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A Case for Scale:

How the world's largest institutional investors leverage scale to deliver real outperformance.

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Executive Summary

Many large institutional investors hold the belief that they have an advantage over smaller investors on account of their scale. How does that scale equate to an advantage, and does scale really result in better returns?

Analysis of CEM Benchmarking's database of large asset owner cost and performance data shows that the largest institutional investors do add incremental value over and above smaller funds. In particular:

- Institutional investors have, on average, been able to deliver returns that exceed fund benchmarks gross of costs. Net of costs, funds with more than $10B (USD) in assets under management have consistently delivered excess returns that are significantly higher than smaller funds with under $1B (USD) in assets under management.
- These large funds have been able to achieve these positive results while taking on less active risk than smaller funds.
- The advantages of scale most prominently manifest themselves in the ability to implement private assets internally, resulting in much lower overall private asset management costs.
- Net of costs, the largest institutional investors deliver more value added than smaller funds in both public and private markets, an advantage driven almost entirely by lower staffing per dollar invested and lower fees paid to external managers.

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A case for scale: How the world's largest institutional investors leverage scale to deliver real outperformance.

Typified by the successes of the large "Canadian Model" funds, there is an increasing belief within the investment community on the benefits of scale in asset management. While the large Canadian funds have received much press[1], the pooling of assets to drive better outcomes is by no means a Canada-only phenomenon.

In the Netherlands the pursuit of economies of scale by defined benefit (DB) pension funds has been underway for over 20 years. In 1997 there were 1,060 DB pension funds. By 2015, consolidation had reduced the number of Dutch pension funds to 290. In the UK, over 90 previously stand-alone Local Government Pension Schemes are being encouraged to merge into eight larger asset pools. Nor is the trend unique to DB arrangements as evidenced by the recent mergers of several Australian Superannuation funds.

Is this perception justified? Is it possible to empirically demonstrate the superiority of larger funds in generating value for stakeholders? CEM Benchmarking Inc. is in a unique position to be able to provide answer to these important questions. Since 1992 our clients of DB pension funds, DB asset managers, buffer bunds, sovereign wealth funds, and other large institutional investors have been providing us with return, benchmark, cost, and asset allocation data.

How much value do institutional investors really add?

To assess the success of a fund we will focus on value added, the difference between a fund's policy benchmark[2] and the actual return realized by the fund. Value added is the sum of both manager value added within asset classes and tactical portfolio decisions between asset classes. Value added has the advantage of being relatively agnostic to asset mix, enabling comparisons across funds.

Analysing nearly 9,000 observations from 1992-2020, we find the average fund in the CEM database has outperformed their benchmark by 67 basis points (bps) gross of costs and 15 bps net of costs [exhibit 1]. It is reassuring to note that the evidence shows that large institutional investors are able to added value over long periods, even if more than 75% of the gross value added generated is eroded through costs.

Breaking down these results by assets under management (AUM) begins to reveal the outperformance delivered by larger funds. Smaller funds with under $1B AUM delivered 47bps of outperformance before costs, 36bps lower than the 83bps of outperformance delivered by funds with more than $10B AUM. In fact, after accounting for cost, funds under $1B failed to deliver any value on average whereas the larger funds averaged 29bps in annual excess returns.

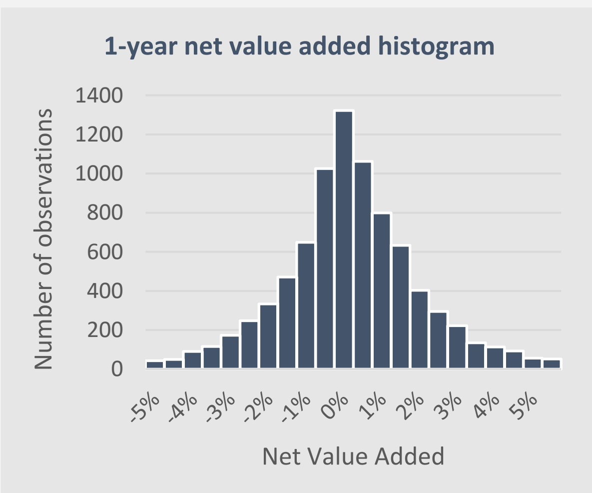
One possible explanation is that the largest funds are simply taking on more active risk than smaller funds. By looking at the observed range of value added, we can confidently say that this is not the case; the standard deviation of value added for the largest funds (190bps) is 33% lower than that of the

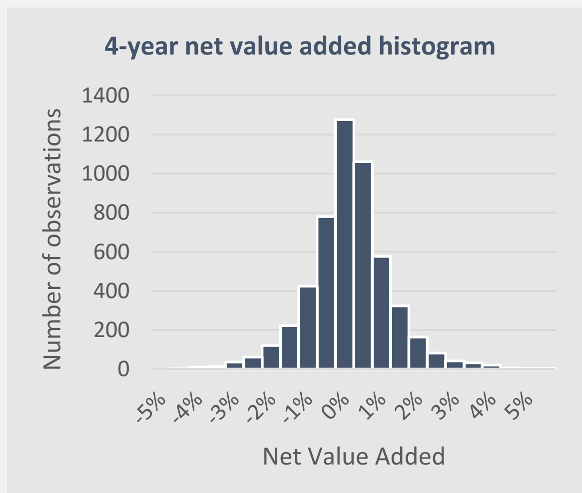
[1] For two recent reviews on Canadian model funds, see Beath, A.D., Betermier, S., Flynn, C., Spehner, Q., "The Canadian Pension Fund Model: A Quantitative Portrait", Journal of Portfolio Management (March 2021) and Ambachtsheer, K., "The Canadian Pension Model: Past, Present, and Future", Journal of Portfolio Management (April 2021).

[2] An investors policy benchmark is the return expected by an investor if they: (i) had an asset mix equal to their strategic asset allocation targets, and (ii) passively invested that asset mix.

Exhibit 1. Gross value added (GVA) and net value added (NVA) statistics for the CEM Universe spanning 1992-2020. A. time-horizon and B. assets under management (AUM). Take note that: (i) the average GVA/NVAs are all greater than zero with a very high significance, the lone exception being the average NVA of investors with AUM < $1bn, (ii) the average GVA and NVA both increase with increasing time horizon because investors with more AUM tend to benchmark with CEM on a more consistent basis, and investors with more AUM have better GVA/NVA, (iii) the standard deviation of GVA and NVA decreases with increasing time horizon, consistent with most of the variabilitiy in GVA/NVA being the result of luck rather than investor skill, and (iv) GVA and NVA increase with increasing AUM size band.

	GVA (basis points)				NVA (basis points)			
Cohort	Avg.	Stderr.	Stdev.	Count	Avg.	Stderr.	Stdev.	Count
A. Time horizon								
1-year	67	3	243	8692	15	2	242	8692
2-year	66	2	176	7061	14	2	173	7061
4-year	66	2	120	5274	15	2	117	5274
10-year	74	1	71	2513	24	1	66	2513
20-year	75	2	54	599	26	2	44	599
B. Size band, AUM (USD)								
AUM < $1bn	47	7	292	1956	-3	7	291	1956
$1bn < AUM < $10bn	67	4	243	4256	15	4	241	4256
AUM > $10bn	83	4	193	2480	29	4	190	2480





Notes:

GVA and NVA over A. multi-year time horizons are calculated for investors with consecutive year data appropriately weighted to elliminate oversampling, B. assets under management (AUM) converted to USD using OECD PPP. B. size statistics are shown for 1-year GVA/NVA. Standard error (Stderr.) measures the significance of the average, while standard deviation (Stdev.) measures the width of the histogram. Histograms of NVA added over 1-year and 4-year periods are shown at the bottom to illustrate the narrowing width with increasing time horizon.

smallest funds (291bps). Not only are larger funds generating higher value add, but they appear to be doing so while taking a lower level of active risk (or as likely, diversifying away more of their active risk).

This observation is especially important when one considers the almost complete lack of persistence observed in value add. Put another way, much of the variability in value added can be attributed to randomness rather than skill.

As stated previously, we observed that the average fund (irrespective of size) generated an average annual net value added of 15bps. The standard deviation of this net value added is 242bps. What that means is that in any given year, roughly 2/3rds of observed net value added will be between -227bps and 257bps. This is quite a wide range and raises the question: is it possible to realistically aim to be at the top of this range every year?

We can assess how much of the difference in net value added is due to differences in skill by comparing the range of 1-year value added to range of multi-year value added. If success and failure in generating above average value added is random, then the distribution of the value added should shrink over time, as “lucky” up years cancel out “unlucky” down years.

Indeed, while the 1-year standard deviation of value added is about 240 bps, the 4-year standard deviation of value added is half that, around 120 bps, and the 20-year value lower still at 54 bps. Not only does the standard deviation decline, but it does so almost precisely in the pattern that would be expected if value added from one year to the next were random. In other words, most of the variability in 1-year value added is not difference in skill, but instead difference in luck.

What this suggests is that it is *not* reasonable to expect recent outperformance (or underperformance) relative to similar peers[3] to persist. It also points to the fact that the lower level of active risk taken by larger funds is likely to be accretive to overall returns over the long term. The largest funds have delivered better outcomes over longer periods both before and after costs – and they have done so while taking less active risk. Are there any additional empirical insights that we can make to further the case for scale?

Value added performance drivers: Empirical evidence in favor of asset pooling.

Prior research conducted by CEM Benchmarking has shown that the most important quantitative features of funds for determining value added are:

- Active management: Investors with more actively managed portfolios have created more value added.
- Internalization: Investors that manage more of their assets inhouse rather than with external managers have produced more value added, at least after accounting for costs.
- Economies of scale: All things being equal, larger investors have outperformed smaller investors, again particularly after accounting for costs.

To estimate the impact of the three factors above we have conducted a simple regression analysis on gross and net value added in our database by year. We then aggregated the by-year results to form a big picture view of what drives success of institutional investors, the results of which are presented in Exhibit 2.

Our analysis has been done using four distinct models labeled model A through D in Exhibit 2.

[3] Similar peers refers to investors with similar AUM, degree of internalization, and fractions of the portfolio actively managed.

Exhibit 2. Results of four regression models [1,2] used to quantify economies of scale (EOS) effects in gross value added (GVA) and net value added (NVA) of large institutional investors in the CEM database spanning 1992-2020. Starting with total-fund GVA in Model A, we find that the biggest drivers of GVA are the fraction of assets under management (AUM) managed actively and size (measured by log AUM), with internalization playing no role. Turning to Model B, where we have removed contributions to GVA from private equity (PE) and unlisted real estate (RE), we find that size now plays no role, hence EOS in Model A are driven by contributions to GVA from PE and RE. Including the impact of cost in Model C by turning to NVA, excluding all contributions from PE and RE, EOS re-emerge, demonstrating that EOS in pubic market assets are driven by differences in cost. Finally, adding back contributions to NVA from PE and RE in Model D, internalization emerges as a drvier of NVA demonstrating that PE and RE are the primary beneficiaries of internalization. Comparison from Model A to Model D demonstrates that the benefits of internalization are purely a function of cost.

Model A: Large/active investors produce superior GVA than small/passive investors.

GVA	Coefficient (bps)	Error (bps)	Significance	Gross of costs:
Percent Active (100%)	71	± 9	*******	- Active investors outperform passive investors
Percent Internal (100%)	-5	± 8		- Internal/external teams are equally skilled
AUM (per 10-fold increas	20	± 3	******	- Bigger investors outperforrm smaller investors

Model B: Active investors produce superior GVA than passive investors, excluding PE and RE.

GVA ex. PE/RE	Coefficient (bps)	Error (bps)	Significance	Gross of costs (excluding PE and RE):
Percent Active (100%)	55	± 8	******	- Active investors outperform passive investors in public markets
Percent Internal (100%)	-10	± 7	*	- Internal/external public market teams are about equally skilled
AUM (per 10-fold increas	3	± 3	*	- No size advantage in public markets

Model C: Large/active investors produce superior NVA than small/passive investors, excluding PE and RE.

NVA ex. PE/RE	Coefficient (bps)	Error (bps)	Significance	Net of costs (excluding PE and RE):
Percent Active (100%)	20	± 8	**	- Active investors outperform passive investors in public markets
Percent Internal (100%)	7	± 7	*	- Internal/external teams are about equally skilled in public markets
AUM (per 10-fold increas	11	± 3	***	- Bigger investors outperforrm in public markets due to lower costs

Model D: Large/internal/active investors produce superior NVA than small/exteranl/passive investors.

NVA	Coefficient (bps)	Error (bps)	Significance	Net of costs:
Percent Active (100%)	22	± 9	**	- Active investors outperform passive investors
Percent Internal (100%)	19	± 8	**	- Internal PE/RE outperform external PE/RE funds etc.
AUM (per 10-fold increas	20	± 3	******	- Bigger investors outperform smaller investors

1. Methods : multivariate regression models of GVA and NVA, both with and without contributions from PE and RE, are carried out for each of the 29 years of data spanning 1992-2020. For an investor x in year y, we have $GVA_{x,y}$ / $NVA_{x,y}$ *:*

$$GVA / NVAx,_{y} = A_{y} \times (\%\ Active)_{x,y} + B_{y} \times (\%\ Internal)_{x,y} + C_{y} \times (\log_{10} AUM)_{x,y} + D_{y} \times (Country\ logit\ variable) + \epsilon_{x,y}$$

with A_y *the co-efficient for 'Percent Active',* B_y *the co-efficient for 'Percent Internal',* C_y *the size co-efficient measuring economies of scale,* D_y *a region dependant variable (regions used are U.S., Canada, Euro region, and Other), and* $\epsilon_{x,y}$ residuals the sum of squares of which are minimized to estimate the set A_y,B_y,C_y,D_y for year y with standard errors δA_y,δBy,δCy,δDy. *For each model, the 29 year specific variables Ay,By,Cy,Dy are meta-analyzed via maximum likelihood estimation to yield A,B,C above (region specific constants D are available upon*

2. Filtering : Not all GVA/NVA data provided to CEM Benchmarking are of equal quality, either because of poor benchmark construction at an asset class level or because the policy portfolio is not a good representation of the actual portfolio. To ensure that only the best GVA/NVA data is used, we run a regression of net return vs. policy return, selecting from the set: (i) investors with 5+ years of data to ensure we can do a regression at all, and (ii) investors for which we achieve a beta between 0.75 and 1.25, and (iii) investors for which we achieve a correlation in excess of 0.92 (the 10th percentile of correlations). Mutliple filters in terms of years, beta's, and correlations were considered in order to ensure that the results presented above have both maximum accuracy and precision. Of the total 8,692 investor/year observations, 7,175 are used. The average regression alpha, beta and correlation of the data set used is 0.20%, 99.3%, and 98.1% respectively.

- Model A considers value added gross of costs allowing us a clear view of top-line performance. This model is also important to better understand the relative impact of cost on the bottom-line results by comparison with Model D.
- Model B removes private equity and unlisted real estate from the analysis in model A. Investors of all types, on average, have been increasing their allocations to private equity and unlisted real estate over the past 20 years, but more so for large investors. Indeed, as shown in Exhibit 3, larger investors in the CEM database have allocated roughly twice as much AUM to private equity and unlisted real estate than smaller investors. Additionally, illiquid assets (and especially private equity) tend to be large sources of gross value added[4]. This model gives us a clearer picture of the influence of these assets on overall value added.
- Model C builds on model B by looking at impacts net of costs. Changes observed between model B and model C are reflective of cost. Comparison of the two models shows that economies of scale in public markets are almost entirely due to cost.
- Model D adds back in private equity and unlisted real estate which provides the analysis for all asset classes and provides the real-world impacts accounting for costs incurred. Comparisons to model C allow us to see additional benefits of scale in illiquid assets, and in particular the benefits of internalization in illiquid assets which are driven by cost.

Large, active investors produce more gross value added than small, passive investors.

Model A shows that a 100% actively managed portfolio produces 71 bps of gross value added compared to a 100% passively managed (i.e., indexed) portfolio. Scale also contributes positively to gross value added, with each 10-fold increase in AUM producing an extra 20 bps of gross value added. Both results align well with our expectations based on the analysis in Exhibit 1. Furthermore, in this model, internal management doesn't have a significant impact. That is, whether investments are managed internally or externally has little impact on overall fund-level value added before considering costs.

Active investors produce more gross value added than passive investors, excluding contributions from private equity and unlisted real estate.

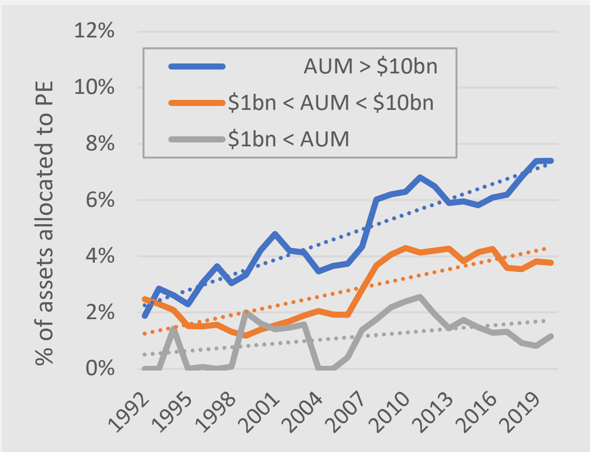
When the impact of private equity and unlisted real estate are removed the results look quite different (Exhibit 2: Model B). In model B, only the percent active remains as a significant contributor to gross value add, albeit at a lower level then model A. From this we can deduce the following:

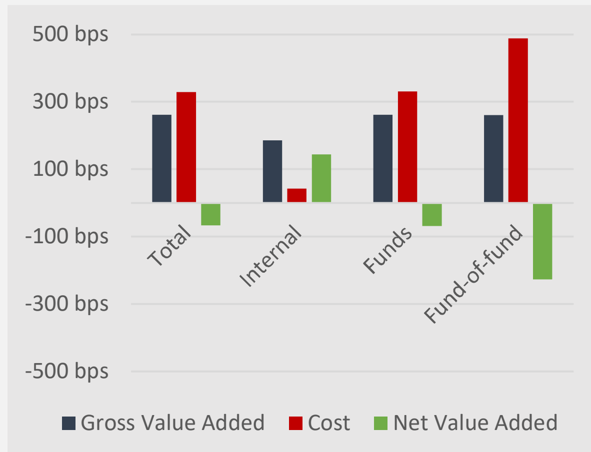
- There are no obvious benefits to scale within public markets before accounting for costs;
- Private equity and unlisted real estate are large contributors to gross value added at the fund level; and
- Reflecting their higher allocations to private equity and unlisted real estate, more of the gross value added realized from these asset classes accrue to large investors, as evidenced by the drastically reduced impact of scale as a determinant of gross value add.

[4] Net of fees, private equity and unlisted real estate produce low or even slightly negative value added. However, with substantial investment costs as a fraction of net asset value, gross value added is typically positive. For more information refer to Exhibit 3.

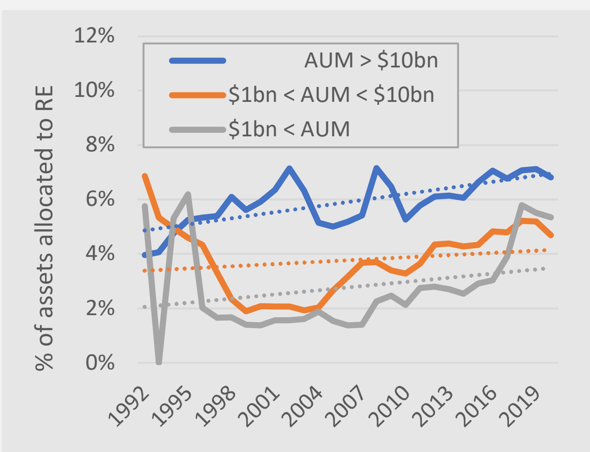
Exhibit 3. Average allocations (left) to private equity (PE) and unlisted real estate (RE) in the CEM database from 1992-2020 by size band which demonstrates that larger funds typically have higher allocations to the primary illiquid asset classes PE and RE. Average value added (right) for PE and RE by implementation style and for the total. Dark blue shows gross value added, red the aveage investment cost, and green net value added. The size dependancy of PE allocations together with the substantial PE gross value added is the source of total-fund gross value added size dependancy (i.e., economies of scale) in Exhibit 2: model A. Substantial, positive net value added of internal PE (which includes co-investments) and internal RE (which includes operating subsidiaries and co-investment) is the source of total-fund net value added internalization dependancy in Exhibit 2: model D. For a description of implementation styles see definitions below.

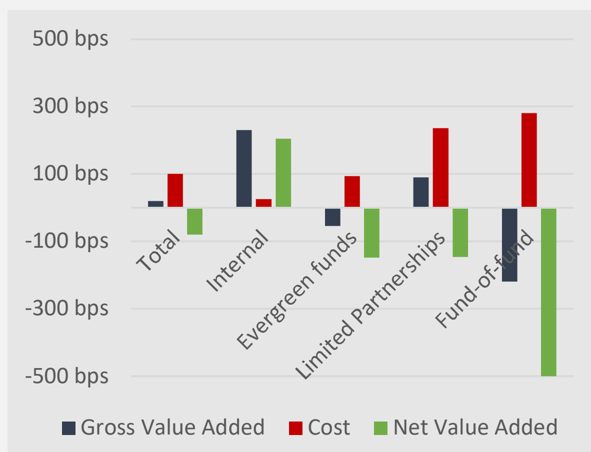
Private equity allocation by size band and value added by implementation style





Unlisted real estate allocation by size band and value added by implementation style





PE definitions : Internal direct are private companies purchased directly by the investor without an external GP. Funds are investments in direct limited partnerships managed by a GP. Fund of funds are investments in funds managed by a fund of fund manager which adds an additional layer of fees. Co-investments alongside an existing GP is included in internal.

RE definitions : Internal are properties purchased directly by the investor, and includes wholy owned real estate operating subsidiaries. Evergreen funds are investment in perpetual (primarily core) real estate funds. Limited partnerships are investments in finite-life (primarily value add / opportunistic) real estate funds. Fund of funds are investments in funds managed by a fund of fund manager which adds an additional layer of fees. Co-investments alongside an existing GP is included in internal.

Sources : For information on private equity value added and benchmarking see: "Benchmarking the Performance of Private Equity Portfolios of the World's Largest Institutional Investors: A View From CEM Benchmarking", The Journal of Investing, December 2020, Vol 10 Number 1. For information on real estate value added and benchmarking see: "Green Urban Development: The Impact Investment Strategy of Canadian Pension Funds" (submitted to Financial Analysts Journal and available on SSRN.)

This latter point is of great importance. While it would be easy to suggest that smaller funds should simply invest a higher proportion of their fund in private assets, one can not ignore the impact of costs. The advantage that large funds have in this regard will become apparent.

Scale: Large, active investors produce more net value added than small, passive investors in public markets.

When cost is considered, again excluding private equity and unlisted real estate, economies of scale re-emerge as a driver of net value added (Exhibit 2: Model C). For economies of scale to be absent pre-cost and to emerge post-cost shows that the economies of scale advantage of large investors in public markets is driven by cost advantages and not skill differences.

Including cost, for each 10-fold increase in AUM, NVA increases by 11 bps as opposed to only 3 bps excluding cost. While skill in public markets exists – after all, a higher proportion of active management leads to improved gross and net value added – the absence of economies of scale gross of costs shows that skill and size are not related for public markets. Rather, the source of economies of scale in public markets is cost; as AUM increase, efficiencies in public markets are found, which improve the bottom line by approximately half, if not more.

Empirically this can be seen in model C by observing that the contribution of internal management, while still only significant to one standard error, is now positive. A concrete example of economies of scale for internally managed public market assets is shown in Exhibit 4.

Economies of scale are found in investment costs for external managers as well. As shown in Exhibit 4, total investment costs for externally managed active U.S. small cap. equity portfolios increases slower than AUM. Where an external $200 million portfolio of active small cap. U.S. stock is expected to cost 55 bps, a $2 billion portfolio is expected to cost only 40 bps.

For public market assets the data is clear; as you get bigger, costs increase slower than AUM which translates directly into improved net value added, even excluding the impact of private market assets. Another win for scale.

Internalization: Large, internalized, active investors produce more net value added than small, externalized, passive investors.

When private equity and unlisted real estate are included back into the analysis (Exhibit 2: Model D), two things become apparent:

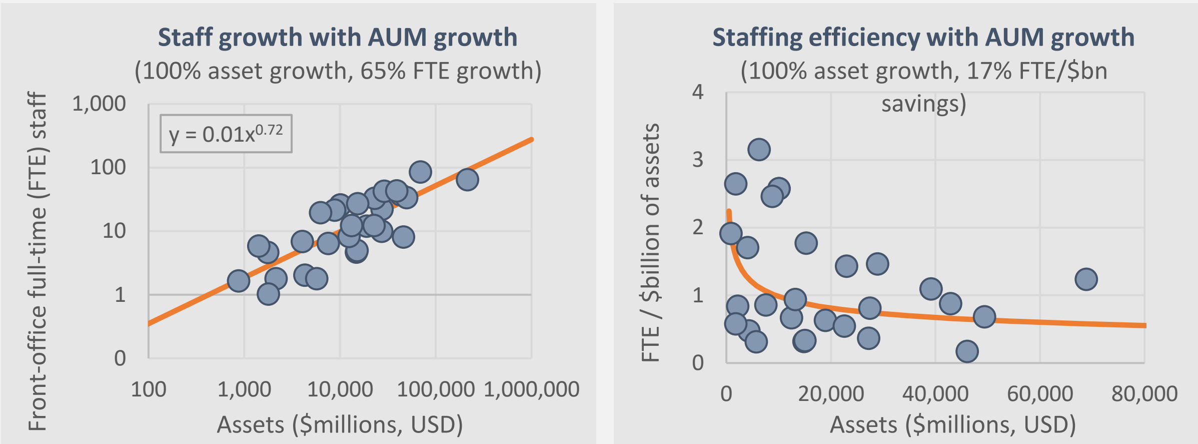
- For the first time, internalization of asset management becomes a significant predictor of value add; and
- The contribution of scale becomes much more significant than in models B or C.

In model D, a 100% internally managed portfolio is expected to produce an incremental 19 bps of net value added relative to a 100% externally managed portfolio. The fact that the benefit of internalization appears with the addition of private equity and unlisted real estate demonstrates that the benefits of internalization net of cost are attributable mainly to these asset classes.

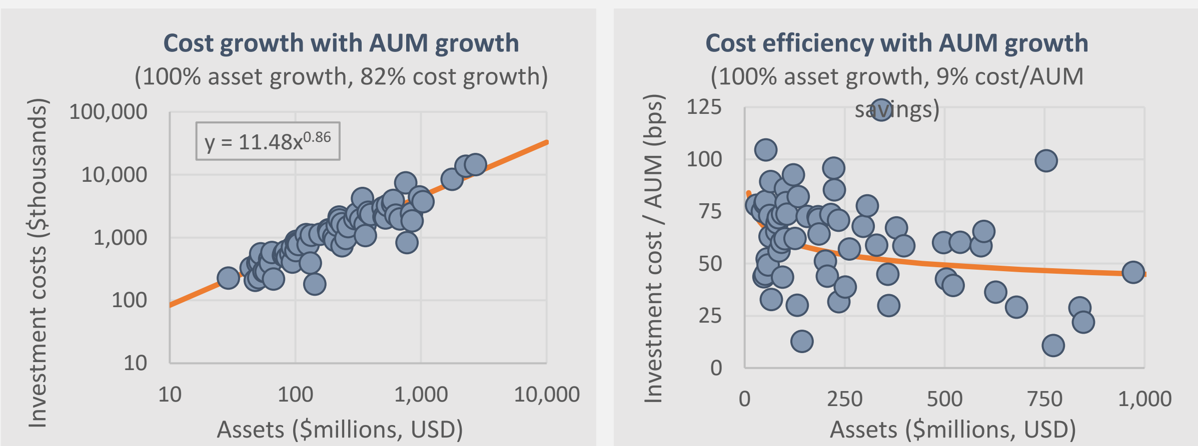
Exhibit 3 shows in stark terms why internalizing private equity and unlisted real estate improves net performance. While internally managed portfolios of private equity and unlisted real estate perform

Exhibit 4. Examples of economies of scale in internal staffing and external costs. Internal full-time equivalent (FTE) staff growth with increasing asset class assets under management (AUM) for internal active stock portfolios (top left) and corresponding efficiency gain in FTE/$bn with increasing AUM (top right). External investment cost growth with increasing asset class AUM for external active small cap. U.S. stock portfolios (bottom left) and the corresponding efficiency gain in cost/AUM with increasing AUM (bottom right).

Example of economies of scale in internal public markets.



Example of economies of scale in external public markets.



Notes:
(Left) Log-log plots of cost driver vs. assets asset class AUM demonstrates power-law growth (a power law is linear in a log-log plot). A power less than one indicates that internal staff (top left) and external fees (bottom left) are growing slower than AUM. (Right) Efficiency gains through economy of scale: Decreasing FTE/$billion of assets with increasing asset class AUM is a clear demonstration of economies of scale in internal public markets (top right) and decreasing investment cost/$billion of assets with increasing asset class AUM a clear demonstration of economies of sclae in external public markets (bottom right).

marginally worse than external investments gross of costs, the cost savings, measuring in the 100s of bps, far outweighs any difference in top line return.

Investment costs alone may not be the only cost benefit of internalizing PE and RE. A second advantage that can be gained by internalizing PE and RE is the ability to exert control over the use of leverage.

Returns in private equity or unlisted real estate are usually amplified with leverage, either through subscription lines of credit or portfolio company bond issuance in the case of PE, or through mortgages or capital structures financed with debt in the case of real estate. Large Canadian Model funds such as CDPQ, CPPIB, HOOPP, OMERS and OTPP all issue debt and participate in repo markets at (presumably) significantly lower rates than are available to real estate funds or private companies. Doing so however requires scale.

Successfully internalizing private equity and/or unlisted real estate demands scale. While smaller investors have some internally managed real estate, the asset base is usually low and the performance tends to trail those of larger funds[5]. Bringing private equity assets inhouse is an activity limited to the largest funds – the smallest investor in the CEM database that reported having substantial internal private equity investments in 2020 had $18 billion (USD) in total assets, while the average investor with internal private equity investments in 2020 has total fund AUM of $152 billion (USD).

This is the real win for scale, the ability to deliver cost-effective and diversified private asset management by leveraging scale to implement these assets internally.

Parting thoughts

The benefits of scale for institutional investors have been widely discussed in industry publications, consultant reports, and academic research. The size and source of the benefits however are rarely quantified. Doubts about the actual benefits of scale given this backdrop are understandable; large funds sometimes produce poor returns and bad news often gets more eyes and ears than good news. It's difficult to separate anecdote from long-term proven fact.

Leveraging our nearly 30 years of large asset owner cost and performance data, CEM Benchmarking is able to cut through the noise. The resulting signal is clear:

- Institutional investors have on average been able to deliver returns that exceed their policy benchmarks gross of costs. Net of costs, funds with under $1B AUM have failed to beat their policy benchmarks on average.
- The largest funds, those managing in excess of $10B AUM, have delivered the highest excess returns on both a gross and net basis. Additionally, these large funds have been able to achieve these results while taking on less active risk than smaller funds.
- Gross of costs, being more actively invested is the largest driver of value added. Once costs are considered, the advantages of scale and the related ability to implement internal management programs, particularly in private assets, are revealed.

What do these findings suggest for institutional investors? The benefits of scale are clear, particularly in the ability to provide excess returns after cost in private assets. Encouraging and facilitating small pension funds to merge with large ones is likely to lead to better investment outcomes by achieving scale and lowering the cost of doing business.

[5] Beath, A.D., Betermier, S., Van Bragt, M., Spehner, Q., and Liu, Y., "Green Urban Development: The Impact Strategy of Large Canadian Pension Funds", submitted to Financial Analysts Journal for publication, December 2021 (pre-print available on SSRB May 2021).