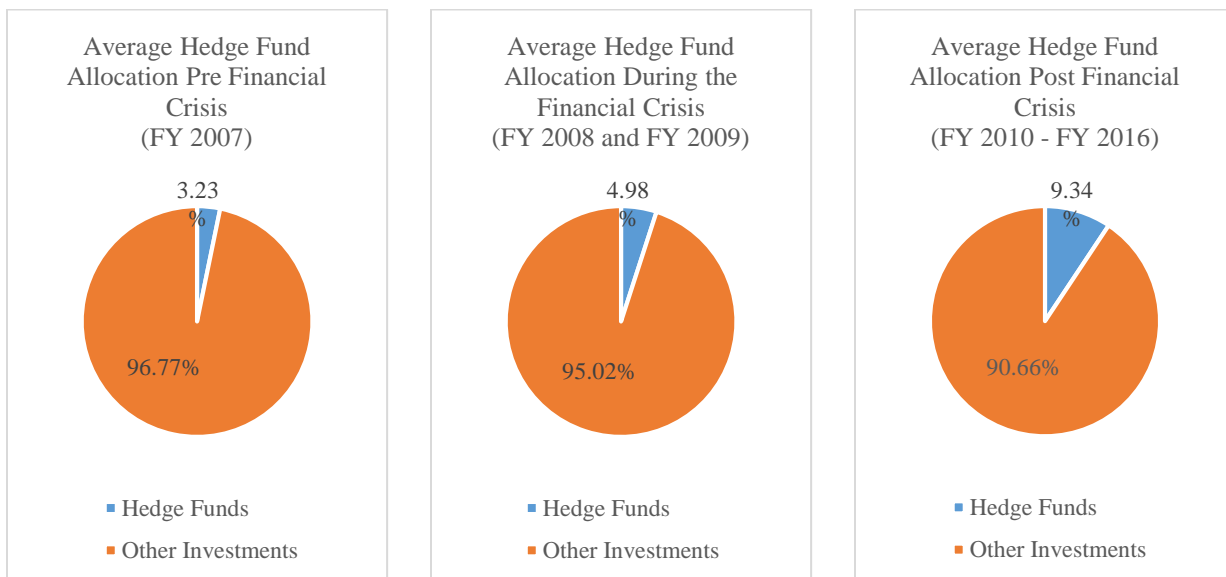
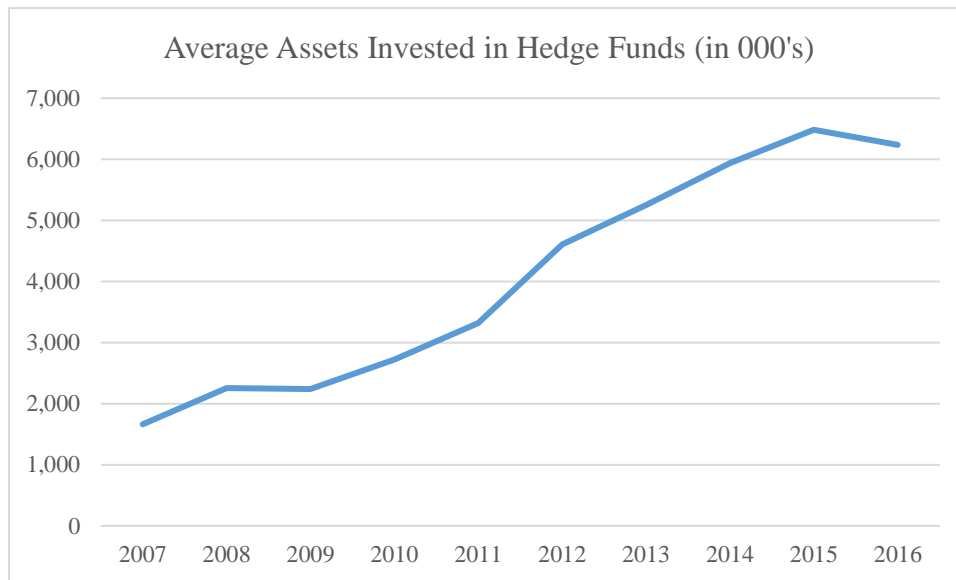
*Average Allocation and Assets Invested in Hedge Funds (in thousands) from FY 2007- FY 2016*

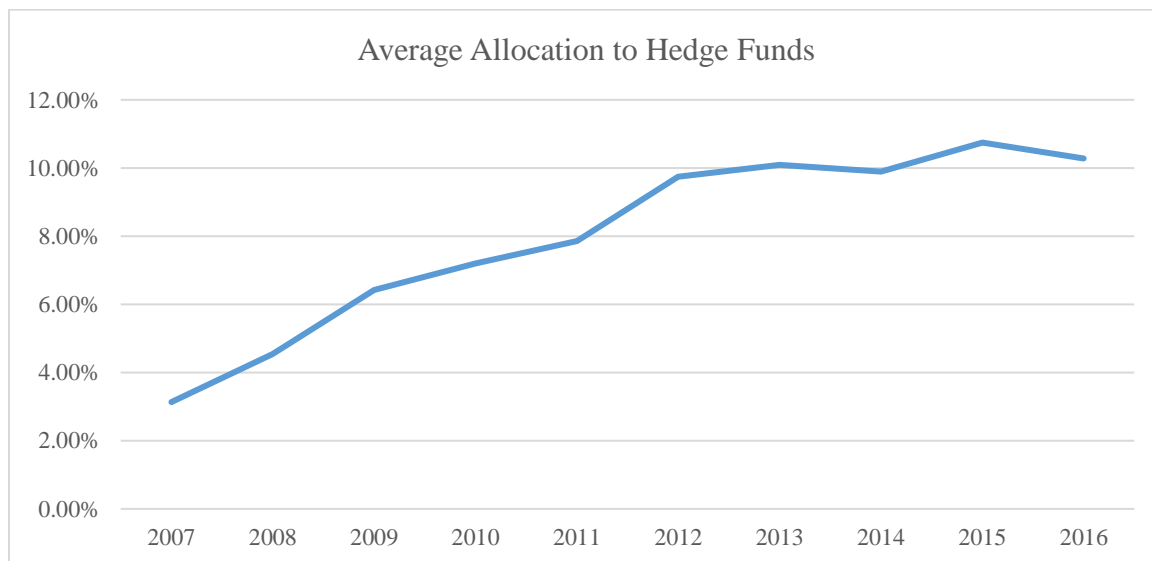
Chart 8



*Note:* These charts were created based off of data from the sample public funds list in this research

Chart 9

*Average Allocation to Hedge Funds of Sample Public Funds List FY 2007-FY2016*



**Tables**

Table 1

*Top 20 Public Funds by Ranking in Defined Benefits AUM as of September 30, 2016*

<u>Ranking</u>	<u>Name of Plan</u>	<u>Assets (in mm)</u>
1	California Public Employee's Retirement System (CalPERS)	\$305,199
2	California State Teacher's Retirement (CalSTRS)	\$193,154
3	New York State Common	\$184,461
4	New York City Retirement Systems	\$171,574
5	Florida State Investment Board (SBI)	\$144,672
6	Texas Teachers	\$133,221
7	NY State Teachers	\$107,042
8	Wisconsin Investment Board	\$96,962
9	North Carolina	\$89,824
10	Ohio Public Employees Retirement System (Ohio PERS)	\$89,344
11	Washington State Investment Board	\$76,758
12	New Jersey Division of Investment	\$72,038
13	Ohio State Teachers (Ohio STRS)	\$70,095
14	Oregon Public Employees	\$69,967
15	Virginia Retirement System	\$69,486
16	Georgia Teachers	\$66,981
17	Mass PRIM	\$63,264
18	Michigan Retirement	\$61,611
19	Minnesota State Board	\$57,804
20	California University	\$56,141
	LA County (LACERA)	\$48,924
	Maryland State Retirement	\$46,285
	Missouri Schools	\$38,735
	Los Angeles Fire & Police	\$19,568
	Illinois State Universities	\$17,172
	Illinois State Board	\$15,609
	Orange County	\$13,106
	Los Angeles Water & Power	\$12,153
	Kentucky Retirement	\$11,048

*Note: Adapted from Pensions & Investments (Pensions & Investments , 2017) p.17 to pg.19*

Table 2

*Historical Comparative Returns of Hedge Funds*

<u>HFRI</u>	<u>September 1996-August 2006 (%)</u>	<u>September 2006- August 2016 (%)</u>
Fund of Funds Composite	7.90%	1.70%
Fund Weighted Composite	10.70%	3.70%
Equity Hedge	13.30%	3.20%
Equity Market Neutral	7.20%	2.00%
Event-Driven	12.20%	4.30%
Global Macro	10.20%	3.30%
Relative Value	9.30%	5.40%
Convertible Arbitrage	9.30%	4.80%
<i>Merger Arbitrage</i>	9.00%	3.60%
<i>Barclays Aggregate</i>	6.50%	4.90%
<i>Barclays High Yield</i>	6.60%	7.80%
<i>MCSI ACWI</i>	7.70%	4.60%
<i>Russell 3000</i>	9.00%	7.60%
<i>Bloomberg Commodity</i>	7.70%	-6.20%

Source: Public Plan IQ, Maryland State Retirement (Meketa Investment Group, 2016)

Table 3

## Hedge Fund Allocation FY 2007

<u>Institutional Investor</u>	<u>Fund Size (in \$mm)</u>	<u>Fund Return</u>	<u>Hedge Funds (in \$mm)</u>	<u>Allocation to Hedge Funds</u>	<u>Hedge Fund Returns</u>
Teacher Retirement System of Texas	111,120	14.40%	2,817	2.54%	15.20%
New Jersey Division of Investment	82,500	17.10%	2,300	2.79%	13.20%
Virginia Retirement System	58,300	20.40%	2,500	4.29%	N/A
Michigan State Employees' Retirement System	62,658	17.20%	216	0.35%	7.68%
Massachusetts PRIM	51,260	19.92%	4,595	8.95%	16.91%
Public School & Education Employee Retirement System of Missouri	31,800	16.60%	78	0.25%	N/A
Los Angeles Fire and Police Pensions	15,549	18.50%	307	1.98%	N/A
Illinois State Board of Investment	12,600	17.10%	496	3.94%	19.90%
<b>AVERAGE</b>	<b>52,236</b>	<b>17.65%</b>	<b>1,663</b>	<b>3.13%</b>	<b>14.58%</b>

Table 4

## Hedge Fund Allocation FY 2008

<u>Institutional Investor</u>	<u>Fund Size (in \$mm)</u>	<u>Fund Return</u>	<u>Hedge Funds (in \$mm)</u>	<u>Allocation to Hedge Funds</u>	<u>Hedge Fund Returns</u>
Teacher Retirement System of Texas	104,100	-4.50%	3,998	3.84%	-1.20%
New Jersey Division of Investment	78,600	-2.70%	3,739	4.76%	N/A
Virginia Retirement System	55,100	-4.40%	3,120	5.66%	N/A
Michigan State Employees' Retirement System	52,941	-12.33%	195	0.37%	N/A
Massachusetts PRIM	50,600	-1.81%	4,875	9.64%	-6.26%
Public School & Education Employee Retirement System of Missouri	29,827	-4.60%	1,072	3.60%	N/A
Los Angeles Fire and Police Pensions	14,406	-4.58%	460	3.20%	0.65%
Illinois State Board of Investment	11,300	-6.20%	598	5.30%	-11.60%
<b>AVERAGE</b>	<b>49,609</b>	<b>-5.14%</b>	<b>2,257</b>	<b>4.55%</b>	<b>-4.60%</b>

Table 5

## Hedge Fund Allocation FY 2009

<u>Institutional Investor</u>	<u>Fund Size (in \$mm)</u>	<u>Fund Return</u>	<u>Hedge Funds (in \$mm)</u>	<u>Allocation to Hedge Funds</u>	<u>Hedge Fund Returns</u>
Teacher Retirement System of Texas	88,653	-13.10%	3,575	4.03%	-10.50%
New Jersey Division of Investment	66,800	-15.50%	2,700	4.04%	-19.10%
Virginia Retirement System	42,600	-21.10%	3,149	7.39%	-19.37%
Michigan State Employees' Retirement System	46,597	-6.15%	859	1.84%	-18.74%
Massachusetts PRIM	37,700	-23.87%	4,517	11.98%	-23.73%
Public School & Education Employee Retirement System of Missouri	23,600	-19.27%	1,747	7.40%	N/A
Los Angeles Fire and Police Pensions	10,994	-19.97%	50	4.56%	-13.02%
Illinois State Board of Investment	8,700	-20.10%	880	10.13%	-22.00%
<b>AVERAGE</b>	<b>40,705</b>	<b>-17.38%</b>	<b>2,241</b>	<b>6.42%</b>	<b>17.95%</b>

Table 6  
FY 2010

<u>Institutional Investor</u>	<u>Fund Size (in \$mm)</u>	<u>Fund Return</u>	<u>Hedge Funds (in \$mm)</u>	<u>Allocation to Hedge Funds</u>	<u>Hedge Fund Returns</u>
Teacher Retirement System of Texas	94,925	15.70%	3,948	4.16%	7.70%
New Jersey Division of Investment	66,824	13.40%	3,400	5.09%	9.80%
Virginia Retirement System	47,900	14.79%	3,822	7.98%	11.05%
Michigan State Employees' Retirement System	48,099	8.73%	1,793	3.73%	8.69%
Massachusetts PRIM	41,007	12.82%	3,914	9.55%	7.13%
Public School & Education Employee Retirement System of Missouri	26,031	12.97%	3,439	13.21%	17.08%
Los Angeles Fire and Police Pensions	12,131	13.91%	537	4.43%	7.18%
Illinois State Board of Investment	9,678	9.10%	917	9.48%	4.40%
<b>AVERAGE</b>	<b>43,324</b>	<b>12.68%</b>	<b>2,721</b>	<b>7.20%</b>	<b>9.13%</b>

Table 7  
FY 2011

<u>Institutional Investor</u>	<u>Fund Size (in \$mm)</u>	<u>Fund Return</u>	<u>Hedge Funds (in \$mm)</u>	<u>Allocation to Hedge Funds</u>	<u>Hedge Fund Returns</u>
Teacher Retirement System of Texas	107,070	22.20%	4,324	4.04%	5.90%
New Jersey Division of Investment	73,731	17.79%	3,910	5.30%	10.69%
Virginia Retirement System	54,600	19.10%	4,031	7.38%	21.50%
Michigan State Employees' Retirement System	47,249	6.58%	2,957	6.26%	1.90%
Massachusetts PRIM	50,200	22.30%	3,820	7.61%	7.51%
Public School & Education Employee Retirement System of Missouri	30,831	21.76%	5,856	18.99%	24.57%
Los Angeles Fire and Police Pensions	14,832	22.90%	575	4.00%	7.00%
Illinois State Board of Investment	11,572	21.70%	1,075	9.29%	12.70%
<b>AVERAGE</b>	<b>48,704</b>	<b>19.29%</b>	<b>3,318</b>	<b>7.86%</b>	<b>11.47%</b>

Table 8

FY 2012- FY 2016

<u>Institutional Investor</u>	<u>Fund Size (in \$mm)</u>	<u>Fund Return</u>	<u>Hedge Funds (in \$mm)</u>	<u>Allocation to Hedge Funds</u>	<u>Hedge Fund Returns</u>
Teacher Retirement System of Texas	124,341	6.80%	10,682	8.59%	2.75%
New Jersey Division of Investment	75,520	6.60%	7,878	10.43%	3.95%
Virginia Retirement System	62,860	7.00%	5,753	9.15%	N/A
Michigan State Employees' Retirement System	57,929	10.29%	6,954	12.00%	4.00%
Massachusetts PRIM	56,880	7.10%	5,277	9.28%	3.70%
Public School & Education Employee Retirement System of Missouri	35,725	7.40%	7,505	21.01%	5.10%
Los Angeles Fire and Police Pensions	17,100	7.42%	284	1.67%	N/A
Illinois State Board of Investment	14,141	6.90%	1,287	9.10%	3.70%
<b>AVERAGE</b>	<b>55,562</b>	<b>7.44%</b>	<b>5,703</b>	<b>10.15%</b>	<b>3.87%</b>



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