Alexander D. Beath, PhD
CEM Benchmarking Inc.
372 Bay Street, Suite 1000
Toronto, ON, M5H 2W9
www.cembenchmarking.com
Alex@cembenchmarking.com

January 2015

VALUE ADDED BY LARGE INSTITUTIONAL INVESTORS BETWEEN 1992-2013

Can large institutional investors beat the market and deliver added value above and beyond their benchmarks? We answer this question using a massive data set comprised of 6,666 samples drawn from a global set of defined benefit pension plans along with a handful of sovereign wealth funds and buffer funds spanning 1992-2013. Gross of investment management expenses, funds deliver 58 basis points of value added. Net of investment management expenses, funds deliver 16 basis points of value added. A deep regression analysis indicates that beating the market is rooted in active asset management paired with cost savings gained through scale and managing assets in-house.

CEM Benchmarking

Table of Contents

Value Added By Large Institutional Investors Between 1992-2013

Alexander D. Beath, PhD
CEM Benchmarking Inc.
372 Bay Street, Suite 1000, Toronto, ON, M5H 2W9
www.cembenchmarking.com
Alex@cembenchmarking.com

1 Introduction

The primary way pension funds quantify their performance remains the tried and true method of constructing a total fund policy benchmark based on asset class policy weights and comparing their performance to it. While some in the industry see the method as being outdated, the benefits remain clear; fund performance is easily separated into two parts, a return that can be attributed to active management (i.e., alpha) and a return attributed to the market (i.e., beta). As the method is available to all, even those who feel it imperfect should perform the exercise to answer the simple question; did you get what you paid for?

A widely held *academic* belief is that the result of the exercise should show that active investors have, on average, no advantage over passive investors (i.e., alpha is zero). This view of markets is rooted in the efficient market hypothesis [1,2]. A problem with testing the hypothesis is that the separation between alpha and beta is not always clear; where one set of benchmarks demonstrates a non-zero alpha, another set can almost always be found that shows that the alpha is zero.

At CEM Benchmarking we are in the unique position of being able to provide answers to the question of whether pension funds are able to add value and beat the market. Not only can we definitively answer the question of whether it is possible, we can also quantify to a large degree how these institutional investors do it. What advantages do they have? Where have they added value? Is the value added really alpha, or is it beta in disguise?

The answer in short is, yes, pension funds have added value. Gross of investment costs, the value added by pension funds over their policy return averaged 58 basis points. The key question though is whether it was worth it. Does the result justify the added costs and risk of active management? The answer here is again, yes, as net of investment costs the value added is 16 basis points[1], on average. However, with three quarters of the performance chewed up by investment costs, it is clear why measuring and managing costs remains a critical element of pension fund management.

2 The CEM database

For over 25 years CEM Benchmarking has been collecting detailed information from pension plans and other large institutional investors on their asset allocation, benchmark returns, gross returns, investment costs, and by consequence net returns. The database is global, with participation from funds in Australia, Canada, Korea, the

[1] 15 basis points of net value added for a fund with $10 billion in assets under management amounts to $15 million of net value added.

Table 1. CEM database statistics. Number of funds by region (Canada, European, U.S., Other), by type (public, corporate, other), and assets under management in the CEM database used in this study.

	Number of Funds by Region				Number of Funds by Type			Assets Under Management ($billions, USD)							
Year	Can.	Euro.	U.S.	Other	Public	Corp.	Other	90th	75th	50th	25th	10th	Avg.	Total	#
2013†	83	68	178	6	111	174	50	45.0	14.1	4.0	1.6	0.7	19.5	6,536	335
2012	88	80	200	11	133	189	57	40.5	13.0	3.7	1.5	0.7	17.1	6,495	379
2011	87	78	203	11	111	197	71	40.3	13.0	3.8	1.3	0.4	16.5	6,235	379
2010	96	57	207	8	120	180	68	34.3	11.5	3.5	1.3	0.5	14.5	5,336	368
2009	94	51	207	8	117	179	64	31.1	9.8	3.1	1.1	0.4	13.0	4,675	360
2008	90	58	214	10	120	175	77	27.6	9.4	3.0	1.2	0.4	12.6	4,679	372
2007	99	28	218	12	124	179	54	29.1	10.3	3.8	1.5	0.6	13.1	4,691	357
2006	102	29	148	13	117	128	47	33.9	11.1	3.7	1.4	0.5	13.8	4,034	292
2005	106	25	157	10	117	134	47	25.6	9.0	3.1	1.1	0.5	11.3	3,367	298
2004	95	18	167	7	112	135	40	24.6	8.1	2.9	1.3	0.5	10.5	3,017	287
2003	96	20	158	5	115	127	37	20.9	7.8	2.4	0.9	0.4	9.4	2,622	279
2002	98	16	156	4	116	122	36	21.3	7.3	2.3	0.8	0.4	9.1	2,489	274
2001	99	17	176	2	121	139	34	19.8	7.7	2.5	0.9	0.4	9.2	2,695	294
2000	104	15	164	2	111	138	36	20.0	7.4	2.3	0.8	0.4	9.6	2,731	285
1999	109	14	182	0	113	157	35	19.2	6.6	1.9	0.7	0.4	8.5	2,583	305
1998	103	8	174	0	96	155	34	15.9	5.4	1.8	0.7	0.3	7.0	2,005	285
1997	96	8	168	0	92	154	26	12.6	4.4	1.6	0.7	0.4	6.1	1,668	272
1996	104	6	185	0	86	177	32	10.0	3.3	1.1	0.5	0.3	4.9	1,453	295
1995	101	4	192	0	91	171	35	9.8	2.9	1.0	0.4	0.3	4.5	1,332	297
1994	98	3	168	0	71	164	34	8.3	2.6	0.9	0.4	0.2	3.9	1,044	269
1993	86	0	134	0	51	140	29	12.6	3.0	0.8	0.4	0.2	4.4	960	220
1992	81	0	83	0	28	112	24	12.9	2.8	0.9	0.3	0.1	4.6	749	164

† The 2013 CEM database was ~ 90% complete at the time this research was conducted.

Netherlands, Sweden, the U.S., and the U.K. along with many others, and more than 1,000 unique funds have participated in it at one time or another. The database skews towards large funds, with an average size in 2013 of about $19.5 billion USD in assets under management (AUM). For the results presented here, funds are for the most part defined benefit (DB) pension plan, both public and corporate, along with a small number of sovereign wealth funds and buffer funds which share characteristics with their large DB counterparts. In Table 1 we summarize the characteristics of funds by year appearing in this study.

A useful feature of the CEM database is the bias free nature of the data with respect to returns [3]. When funds benchmark with CEM they are benchmarking their investment costs. As part of the investment cost benchmarking process, investment performance metrics are provided as well in order to answer the question "do you get what you pay for?" which is increasingly top-of-mind for stakeholders. So while funds enter and exit the database over time, their motivation for doing so is unrelated to investment performance which explains why performance biases typically seen in other databases (e.g., hedge funds, mutual funds, etc., which suffer from survivorship bias [2]) is absent in the CEM database.

3 Total fund value added, net and gross

A standard part of the CEM survey asks funds to provide their calendar year investment return along with their total fund policy benchmark return. Total fund benchmark return is a time weighted average of asset class policy weights and asset class benchmark returns. Gross value added is the difference between total fund return, before netting of investment costs, and the policy return. Net value added equals gross value added less investment costs. Spanning 1992-2013, there are 6,666 data points, more than sufficient to draw firm conclusions regarding fund performance.

Table 2. Annual gross and net value added statistics from the CEM database 1992-2013.

	Gross Value Added (basis points)				Net Value Added (basis points)				
	Avg.	Std. Err.	Std. Dev.	T-statistic	Avg.	Std. Err.	Std. Dev.	T-statistic	#
All funds	58.1	3.3	266.6	17.8	15.5	3.3	265.4	4.8	6,666
Canadian funds	56.7	5.7	261.1	10.0	20.5	5.7	261.2	3.6	2,115
European funds (1994-2013)	66.3	11.0	270.2	6.0	28.7	10.7	262.6	2.7	603
U.S. funds	58.6	4.4	270.6	13.4	11.8	4.3	269.4	2.7	3,839
Other Region funds (2000-2013)	20.9	19.0	198.2	1.1	-25.7	19.6	205.2	-1.3	109

In Table 2 we show the average total fund value added, gross of investment costs, calculated from all 6,666 data points together with geographic splits and population statistics. The average[2] value added gross of investment costs is 58.1 basis points. The standard error, a measure of the confidence in the estimate due to the inherent dispersion in the underlying data together with the finite size of the sample, is only 3.3 basis points. That the gross value added is nearly 18 standard errors greater than zero (i.e., the T-stat is 17.8) provides definitive proof that, gross of investment costs, large pension funds as a group beat their benchmark.

Also shown in Table 2 is total fund value added net of investment costs calculated from the same data. The average value added net of investment costs was 15.5 basis points. The standard error on this estimate, 3.3 basis points, is unchanged from the prior case while the signal itself is much closer to zero due to investment costs which consume nearly 75% of the gross value added. Because of the smaller signal, the T-stat is smaller as well at a bit under 5. However, this value is more than sufficient to prove definitively that, between 1992 and 2013, large pension funds as a group have beaten the market.

We emphasize that the standard deviation of the gross and net value added populations at about 267 and 265 basis points are large in comparison to the averages at 58 and 16 basis points gross and net respectively. For any single pension fund, this result is likely just as important as the non-zero average. The standard deviation indicates the range that a typical plan, with a typical active:passive management ratio of 4:1, can expect their value added to stray from the average. So, while the long term average gross and net value added are decidedly non-zero, in any given year many funds will trail their benchmarks, often by substantial margins. Clearly, funds engaging in active management need to consider whether the potential gains are worth the risk quantified by the standard deviation.

Finally, there is also a hint of variation between funds depending on geographic location as Canadian, European, and U.S. funds appear to outperform the "Other" region group of funds[3]. Much of the differences here, however, result from the difference in time frame considered, with data in the "Other" region group beginning in 2000 only.

4 What characteristics of pension plans predict value added?

Pension plans vary widely in their construction, including the amount of indexing used, amount of assets managed internally, amount of assets managed actively, scale in AUM, and differences in asset mix. These differences are

[2] Because the number of funds participating is increasing with time, the average presented under-weights early years relative to later years. Removing this bias (by weighting data points inversely to the number of data points per year in each sample) yields an average gross value added of 58.8 basis points with a standard error of 3.1 basis points. The two estimates are within error and therefore statistically equal.

[3] The net value added differences between "Other" region funds and Canadian funds (-46 basis points), European funds (-54 basis points), and U.S. funds (-38 basis points) are of borderline statistical significance as the differences are approximately two standard errors in magnitude in each case (-2.3, -2.4 and -1.9 respectively, with errors calculated via. quadrature).

expected to have meaningful impacts on value added. For example, indexing, managing assets internally, and increased scale are all expected to reduce costs and increase *net* value added (all other things being equal). Attempts to beat the market by active management, by contrast, are expected to increase *gross* value added. The balance between enhanced gross value added from security selection on one side and diminished net value added from increased costs associated on the other determine whether active management is worthwhile.

To disentangle and quantify these differences, we have regressed gross and net value added for each pension fund according to a simple model which takes into account: (1) the percent of each fund's holdings that are internally managed, (2) the percent of each fund's holdings that are actively managed, (3) the size of the funds in $\log_{10}$ AUM, and (4) a variable constant for each of the four regions appearing in Table 1. (The effects of asset mix on value added will be addressed in a future publication.)

Two important comments are in order prior to discussing the results of the regression. First, the greatest difficulty by far lies with private equity benchmarks which have much lower correlations to their corresponding private equity returns than for liquid asset classes [4]. The low correlation introduces substantial noise in each fund's value added which masks real signals about the where and why funds add value relative to their benchmarks.

A second and no less important issue is that when regressing value added it is necessary to do so on a year-by-year basis and average the results. The reason is that the region constants and coefficients can fluctuate substantially on a year-by-year basis, and do so in a predictable fashion based on asset class value added[4]. For example, in years where common active management strategies pay off, such as taking excess credit risk, we see the coefficient for active management is substantially positive and vice versa.

We mitigate these issues as follows: First, we subtract from each fund's value added the component due to private

Table 3. Fund characteristics that predict value added – regression results and their significance. Coefficients and constants are standard error-weighted averages from regressing annual gross and net value added against fund size, percent internal management, percent active management and region (excluding private equity value added – see text).

	Gross Value Added (basis points)		Net Value Added (basis points)	
	Impact	Significance†	Impact	Significance†
Average regression coefficients				
Fund size‡ (per 10 fold increase)	1.6		7.6	**
Percent internal (per 100% increase)	7.3	*	22.1	**
Percent active (per 100% increase)	71.7	***	38.7	***
Average regression constants¶				
Canada	13.1	*	-17.6	*
Europe	-8.3		-39.3	**
U.S.	6.1		-37.6	**
Other	-43.5	**	-80.2	***

† Asterisks indicate the difference from the estimates impact to the null model (i.e., zero) measured in units of standard error. Assuming a large sample, the data in the absence of true correlation will display a * level of significance 32% of the time, a ** level of significance 4% of the time, and a * level of significance 0.3% of the time.**

‡ The fund size coefficient is expressed in units of $\log_{10}$ millions of U.S. dollars.

¶ Regional regression constants represent the intercepts of the regression equation for funds, and imply the expected value added for 100% external, 100% passively managed funds with $1million in AUM. Together with the regression coefficients, they may be used to estimate the expected value added for a specific fund. For example, a hypothetical U.S. fund (gross value added of 6.1 bps), 50% internally managed (0.5 x 7.3 bps = 3.7 bps), 50% actively managed (0.5 x 71.7 bps = 35.9 bps), and with $100 million in AUM (2 x 1.6 bps = 3.2 bps) should expect to have a gross value added of 48.9 bps.

[4] In a future article we will present and discuss value added by asset class. For the purposes of the present discussion it suffices to say that asset class value added displays significant year-to-year fluctuations well in excess of any sampling error, and that the fluctuations correlate strongly with known investing strategies such as long credit / short debt (in the case of broad fixed income).

equity. That is, where funds provide a private equity policy weight, benchmark and return, we adjust the value added to negate this source of performance. Where funds cannot provide the necessary details they are excluded from our analysis. Second, we perform 22 separate regressions for each year in the data set spanning 1992-2013. The regression parameters are then aggregated by standard error weighted averaging (i.e., more significance is given to regression parameters with smaller statistical errors and vice versa). By regressing value added year-by-year, statistically significant factors can be resolved that are not otherwise visible.

The results of the analysis are shown in Table 3 for value added both gross and net of investment fees. Looking first at the gross value added, the only significant results (i.e., two or more standard errors of significance) are percent actively managed (+71.7 basis points) and the regional regression constant "Other" (-43.5 basis points). Both results are readily understandable.

First, the +71.7 basis point regression coefficient quantifies the additional gross value added expected for funds that are 100% actively managed relative to those that are 100% indexed. Since the regression is linear, this implies that every percent increase in active management adds 0.7 basis points gross value added. Second, the -43.5 basis point regional regression constant "Other" demonstrates that even after controlling for differences in active management, fund size, and degree of internal management, funds outside Canada, Europe, and the U.S. performed worse in accords with the data appearing in Table 2. This result is in large part due to the different time frame used for this group (see Table 1). Finally, our null expectations are met as well; internal management and fund size appears to have no significant impact on gross value added.

Turning to the net value added regression results (also shown in Table 3) it is immediately clear that the effects of investment management costs are dramatic. Where in gross terms only two regression parameters were statistically significant, now all of the parameters are statistically significant but one. Since the only difference between the data used in the regressions for gross and net value added is investment costs, it follows that the differences between gross and net value added regression parameters are solely due to investment management costs. Summarizing the results for the net value added regressions:

- Funds increased their net value added by +7.6 basis points for every 10 fold increase in holdings due to lower investment management costs.
- Funds increased their net value added by +22.1 basis points for by managing their assets in-house due to lower investment management costs.
- Funds increased their net value added by +38.7 basis points by actively managing their assets in an attempt to beat the market (but less than the +71.7 basis points gross due to investment management costs).

The regression constants themselves are also reduced on going from gross to net since indexed investing, while inexpensive relative to active management, has associated investment management costs.

5 How much total fund value added comes from asset class value added?

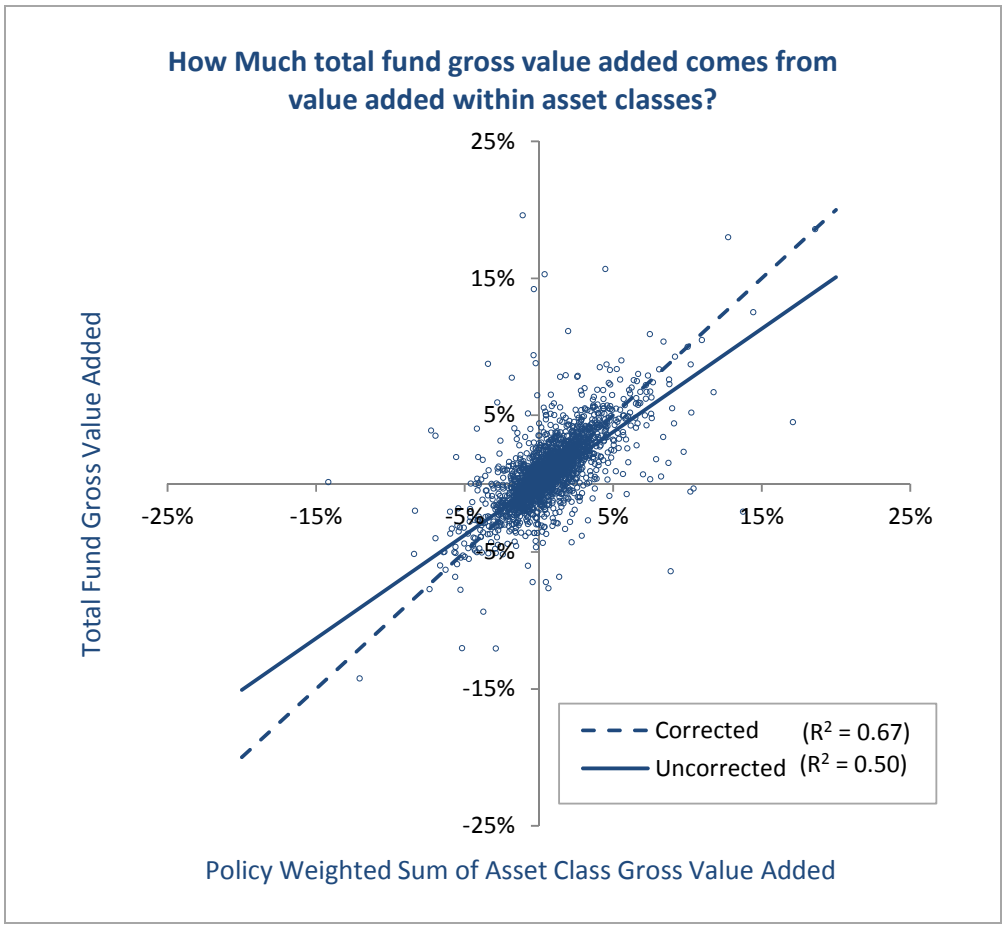
The simple picture presented so far is one where funds produce net value added through active management mixed with cost savings due to internal management and economies of scale. This, however, does not address how much of the value added comes from in-category asset class value added. While a detailed discussion of value added at the asset class level is reserved for a later communication, it is important in the context of total fund value added to address how much of it is produced within asset classes themselves.

In Figure 1 we show total fund gross value added plotted against policy weighted, in-category, value added. Clearly, there is a strong relationship between the two and the relationship is linear. Linear least squares fitting

suggest[5] that 67% of total fund value added can be explained by simple, policy weighted in-category asset class value added. The remaining value added not explained by in-category value added comes from a balance of:

- Short-term differences between actual asset mix versus policy mix. Short-term differences may represent tactical asset allocation, allowing the portfolio to drift versus rebalancing, or constraints on asset mix changes particularly surrounding illiquid assets (real estate, infrastructure, etc.).
- Long-term differences between actual versus policy asset mix, such as substituting private equity for equity.
- Value added within asset classes that CEM's model cannot isolate such as value added from unfunded derivatives programs, asset classes with partial year returns, and the 'change portion' of asset classes where policy weights change mid-year.

Figure 1. Total fund gross value added versus policy weighted sum of asset class gross value added. A simple, naïve, linear least squares fit of the data (solid line) results in R^2=0.50 with a slope β=0.75. Correcting for regression dilution by assuming the actual slope is one (dashed line) yields an estimate R^2=0.67.



[5] Initial least squares regression of the data appearing in Figure 1 indicates that the data suffers from regression dilution, a common phenomenon caused by noise in the x-axis, the cause of which is largely imperfect private equity benchmarks. Evidence for regression dilution is found in the uncorrected slope of the least squares best fit to the raw data which yields a slope of β=0.75 (with R^2=0.50). A slope of 0.75 indicates that the magnitude of the actual value added is proportionately less than the predicted value added. This result has two interpretations: (i) funds, on average, attenuate their actual value added in direct proportion to the sum of their asset class value added due to the factors listed in section 5 or (ii) regression dilution. If the latter case is true, which we believe, then under the assumption that the true slope is β=1 we arrive at a corrected R^2=0.67.

6 Final Remarks

Contrary to the efficient market hypothesis, pension funds have been able to beat the market. Investment costs, however, eat up nearly 75% of the 58 basis points of gross value added, leaving only 16 basis points of net value added for stakeholders. This illustrates in stark terms why funds must measure and manage their costs.

While average value added has been positive, individual fund performance around the average varies significantly, with standard deviations of 267 basis points gross and 265 basis points net. Three fund characteristics increased value added on average, but did so modestly in comparison with the standard deviation. First and foremost, active management of assets; on average, actively managed assets added 38.7 basis points in net value added relative to indexed assets. Second, in-house management outperformed external management; on average, in-house management saved 22.1 basis points of net value added compared to out-sourced management. Third, large funds averaged better net value added; for every 10-fold increase in size, funds save 7.6 basis points of net value added from reduced investment costs.

Finally, two thirds of total fund value added is gained through simple policy weighted asset class value added achieved through active management. This observation serves to illustrate an interesting fact that traditional portfolio optimization cannot be accomplished using expected value added from benchmarks alone; to truly optimize a portfolio one needs to account for the incremental value added from active management *in those asset classes where it is reliably found* less the costs incurred chasing it.

7 About CEM Benchmarking

CEM Benchmarking is a Toronto based provider of investment cost and performance benchmarking for large institutional investors including pension funds (defined benefit and defined contribution), sovereign wealth funds, buffer funds, and others. For information on benchmarking with CEM or other data inquiries please contact:

Mike Heale, Principal
372 Bay Street Suite 1000
Toronto, Canada, M5H 2W9
Telephone: +1 416-369-0468
Mike@cembenchmarking.com

8 References

[1] For a vintage review of the Efficient Market Hypothesis by the developer of the theory read: Fama, Eugene F. “Efficient Capital Markets: A Review of Theory and Empirical Work”, The Journal of Finance, Vol. 25, No. 2, 1969, pp. 383-417.

[2] For a modern review of the evidence in favor of the Efficient Market Hypothesis read: Malkiel, Burton G., “The Efficient Market Hypothesis and Its Critics”, CEPS Working Paper No. 91, April 2003. Note the comment on page 31, “The most direct and convincing tests of market efficiency are direct tests of the ability of professional fund managers to outperform the market as a whole”, the topic of this research paper.

[3] Bauer, R., Cremers, M. and Frehen, R.G.P., “Pension Fund Performance and Costs: Small is Beautiful”, April 30 2010. Available at SSRN: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=965388.

[4] Beath, A. D., Flynn, C., and MacIntosh, J., “How Implementation Style and Costs Affect Private Equity Performance”, Journal of International Pension Management, vol. 7 issue 1. Available at SSRN: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2449784.


CEM Benchmarking