Research Working Paper

Capacity Management for Institutional Asset Owners

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Synopsis

The management of capacity is considered from the perspective of institutional asset owners. How capacity differs across asset classes is outlined. Investment strategies that offer greater capacity are identified. A discussion of capacity management for multi-asset portfolios highlights how asset owners should manage investments according to their size, focusing on the relation between potential to generate value and capacity. It is argued that optimal scale need not exist for asset owners with the flexibility to adjust where and how they invest as they grow, even though it may exist for specific assets or strategies. Suggestions are also made for managing capacity when investing through external managers, including ideas for detecting and addressing related agency issues.

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Introduction: A Broader View of Capacity

Much of what is written about capacity in an investment management context has been narrowly framed. Capacity is often approached from a ‘product’ perspective, with a view to addressing the size of funds under management (FUM) that should be utilized for a particular fund or strategy. Further, the vast majority of research considers capacity with respect to actively-managed equity funds. A recent CIFR paper (O’Neill and Warren, 2016) adopts a similar standpoint in overviewing the issues and methods for the evaluation of capacity for funds trading on a given investment signal. Institutional asset owners, such as pension funds, face a wider set of challenges than just how much assets to commit to a specific equity fund. In particular, they are concerned with the management of capacity, and not just its measurement. This paper addresses four questions related to this issue:

A. How does capacity differ across asset classes?
B. Why types of strategies offer greater capacity?
C. How might capacity be used in a multi-asset context?
D. What issues need to be addressed when employing external managers?

The general theme is that asset owners should develop a strategy for managing capacity, especially as FUM grows. The paper describes how the level and drivers of capacity for actively-managed investments varies across asset classes and investment strategies, doing so in a way that is closely related to the nature of the investment universe and the sources of return generation. Hence large asset owners should target different asset classes and strategies than those with smaller FUM: both where and how a fund invests should evolve as it grows. In addition, it is important to manage the agency issues related to capacity that arise when investing through external managers. It helps to understand the incentives faced by the various players; identify whether a manager is managing their capacity with investor interests in mind; and devise strategies for securing access to capacity. This paper provides discussion and suggestions around all of these matters.

One implication is that scale for asset owners with respect to investment operations emerges as a complex issue. Capacity problems and return erosion can emerge as FUM increases if an asset owner continues to manage in the same manner. However, this need not occur. Asset owners should adjust to focus attention on where the balance between return opportunities and capacity is most appropriate for their size. Small funds can use their ability to be nimble, and pick up opportunities that are insignificant to larger players. For instance, they are better placed to capture excess returns from small-cap equities, or indeed any market where attractive opportunities are available in small licks. Large funds should do better in markets that are substantial in value terms, and where size provides a competitive advantage via the ability to provide large slices of capital supported by considerable organizational resources. In particular, large funds can more readily access opportunities in certain unlisted markets, such as direct property and infrastructure, which may prove difficult for small funds. Larger funds might also consider whether they may be better off managing in-house; or eschewing the search for excess returns or ‘alpha’ in parts of the portfolio, focusing instead on the management of market exposures or ‘beta’.

The concept of optimal scale need not exist for asset owners running multi-asset portfolios, providing that they do so in a manner befitting their size. This is pretty much what is observed in practice. Literature on the relation between size and performance for global pension funds is reviewed in an Appendix, and yields mixed evidence on economies of scale in investment management. It supports the idea that large funds can reap scale economies in certain alternative assets such as real estate, while suffering diseconomies in listed markets such as active equities. The inference is that investment performance is more a function of skill in identifying and executing the right strategy for the fund’s size, than a function of size per se.
This paper addresses an area that has received limited attention in the literature. It offers some thoughts and opinions, and should be seen as formative rather than comprehensive. Readers may not agree on all points, and it is hoped that it sparks debate. The paper is arranged in four parts that address each of the questions posed above. Part A discusses how capacity varies across asset classes, or where a fund invests. Part B considers the link between capacity and investment strategy, or how a fund invests. Part C then draws the discussion together by addressing the use of capacity in a multi-asset context, focusing on where large funds of differing size might place their attention. Part D deals with managing capacity through external investment managers. It identifies the agency pressure points, and discusses strategies for dealing with them. The paper wraps up with concluding comments, followed by an Appendix summarizing the literature on scale for pension funds.

Part A: Capacity across Asset Classes

Forming a judgment on potential capacity in any asset class, or market segment, can be guided by contemplating the factors that limit capacity, and whether there are advantages or disadvantages to size when operating in the particular market. Consideration of these issues points toward two key dimensions that influence the relative levels of capacity across asset classes. The first is the nature of the investment universe. The second is whether assets are traded in private (unlisted) or public (listed) markets. These two dimensions are discussed, before summarizing the implications for specific assets.

Investment Universe

Capacity under active investing is likely to be greater when applied to asset universes that offer the potential to put substantial dollars to work in pursuit of return opportunities. Three considerations that come into play include: the total value of assets in the universe; ability to access those assets; and the nature of other participants in the market.

- **Value of assets in the universe** – A large universe in value terms is a prerequisite to putting substantial dollars to work. Figure 1 provides a starting point by plotting the relative size of selected asset classes, based on available data on investor holdings during 2012. The dominance of equities and fixed income markets in terms of assets available to investors is apparent. However, this data obscures a number of important features. Equities and fixed income can be broken into segments for which the value of available assets may vary substantially. For example, while the markets for government bonds and (to a lesser extent) investment grade bonds are large, the markets for inflation-linked bonds, emerging market debt and high yield credit are much more limited. Certain sub-sectors within equity markets are too small to digest very large licks of capital chasing the available opportunities, including emerging market and small-cap equities. Listed property (REITs) and listed infrastructure are also relatively modest in size at around 3%-4% each of the global equity market.1 On the other hand, neither property nor infrastructure feature as large asset classes in most investor portfolios, although very substantial assets exist within the economy. This suggests that these asset classes possess the potential for high capacity. However, many of the existing assets are unavailable to investors. This provides a segue to the second point to be discussed below: the ability to access the assets also matters. Finally, it is worth noting that some private market assets lack the size required to offer meaningful capacity to large asset owners. For example, catastrophe bonds, timberland, unlisted agriculture and life settlements are all relatively small markets in the overall scheme of things.2

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1 The 3%-4% estimate is based on the S&P Dow Jones Indices in 2016.
**Ability to access the assets** – Capacity will be high in an asset class only if it is possible to access the assets. A range of issues come into play. Liquidity matters: capacity is related to the ability to trade in volume without significant market impact (for discussion, see O’Neill and Warren, 2016). The extent to which assets are available to investors also matters. As mentioned above, property and infrastructure are large asset classes where many of the assets are ‘locked up’. Arguably the effective capacity in infrastructure is currently quite low because it is significantly supply-constrained. Primary markets also have a role to play. Capacity is likely to be enhanced if the universe of assets is being augmented by primary issuance: capacity may hence vary over time with asset supply. For instance, the supply-related capacity issues in unlisted infrastructure could be addressed eventually by government actions to enhance the asset pipeline. In some markets, access to assets occurs largely via primary issuance. For example, access to fixed income investments is secured in the main by participating in new issues and the regular process of refinancing existing debt as it rolls over. Meanwhile, illiquidity can be problematic in the secondary markets; although this may not be the critical factor that limits capacity.3

**Nature of other participants** – The population of investors operating in a market can influence capacity. Higher capacity is likely to ensue in markets where competition for assets is limited relative to the supply; or where investors follow different investment approaches, so it is easier to find a counterparty that is willing to trade. Unlisted infrastructure is again a case in point. Capacity is currently limited in this asset class not only because supply is constrained, but also because investors are cueing up to compete to buy the limited assets that are available. Another issue is whether assets are offered by way of private negotiation or public tender. Public tenders can neutralize some of the advantages of networks for sourcing assets, by turning the process of party-to-party contracting into an open auction.

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3 MFS consider replication constraints in non-government issues, rather than trading volume, when estimating capacity in their fixed income portfolios, see Cantara et al. (2016).
Private versus Public Markets

Whether an asset is traded in private or public markets emerges as a key point of demarcation. This is due to differences in how investments are secured and managed, as well as how excess return (or alpha) is generated. As a general rule, size can be the enemy of alpha generation in many public markets. However, it can be beneficial in some (but not all) private markets.

Key attributes of public markets, such as equities and fixed income, include that they are open to all investors, and information on securities is often readily available. This generates competition for opportunities, and makes it much more difficult to possess private information. Indeed, opportunities often arise from being better able to interpret what is mainly publically available information. Further, the scope to exploit information is limited by the tendency for market impact and/or opportunity costs to increase with trade size (see O’Neill and Warren, 2016). Open competition to identify and exploit opportunities makes it difficult to create value from active management in significant dollar magnitudes. This is especially the case where the better return opportunities arise in smaller, harder-to-access pockets of the market, such as small-cap equities or illiquid securities like high yield credit. Meanwhile, it is not apparent that any clear operational scale economies exist in public markets. Some advantages may arise from access to greater resources, such as improved capability to research opportunities. However, there are also potential disadvantages to large size, such as diseconomies related to co-ordination problems and distraction of key investment staff. In sum, large FUM tends to be a disadvantage in public markets, largely because opportunities to generate active returns are limited in magnitude, and their impact becomes diluted under a larger asset base. Hence capacity constraints are inevitably encountered, quite possibly at modest levels of FUM. This notion appears to be borne out by the evidence for the performance of pension funds in public markets, as discussed in the Appendix.

In private markets, the key drivers of return generation – and the limiting factors on capacity – are more related to the ability to source and directly manage assets. Unlisted assets are not readily available on a market by definition: they must be found. Capability to manage assets in order to extract value is also important. This is highlighted by Lopez-de-Silanes, Phalippou and Gottschalg (2015), who find that diseconomies of scale in private equity relate to the number of simultaneous investments, rather than FUM. Further, in private markets it can be possible to generate returns by possessing private information and adding value to the assets themselves (see Kaiser, 2005). Size can be an advantage in all these activities, to the extent that it provides access to greater resources and broader networks to assist in asset sourcing and management. In addition, size can be a pre-requisite to directly invest in some private market assets, such as direct property and infrastructure, where investments are large and lumpy. Here substantial FUM supports accessing opportunities and forming adequately diversified portfolios. In sum, size is an advantage in private markets where the ability to invest large FUM supported by well-resourced teams and deep networks is important, if not critical. The availability of economies of scale and scope in unlisted assets is also borne out by the literature discussed in the Appendix; in particular Andonov, Eichholtz and Kok (2013), who provide evidence with respect to direct property investments by pension funds.

Implications for Capacity across Asset Classes

Figure 2 summarizes by assigning selected asset classes along the dimensions of investment universe and public versus private markets. While this may not capture all the important elements that distinguish asset classes by potential capacity, and some of the assignments may be debated, it hopefully amounts to a useful categorization and a point of departure. Figure 2 arranges asset classes into three capacity groups:

- The low capacity group includes assets where the investment universe is too small or too illiquid for large asset owners to consistently extract excess returns of a substantial magnitude. In public markets, this includes small-cap equities, high yield bonds and hybrids (e.g. convertible notes). In private markets, this includes agriculture funds, timberland, catastrophe bonds and life settlements. This is not
to say that no excess returns are available to large asset owners in these segments. Rather, it indicates that any returns will more than likely be insignificant for larger funds, and do not readily scale to a size that would make a difference. Smaller asset owners, however, may find these assets quite attractive.

- The **high capacity** group comprises assets where either the investable universe is large and liquid, or where size offers a distinct advantage. Included in the public market group are large-cap and global equities, sovereign and broad fixed income, and currency. The main private market assets that offer capacity are direct property and direct infrastructure. The latter is included on the basis that it is expected to offer high capacity over time, with the caveat that capacity is probably unusually low at the current time due to an acute tightness in the supply/demand balance (as discussed). Large asset owners should not be currently expecting to access excess returns with large capacity in infrastructure for the time being, unless they possess some unique competitive advantage in sourcing assets.

- Any assets where the case for including them in either the low or high capacity group could be disputed are included in the **debatable** group. They typically involve investment universes of moderate size or liquidity, or where the investment approach itself will be crucial to capacity (to be discussed in Part B).

**Figure 2: Asset Class Capacity across Two Dimensions**

<table>
<thead>
<tr>
<th>Investment Universe</th>
<th>Does it Provide Potential to Put Substantial Dollars to Work?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Capacity</td>
</tr>
<tr>
<td>Public Markets</td>
<td>Small Cap Equities</td>
</tr>
<tr>
<td></td>
<td>High Yield Bonds</td>
</tr>
<tr>
<td></td>
<td>Hybrids</td>
</tr>
<tr>
<td></td>
<td>Emerging Market Equities</td>
</tr>
<tr>
<td></td>
<td>Investment Grade Bonds</td>
</tr>
<tr>
<td></td>
<td>Emerging Market Debt</td>
</tr>
<tr>
<td></td>
<td>Inflation-Linked Bonds</td>
</tr>
<tr>
<td></td>
<td>Listed Property (REITs)</td>
</tr>
<tr>
<td></td>
<td>Listed Infrastructure</td>
</tr>
<tr>
<td></td>
<td>Hedge Funds</td>
</tr>
<tr>
<td></td>
<td>Commodities</td>
</tr>
<tr>
<td>Private Markets</td>
<td>Agriculture Funds</td>
</tr>
<tr>
<td></td>
<td>Timberland</td>
</tr>
<tr>
<td></td>
<td>Catastrophe Bonds</td>
</tr>
<tr>
<td></td>
<td>Life Settlements</td>
</tr>
<tr>
<td></td>
<td>Private Equity</td>
</tr>
<tr>
<td></td>
<td>Natural Resources</td>
</tr>
<tr>
<td></td>
<td>Direct Property</td>
</tr>
<tr>
<td></td>
<td>Direct Infrastructure</td>
</tr>
</tbody>
</table>

It is worth commenting on the assignment of selected asset classes within Figure 2:

- **Investment grade bonds** are a relatively large asset class that might have been included in the high capacity grouping. Nevertheless, liquidity is not as deep as for equity markets, in part due to the erosion of market-making capability over the last decade or so, which inhibits the ability to pursue investment strategies where trading is required. Broad fixed income has been included in the high capacity group, and includes the capability to invest across all fixed income segments including credit.

- **Hedge funds** are assigned to the debatable group as they are better viewed as a range of differing investment strategies, rather than as an asset class. Capacity for a hedge fund will be a function of where and how it invests. For example, global macro funds might be expected to have high capacity; while capacity in convertible arbitrage or long-short credit might be more problematic.

- **Private equity** is categorized as debatable because the unit size of investments can be relatively small, and challenges in sourcing and managing multiple investments can inhibit scaling to large FUM. Within this asset class, capacity is lower in venture capital, and higher in buy-outs.
Commodities are problematic to categorize. They have been included in the debatable group, but this might be generous. With the notable exception of oil, and perhaps gold, many physical commodity markets tend to be quite small. However, investment more typically occurs via collateralized commodity future funds, where capacity will be determined by the depth and actions of participants willing to short futures. The total value of buy-side index activity in commodities futures stood at only US$189 billion when last reported by the CFTC at October 2015, suggesting that this is a relatively small asset class; although other means exist for gaining exposure such as over-the-counter swaps.

Currency markets are generally considered to be large and liquid, although this assumption may be less solid where a strategy requires trading currencies outside of the majors.

Part B: Capacity and Investment Strategies

Investment approach has an important influence on capacity. O’Neill and Warren (2016) discuss the dimensions along which investment approach impacts on potential capacity for an individual fund trading on a particular investment signal. The role of investment approach is considered here by identifying active investment strategies that might allow an asset owner to deploy assets in size, while continuing to generate excess returns at higher FUM. The discussion commences by proposing five attributes of ‘scalable’ strategies (listed below). Investment strategies that possess these attributes are presented in Figure 3.

Five attributes of scalable strategies

1. **Capable of being successfully applied in investment universes that are large and liquid** – Strategies that can be effective in the public market assets that are designated as ‘high capacity’ in Figure 2 may meet the bill. In addition, active strategies that can be implemented using deep derivative markets – such as certain futures, forward contracts, or ETFs – also tend to be scalable.

2. **Limited reliance on constant trading in large volumes** – The need to trade in volume is lower for strategies that are less concentrated (i.e. take a broad range of bets), or those that invest for the long term. Such strategies are less exposed to the risk of implementation shortfall from either market impact or the opportunity costs that arise as a consequence of deferring or failing to undertake trades.

3. **Liquidity supplying, rather than liquidity demanding** – Strategies that either respond to the liquidity demands of other investors, or trade against market consensus, are typically liquidity supplying. Such strategies tend to have little difficulty being implemented in large volume.

4. **Low competition from other investors** – Low competition is likely to result if a strategy is being pursued by relatively few others. When an investor has the ‘run of the market’, they should be better able to capture the more attractive opportunities, and capacity is likely to be higher as a consequence. The level of competition needs to be viewed relative to the supply of assets: capacity might be meaningful in a smaller asset class that is being overlooked by most investors. Also, a relatively unique strategy can have higher capacity, even if applied in a market that is widely populated by other investors. This occurs because a unique strategy supports trading in size, as it is usually easier to find a counterparty to take the other side when an investor is doing something different to others.

5. **Size gives rise to economies** – Certain strategies may leverage size through exploiting economies of scale or scope. Economies can arise when benefits accrue to aspects such as more staff, systems, networks, influence, or the ability to supply capital in large licks. On the other hand, some strategies may not scale due to organizational or staff diseconomies related to loss of flexibility or focus. For example, it may be difficult to scale up a strategy that relies on the skill of key individuals in identifying and closely managing concentrated investments.

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### Figure 3: Scalable Active Strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Main attributes</th>
<th>Notes, issues and examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core portfolios in public markets</td>
<td>• Can be focused on large, liquid markets</td>
<td>• More likely to be quant-based</td>
</tr>
<tr>
<td></td>
<td>• Ability to control trade sizes by limiting position size and increasing breadth</td>
<td>• Scope to choose how exposures are taken</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Can be used to add tilts or overlays on an existing multi-manager portfolio</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Issues: alpha potential</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Examples: multi-factor strategies; smart betas; sector bets</td>
</tr>
<tr>
<td>Long-term strategic investments</td>
<td>• Trading is occasional, often with discretion to manage entry and exit</td>
<td>• Typically fundamentally-driven</td>
</tr>
<tr>
<td></td>
<td>• May leverage economies of scale or scope (ability to supply patient capital,</td>
<td>• Could be focused on either value, or value-creation (i.e. growth potential)</td>
</tr>
<tr>
<td></td>
<td>management resources, networks)</td>
<td>• Potential to add value through engagement</td>
</tr>
<tr>
<td></td>
<td>• Potentially low competition</td>
<td>• Issues: often committed, so need to get it right</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Examples: private equity; adding value via strategic corporate investments and advocacy</td>
</tr>
<tr>
<td>Contrarian investing</td>
<td>• Trading is occasional, often with discretion to manage entry and exit</td>
<td>• Seeking mean reversion via taking positions when markets move to extremes</td>
</tr>
<tr>
<td></td>
<td>• Liquidity supplying</td>
<td>• Issues: timing of entry / exit; cyclical capacity, e.g. more opportunities in a liquidity crisis</td>
</tr>
<tr>
<td></td>
<td>• Low competition (almost by definition)</td>
<td>• Examples: distressed assets; credit markets during GFC; cashing up in booms, and waiting</td>
</tr>
<tr>
<td>Thematic investing (with long-term focus)</td>
<td>• Trading is occasional, and there may be discretion in how exposure is built</td>
<td>• Positioning for trends that act as a tidal force impacting on returns over time</td>
</tr>
<tr>
<td></td>
<td>• Can be implemented using large, liquid markets in many cases</td>
<td>• Often little urgency, with multiple choices of the vehicle used to capture exposure</td>
</tr>
<tr>
<td></td>
<td>• Ability to control the size and timing of trades, due to slow return accrual rate</td>
<td>• Issues: connecting themes to market exposures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Example: riding the China boom in the 2000s, then reversing late in the decade</td>
</tr>
<tr>
<td>Participation in large capital raisings</td>
<td>• Liquidity supplying</td>
<td>• Provide capital in size to issuers that appreciate a large, stable stakeholder</td>
</tr>
<tr>
<td></td>
<td>• Leverages economies of scale (capital), possibly economies of scope (networks)</td>
<td>• Complementary to in-house management; may be overlaid on a core portfolio</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Issues: capacity can be cyclical (issue pipeline); may be subject to competition where assets are secured via open auction, e.g. book-builds</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Example: participation in IPOs or placements</td>
</tr>
<tr>
<td>Market making</td>
<td>• Liquidity supplying</td>
<td>• Allocate pot of capital to gather returns from investors willing to pay for liquidity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Example: enhanced index funds</td>
</tr>
<tr>
<td>Private markets (selected large assets)</td>
<td>• Leverages economies of scale and scope (ability to apply large capital,</td>
<td>• Assets where large FUM, substantial resources and sourcing networks are an advantage</td>
</tr>
<tr>
<td></td>
<td>management resources, networks)</td>
<td>• Issues: capacity can be cyclical (asset pipeline); competition for assets, including secured by direct negotiation or open auction</td>
</tr>
<tr>
<td></td>
<td>• Potentially liquidity supplying</td>
<td>• Examples: direct property, direct infrastructure</td>
</tr>
</tbody>
</table>
Specific examples of high capacity or ‘scalable’ strategies appear in Figure 3. They include: establishing a ‘core’ portfolio in public markets; long-term strategic investing, possibly supported by direct engagement; contrarian investing; investing to capture long-term themes; participation in large capital raisings; and investing in selected private market assets where size is a distinct advantage. The middle column of Figure 3 links these strategies to the attributes discussed above. The final column presents notes on the nature of each strategy, identifies the main issues faced in its implementation, and provides some examples.

**Part C: Managing Capacity in a Multi-Asset Context**

This part addresses how FUM and associated capacity issues can affect how assets are best deployed. The central theme is that an asset owner running a multi-asset portfolio should focus on the assets and strategies that are suited to their particular size. This implies that an appropriate response to increasing FUM is to evolve the manner in which the portfolio is being managed. This could include giving due consideration to managing certain assets in-house, or perhaps placing more attention on managing beta exposures than pursuing alpha. While capacity limits are often encountered by individual funds aiming to invest in particular asset classes and strategies, these need not apply to asset owners managing multi-asset portfolios due to the flexibility to choose where and how to invest.

**Size, Portfolio Construction and Performance for Multi-Asset Portfolios**

To motivate the discussion, a constructed example involving two assets is presented in Figures 4, 5 and 6. Asset A (which might be thought of as an equity sector) is assumed to earn a relatively high rate of return of 12% until the amount invested reaches $0.5 billion, after which returns are progressively eroded due to capacity issues. Asset B (which might be thought of as direct property or infrastructure) only earns a low return at small levels of FUM due to being sub-scale; but return increases to in excess of 10% at higher FUM as economies of scale and scope are realized. Figure 5 plots the dollar value added from investing different amounts in each asset. Value added plateaus for Asset A after about $4.0 billion. The reason is that the additional value arising from adding more FUM is offset by the erosion of the rate of return applied across the total amount invested. Meanwhile, value added rises considerably for Asset B as FUM increases, reflecting the product of larger amounts invested and a greater return. Figure 6 presents the portfolio weights in the two assets that maximize the Sharpe ratio at various levels of FUM. At low FUM, it is optimal to bias the portfolio toward Asset A, with some exposure to Asset B to reduce risk (reflecting its assumed lower standard deviation and diversification benefits). As FUM increases, it is optimal to switch toward Asset B, which supports more dollars being put to work at a higher return.

While this example is only illustrative, it is instructive. It highlights how value added reflects the interaction between the amount invested and the rate of return earned across the total amount. Multiplicative effects can arise when increasing FUM gives rise to either economies or diseconomies of scale that impact on the average return. Essentially it is a game of maximizing the sum of dollar value-add relative to dollars invested across multiple investment opportunities. Asset owners should work out what mix of investments is most appropriate for their size, and any comparative advantage they possess. Smaller funds might look toward assets or strategies where returns are attractive but the quantum of value added is small in dollar terms, and where large resources are not required to participate. Such opportunities are also less likely to draw attention from larger funds, helping to keep competition at bay. They will tend to be associated with strategies that are high returning but capacity constrained. For example, smaller funds may be well-placed to capture the returns available in small-cap equities, or indeed any market with limited available assets and low liquidity. In contrast, the ability to earn high returns on small amounts invested is of limited consequence to large funds that need to put substantial amounts of FUM to work. Large funds are likely to favour opportunities that can generate attractive returns when investing large amounts. They should be targeting the type of asset classes and strategies that are less capacity constrained and where size offers an advantage, as discussed in Parts A and B.
Figure 4: Return from Two Assets vs. Amount Invested

![Figure 4: Return from Two Assets vs. Amount Invested](image1)

Figure 5: Dollar Value Added from Two Assets vs. Amount Invested

![Figure 5: Dollar Value Added from Two Assets vs. Amount Invested](image2)

Figure 6: Asset Weights for Optimal Sharpe Ratio vs. Amount Invested

![Figure 6: Asset Weights for Optimal Sharpe Ratio vs. Amount Invested](image3)

Assumptions:
- $SD(A) = 15\%$
- $SD(B) = 10\%$
- $Corr(A,B) = 0.20$
- $R_f = 2\%$
The notion that some asset classes and strategies are capacity constrained, while others benefit from economies of scale or scope, suggests that an optimal size may not exist for asset owners that have the flexibility to choose where and how they invest. Rather, it points toward an equilibrium where asset owners focus on the asset classes and strategies that are most suitable for their particular size. This equilibrium may potentially emerge without substantial variation in investment performance associated with size per se – at least once a minimum efficient scale is attained. Indeed, variation in performance is more likely to arise from any fund-specific skill in identifying the right strategy to pursue, or perhaps any other unique comparative advantages.

Evolving with Size

Part A and Part B addressed how the type of asset classes and investment strategies that are targeted by an institutional asset owner pursuing active investing may change with fund size. The discussion below covers off on three other aspects that may evolve as FUM increases.

Greater use of in-house management is one direction that an asset owner may take as it grows. Gallagher, Gapes and Warren (2016) investigate the trend towards in-house management for Australian superannuation funds. Managing in-house can assist asset owners in addressing the capacity constraints encountered with external managers, which occur in part due to limits on the mandate size that managers are willing or able to accept. In-house management can also be seen as a way of capturing scale economies for members by converting the variable cost associated with ad valorem fees paid to external managers to a (smaller) fixed cost associated with resourcing an internal team. In addition, internal teams can assist an asset owner to build potential for economies of scale and scope in a number of ways. For example, internal public market teams provide the capability to evaluate and then participate in capital raisings: a strategy that was identified as scalable in Figure 3. Internal teams can provide both the resources and networks required to extract economies of scale and scope from private markets such as direct property and infrastructure, or perhaps private equity. While it may be possible to access these economies through partnerships to some extent, potential exists for very large managers to do so more effectively at lower cost if they can successfully build appropriately skilled and resourced internal teams.

Another option for a growing asset owner is to shift towards management of ‘beta’, rather than pursuit of ‘alpha’. Beta can often be accessed by large FUM at low cost. This is especially in public markets, where beta exposures can be obtained efficiently through cap-weighted investments which minimize rebalancing, or managed using vehicles such as futures, passive funds and ETFs. Shifting the focus towards beta implies concentrating on the design of policy portfolios in accordance with objectives, or applying skill in either dynamic asset allocation or management of exposure to macro factors. The beta-focused approach to management by large asset owners is exemplified by the Government Pension Fund of Norway (see Ang, Brandt and Denison, 2014). This offers an alternative to concentrating on private markets where size can be used to advantage, in accordance with the approach adopted by the likes of the Canada Pension Plan Investment Board, Ontario Teachers’ Pension Plan and the Future Fund (see Rozanov, 2015).

Finally, organizational issues deserve attention as an asset owner grows, with a view to limiting any diseconomies of scale. O’Neill and Warren (2016) note how organizational diseconomies may arise from co-ordination and communication problems; and how key staff can become distracted from investment matters or dis-incentivized as an organization grows. While these comments were directed at fund managers, the sentiments equally apply to asset owners that manage their own portfolios. Care should be taken to ensure that investment flexibility and focus is not diluted with size through establishing clear delegations; that key investment personnel are not over-loaded with the need to attend to business or management issues; and that staff retention is supported through the right incentives and culture.

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5 This ‘if’ is not inconsequential.
Part D: Managing Capacity and External Managers

The management of capacity runs into various agency issues when investments are delegated to external managers, as is commonly done by institutional asset owners. This part commences by identifying the parties involved, their objectives and potential actions they might pursue. Questions that an asset owner might ask their managers are then proposed. The discussion concludes by outlining three specific aspects to address in managing capacity when using external managers: watching for changes as a manager grows; the need for asset owners to conduct their own capacity analysis; and being aware of the game play around capacity.

The Parties, Objectives, and Potential Actions

The three main parties involved in the delegation of investments to an external manager are identified below. These parties all reap differing benefits or costs from increased FUM. Further, the way in which they interact can be complex, and ultimately involves some game play.

- **Institutional asset owners (investors)** would prefer FUM to be set at a level that maximizes the quantum of excess return. As this often occurs at low FUM, increases in size beyond a certain minimum efficient scale can be unwelcome. Nevertheless, most asset owners appreciate that external managers are running a business, and that expecting FUM to be restricted to the level that maximizes excess return is a pipe dream. Hence their main concern is ensuring that an external manager does not exceed the FUM at which excess return becomes eroded to below some acceptable level.

- **Investment management companies** have an incentive to set FUM as high as possible, given that greater FUM leads to larger profits. The extent of the desire for greater FUM may flow down from the owner or management. However, the prism through which the pursuit of FUM is viewed can depend on horizon. An organization with a short horizon may try to grow FUM as quickly as possible, regardless of the impact on investor returns over the long haul. Another organization with a long horizon may be focused on growing the business and its profit in a sustainable manner, and hence could be more concerned with building reputation by ensuring that investors continue to benefit.

- **Fund managers** who are responsible for the investments can face a variety of incentives with regard to FUM. They could benefit from higher FUM in cases where they share in the profitability of the investment management company, such as where they are owners, or where their bonus is linked to organizational size or profits. On the other hand, if their reward structures are aligned with fund performance, they should prefer the FUM that maximizes return. This situation could occur where investment performance determines their bonus, market value, career prospects or status; or there are personal motivations such as making a contribution, or competing to win. Such incentives may lead a fund manager to resist any push for greater FUM. Sought-after fund managers often have leverage in the debate over FUM and capacity by virtue of their positions, including the implied threat that they may resign if they becomes dissatisfied (which could potentially lead to an exodus of FUM).

In the vast majority of cases, the investment capabilities and available capacity of an external fund is being shared with other investors. While this is obvious in the case of a pooled vehicle, it also occurs under separately managed mandates where the manager is responsible for investing on behalf of multiple funds or accounts using a similar investment signal or strategy. The implication is that an asset owner can be effectively competing against other investors for the capacity that a manager has available. Negotiation under these conditions will reflect the relative bargaining power of the parties. When a highly-regarded manager has limited capacity to offer, bargaining power may reside with the investment management company or perhaps the manager themselves, rather than the asset owner or other investors.

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6 Thanks to Barry Gillman for prompting the ideas that appear in this section.
An investment management company may pursue one of three responses when capacity constraints are encountered, and competition emerges for capacity. First, it could charge a higher fee. Second, it could accept more FUM until excess return is fully eroded. These first two responses reduce the return available to investors, and effectively extract value for the investment management company itself. (This is the situation envisaged by Berk and Green, 2004.) Third, they can opt to ration capacity by closing a fund to new money. A ‘soft close’ entails closing the fund to new investors, while still accepting new money from existing investors. A ‘hard close’ involves closing the fund to all new money. Closing a fund to protect returns for existing investors demonstrates alignment with investor interests. However, it does not resolve capacity problems for large or growing asset owners, to the extent that they are being blocked from investing more dollars in their preferred managers.\(^7\)

Either way, asset owners can often find themselves involved in a situation where they are competing and negotiating over limited capacity, especially where the manager is skilled and highly sought after.\(^8\) (There tends to be ample capacity in the managers that nobody wants!) A large asset owner should have two aims under such circumstances. The first is to invest using external managers that are focused on managing their available capacity with a concern for investor interests; meanwhile avoiding those organizations that are intent on securing as much value as possible for themselves through either jacking up the fee or (worse) expanding FUM without due regard for investor returns. The second aim is to secure as much of the available capacity as required for its own use. Some ideas for how these aims might be achieved are discussed next, appearing in the form of a range of questions to ask a manager.

Some Questions to Ask

Figure 7 lists a range of questions to ask a manager about capacity.\(^9\) This set of questions is directed at extracting information on three issues:

- **Alignment** – Asset owners should look for signs that their managers are managing capacity in a way that is aligned with investor interests. Questions should be asked about *organizational philosophy and objectives*, with a view to ascertaining if delivering value to investors over the long term is embedded in the organizational psyche. Ideally the philosophy should be that creating value for investors over time is the best way to build a profitable and sustainable business; and that viewing good performance as just an opportunity to gather FUM can be self-defeating over the long run. *Management remuneration* should be investigated, looking for signs that it is based around creating value for investors – including through delivery of long-term performance – rather than based on organizational size or profitability (Scobie, 2013; Cantara et al., 2016). Another sign of alignment would be the adoption of a threshold definition of capacity (Vangelisti, 2006), under which capacity is defined as a minimal return that is acceptable to investors.

- **Focus on capacity management** – Asset owners should satisfy themselves that their external managers are keenly focused on the management of their available capacity. This can be revealed by asking whether and how they *estimate capacity*, with a view to confirming that they have paid it due attention and understand the issues. A well-considered *policy with regard to closing the fund* to new money would be a further sign of preparedness to manage capacity with investor interests in mind.

- **Preferential access** – A large asset owner may be interested in securing preferential access to capacity. It is worth asking if it is possible to *contract over the amount of FUM* that will be accepted (to the

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\(^7\) Gallagher, Gapes and Warren (2016) note this issue as one of the motivations for the shift towards in-house management by larger Australian superannuation funds.

\(^8\) As an aside, competition for limited capacity makes it harder for investors to place downward pressure on manager fees, and for larger asset owners to use their size as a negotiating tool.

\(^9\) Thanks to Marian Poirier for the idea.
exclusion of others, of course); or if there is a tendency to look after investors where there exists a close working relationship (as occurs in the private equity market, for instance). Another way of securing capacity may be through partnerships, under which external managers provide the capabilities while the asset owner supplies the capital. This can allow an asset owner to carve out some capacity as their own, while still leveraging the skill base of external managers. Engaging with managers that offer these mechanisms may assist with securing capacity for the long run. Conversely, asset owners should remain alert to situations where the manager is locked into giving preferential access to other investors, perhaps reflecting an ownership connection, or a contract to deliver product into a distribution platform.

**Figure 7: Questions to Ask a Manager about Capacity**

- What is the guiding philosophy and objectives of the organization and its owners? (Does delivering value to investors play a role?)
- How is management remunerated? Is it based on organizational profitability, or the value delivered to investors? (Questioning should be directed not just at fund managers; but also the executive team and sales staff.)
- What is your estimated capacity, and how is it defined and measured? In particular, is it based on a target minimum return?
- What is your policy regarding closing the fund to new money?
- Do you offer preferential access to certain investors? If so, on what basis?
  - Is it based on contracts for FUM, existing relationships, or what?
  - Is a partnership a possibility?
  - How is shared capacity allocated across funds / mandates?

**Watch for Changes**

As the FUM increases for an external manager, asset owners should watch for any changes that could reveal emerging issues that might impact on performance. Taking a broader view is important, given that the drivers of capacity extend beyond just the technical difficulties of implementing an investment process based around a particular signal as FUM grows (see O’Neill and Warren, 2016). It is worth asking whether the investment management company is taking steps to protect performance from diseconomies related to co-ordination and communication problems, or distraction of key investment staff, e.g. through the appointment of investment specialists. A look-out should be kept for signs that an external manager is changing their underlying investment process in unexpected ways as FUM increases. Also, attention should be paid to what is happening in the market at large, including whether flows are being encountered by similar funds that may be effectively sharing the capacity around a particular signal or strategy. All of these developments may indicate the scope for more severe erosion of returns than suggested by more traditional capacity analysis. If such developments are noted, then the question should be asked as to whether remedial action is required, such as withdrawal of funds. Ascertaining if such effects are at play requires vigilance, and often involves some investigation.

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10 Whether changing the investment process is a good or bad thing depends on the situation. In some circumstances, managers are expected to innovate in the investment process, e.g. some quant funds and hedge funds. In other cases, a change in process may point to dilution of a comparative advantage, e.g. stock pickers moving outside the areas where they have traditionally generated excess returns.
Do Your Own Analysis

Given the incentives involved, asset owners should ideally undertake their own capacity analysis of external managers, rather than just accept what the managers say. Many large asset owners collect sufficient data on the trades and portfolio holdings of their managers to support such analysis. Various methods for capacity analysis are outlined by O’Neill and Warren (2016). They fall into four groups: rules of thumb, based around simple measures such as the percentage of market segment or days to exit; ex-post analysis, under which selected portfolio metrics are examined for signs that capacity constraints may be emerging; simulation analysis, where FUM is ‘scaled up’, and portfolio performance or implementation is re-evaluated under the impact of constraints and/or greater transaction costs; and predictive models, which assume that a fund adjusts either its trading strategy or portfolio construction as FUM increases. At a minimum an asset owner should conduct ex post analysis, which would ideally be supplemented by a predictive method, such as simulation analysis.11

Be Alert to the Game Play

Asset owners should be alert to the games that may be played around capacity. Most investment management companies have an incentive to overstate potential capacity. Scobie (2013) notes that: “it is very much a rarity for (funds) to admit to having too much money”. He also observes that large investment management organizations often downplay capacity as an issue, whereas small players may over-emphasize the effects to enhance their value proposition. The dynamics around how capacity is addressed by an organization can depend on its structure and the personalities involved. For instance, the sales team may want to sell more; while fund managers may view additional assets and marketing to more clients as a hindrance. How executives balance these competing views may depend on the incentives they face, whether they come from a sales or an investment background, and the organizational culture.12 Scobie (2013) observes that capacity tends to be managed more stringently in organizations where there is an absence of controlling external shareholders, management is connected with the day-to-day investment function, and where the firm is a niche operator. The potential for game play is only enhanced by the lack of precision in capacity estimates, which provides scope to manipulate the analysis to generate a desired outcome. In summary, it helps to know the direction that the various players are coming from, and to maintain a healthy dose of skepticism.

Concluding Comments

This paper considers the management of capacity from the perspective of institutional asset owners that manage multi-asset portfolios. It forms part of a broader project on capacity, following on from an earlier paper that addresses the issues and methods for evaluating capacity in the context of an individual fund that invests based on a specific investment signal (O’Neill and Warren, 2016). The view of capacity changes considerably when the perspective shifts from that of a single fund to an asset owner running a multi-asset portfolio. The key difference is that asset owners have considerable flexibility to choose where and how they invest. Capacity – or the ability to put substantial assets to work in pursuit of value added – varies considerably across asset classes and strategies. It follows that asset owners of differing sizes will invest in different ways. Further, the concept of optimal scale need not exist with respect to investment operations once one enters the multi-asset space, where both economies and diseconomies of scale are observed. The challenge for asset owners is to identify the asset classes and strategies that are most suitable given their FUM and competitive advantages; and to manage the agency issues around capacity when investing through external managers. This paper provides some suggestions on how these challenges might be met.

11 Iverson and Gregory (2015) outline how the latter is undertaken by NZ Super.
12 Thanks to Barry Gillman for these points.
APPENDIX

Size and Performance in Pension Funds: Literature Review

The publically available literature on the relation between size and performance for asset owners is relatively limited. It provides mixed evidence on the existence of economies of scale in investment management. Large funds are found to outperform smaller funds under some research methods and situations, but not under others. Nevertheless, the data generally supports the idea that large funds can reap economies of scale in private markets, while suffering diseconomies of scale in public markets. It also confirms that funds manage their investments differently depending on their size. Finally, evidence emerges of scale economies with regard to administration costs.

Much of the available research in the topic area draws on data from CEM Benchmarking. This database contains detailed information on a substantial sample of global pension funds spanning back to the early-1990s, albeit with a bias towards defined benefit (DB) rather than defined contribution (DC) funds. The following authors present results based on this data:

- Dyck and Pomorski (2010) find that large pension funds outperform small pension funds, with a return difference of 33-42bps between the largest and smallest quintile. The higher returns for larger funds appear related to improved margin within asset classes as a consequence of greater use of in-house and passive management, coupled with effects stemming from increases in the number of external managers used. The authors also observe a (sometimes dramatic) shift towards assets where size gives rise to negotiating power, such as real estate and private equity (but not hedge funds). In these asset classes, costs are higher but gross returns are higher still. This is consistent with the idea that asset owners change how they manage as they grow in size. Some evidence emerges of organizational diseconomies, perhaps due to co-ordination and hierarchy problems. This is indicated by the finding that being larger within an asset class is associated with higher returns, but is partly mitigated by negative effects from larger overall size.

- Andonov, Bauer and Cremers (2012) examine US DB funds, and generate results that differ from those of Dyck and Pomorski (2010). Specifically, they find that larger funds have lower investment costs, but that this did not lead to better net performance. They observe substantial diseconomies related to exposure to illiquidity in the contributions arising from asset allocation, market timing and security selection. However, they do find that large funds reap scale economies in alternative assets. The reverse occurs in equities and fixed income, which seems to be related to illiquidity. The authors argue that the difference between their results and those of Dyck and Pomorski (2010) stem from differences in method, noting that their analysis adjusts returns for factor exposures and includes fund fixed effects. In addition, they examine only US funds, while Dyck and Pomorski (2010) examine pension funds from a number of countries.

- Andonov, Cremers and Frehen (2010) provide additional evidence of diseconomies of scale in public markets, finding that larger fund size and (in particular) larger mandate size is associated with lower performance from US equities than for US pension funds.

- Andonov, Eichholtz and Kok (2013) examine investment in real estate (i.e. direct property) by pension funds. They find that larger funds are more likely to invest through internal teams, have lower costs, and generate higher net returns. Further, smaller pension funds tend to invest in direct real estate primarily through external managers and fund-of-funds, which both increases cost and disproportionally reduces return. This research provides strong support for the notion of economies of scale in direct property. Superior performance arises with fund size due to both increased gross return and reduced cost. It stems from a combination of internal management, and improved ability to
organize mandates and negotiate lower fees when using external managers. These findings are also consistent with size providing both negotiating power and access to better investment opportunities.

- Beath (2015) uses regression analysis to extract the determinants of performance for funds in the CEM database. He finds that size is correlated with outperformance, although this is more evident in explaining net returns (+7.6 bps per ten-fold increase in FUM) than gross returns (+1.6 bps per ten-fold increase). This implies that large funds primarily benefit from size through cost savings. Nevertheless, the coefficients suggest that the effect of size is relatively modest; with the positive impacts arising from the use of in-house management and active investing found to be more substantial.

A number of issues arise in interpreting the findings based on CEM data. First, the CEM sample is dominated by what might be considered small-medium size funds, which may diminish the extent to which the findings indicate the impact of very large size. For instance, Dyck and Pomorski (2010) report the average FUM for the top quintile at US$37 billion in FUM over the period 1990-2008; with the second quintile averaging just US$5.3 billion, and the smallest quintile averaging only $0.34 billion. Beath (2015) reports the 90th percentile fund at US$45 billion, the 75th percentile at US$14.1 billion, and the median at only US$4 billion in 2013. Another issue is the dominance of DB funds, which cast doubt over the extent to which the findings translate to DC funds. In contrast to DB funds that service a central liability, DC funds are often required to offer multiple products, service their members, and provide the ability to redeem funds or switch products. These functions all add to the cost base; and can influence the manner in which a fund invests. In particular, the need to provide liquidity to members may impact on the propensity to invest in illiquid assets, or adopt a long-term view.

Research on pension fund scale using other data is relatively limited. Cumming (2016) examines Australian superannuation funds over the period 2004-2010 employing data from the Australian Prudential Regulation Authority (APRA). He finds that investment returns are unrelated to fund size in the not-for-profit sector; but are negatively related to size in the for-profit (retail) sector. He notes that larger not-for-profit funds use their size to invest in alternative assets, which yields diversification benefits. Operating expense ratios are found to decline with fund size, providing evidence of scale economies with regard to administration. Two problems with the data underpinning this study are the relatively short sample period, and the fact that the data reflects an aggregation of all products supplied by fund providers.

Finally, Bikker (2011) examines the relation between cost and FUM for Dutch pension funds. He finds evidence that investment costs decline with size for smaller funds, but then flatten out so that no significant economies of scale are apparent once funds exceed a modest size of around Euro 0.7 billion. Evidence is detected of scale economies with regard to administrative expenses up to very large fund size. However, these findings refer only to costs, and not net returns.

The results described above are mixed and inconclusive about how overall investment performance relates to fund size. However, evidence emerges in support of the existence of scale economies in private markets, along with strong hints of diseconomies in public market assets like equities. The research also supports the notion that asset owners manage differently depending on their size.
References


